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**LIQUID PHASE METHANOL LAPORTE PROCESS DEVELOPMENT UNIT:
MODIFICATION, OPERATION, AND SUPPORT STUDIES**

Topical Report for the Period April 9, 1987–March 31, 1991

Task 2.2: Alternate Catalyst Run E-6 and Catalyst Activity Maintenance Run E-7

Appendix A. Run E-6 Detailed Data Acquisition Sheets

Appendix B. Run E-7 Detailed Data Acquisition Sheets

February 2, 1991

Work Performed Under Contract No. AC22-87PC90005

**For
U.S. Department of Energy
Pittsburgh Energy Technology Center
Pittsburgh, Pennsylvania**

**By
Air Products and Chemicals, Inc.
Allentown, Pennsylvania**

and

**Chem Systems, Inc.
Tarrytown, New York**

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LIQUID PHASE METHANOL LAPORTE PROCESS DEVELOPMENT UNIT:
MODIFICATION, OPERATION, AND SUPPORT STUDIES

Topical Report

Task 2.2: Alternate Catalyst Run E-6 and
Catalyst Activity Maintenance Run E-7

Appendix A. Run E-6 Detailed Data Acquisition Sheets

Appendix B. Run E-7 Detailed Data Acquisition Sheets

Contractor

AIR PRODUCTS AND CHEMICALS, INC.
Allentown, PA 18195

and

Subcontractor to Air Products

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2 February 1991

Prepared for the United States Department of Energy
Under Contract No. DE-AC22-87PC90005
Contract Period 9 April 1987 - 31 March 1991

APPENDIX A
RUN E-6
DETAILED DATA ACQUISITION SHEETS

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

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DATE : 05-DEC-89
TIME : 15:48:38
TIME INTERVAL : FROM: 1700 25-Aus
                TO: 2400 25-Aus

NUMBER OF AVERAGED HOURS : 4
RUN ID NUMBER : E6A01
FEED GAS TYPE: CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) : 157.1
OIL/SLURRY REACTOR INLET TEMP. (des.C) : 138.9
AVG. REACTOR SLURRY TEMPERATURE (des.C) : 250.6
REACTOR FREEBOARD TEMPERATURE (des.C) : 246.1
OIL/SLURRY OUTLET TEMP. (des.C) : 242.2
REACTOR FEED GAS PRESSURE (kPa) : 5453
REACTOR EFFLUENT GAS PRESSURE (kPa) : n.a.
GAS SUPERFICIAL VELOCITY (cm/sec) : 0.0
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 0.0
SLURRY CONCENTRATION (wt%) : 39.1
CATALYST OXIDE IN REACTOR (kg oxide) : 527
GAS HOLD-UP (X) : 16.7
SPACE VELOCITY (1/kg-hr) : 5715
RECYCLE/FRESH FEED RATIO : 3.796
OIL/SLURRY CIRCULATION RATE (m3/hr) : 0.0
PROD. SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 113.85
PURGE GAS FLOW RATE <50> (ksmol/hr) : 7.46
HEAT TRANSFER COEFFICIENT (Watt/m2-des.C) : 638
  
```

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
=====	=====	=====	=====	=====	=====	=====	=====	=====
	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<WTX>
H2	56.65	28.39	34.99	35.24	26.68	26.34	7.31	-----
CO	40.35	57.49	53.69	53.42	52.18	53.64	30.90	-----
CO2	2.07	12.24	9.72	9.49	11.58	11.21	51.52	-----
N2	0.15	0.96	0.74	0.66	0.90	0.75	2.40	-----
CH4	0.00	0.23	0.20	0.19	0.22	0.23	0.21	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.53
CH3OH	0.00	0.62	0.51	0.45	7.09	7.28	7.20	94.20
DME	0.00	0.05	0.00	0.05	0.07	0.00	0.49	0.13
C2H5OH	-----	-----	-----	-----	-----	-----	-----	1.37
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.63
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.49
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.34
ALKAYENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	1.31
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	1.00
TOTAL :	99.21	100.00	99.83	99.49	99.72	99.44	100.03	100.00
DENS,g/cc	0.005	0.047	0.031	0.031	n.a.	n.a.	0.004	0.785
AV.MOL.WT	13.50	22.59	20.44	20.33	23.18	23.20	34.70	32.66
Mm3/hr	628.2	2384.7	3019.0	3012.9	2651.7	2650.5	2.9	-----
ksmol/hr	28.03	106.39	134.69	134.42	118.30	118.20	0.13	6.28
1/hr:prod	-----	-----	-----	-----	-----	-----	-----	261.17

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

	GC#1	GC#2
CALCULATED BY GAS COMPOSITION		
HYDROGEN CONVERSION (Z) :	33.9	33.4
CARBON MONOXIDE CONVERSION (Z) :	12.3	12.4
CARBON DIOXIDE CONVERSION (Z) :	-1.3	-7.4
RATIO H2 CONSUMED/CO CONSUMED :	1.80	1.78
CALCULATED BY METHANOL IN EXIT GAS		
HYDROGEN CONVERSION (Z) :	33.6	32.8
CARBON MONOXIDE CONVERSION (Z) :	11.0	10.8
CALCULATED BY OVERALL BALANCE		
HYDROGEN CONVERSION (Z) :	26.8	26.7
CARBON MONOXIDE CONVERSION (Z) :	8.8	8.9
RATIO H2 CONSUMED/CO CONSUMED :	1.99	1.99

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL *
CO (+CO2) SELECTIVITY TO METHANOL (Z) :	94.2	92.6
CO (+CO2) SELECTIVITY TO ETHANOL (Z) :	—	0.9

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	smol/hr-ks cat	ks/1000 Ma3 fresh feed	ks/1000 Ma3 reactor feed
As calculated ACROSS REACTOR	14.89	400.5	83.5
As Net MeOH produced, OVERALL balance	11.54	310.3	64.7

REACTOR FEED $\{H_2/(CO+1.5CO_2)\}$:	0.52
REACTOR FEED $\{(H_2-CO_2)/(CO+CO_2)\}$:	0.41
APPROACH TO METHANOL EQUILIBRIUM (des.C) :	n.a.
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) :	n.a.
METHANOL COLLECTED AS % OF CALCULATED :	76.8
CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) :	7.85

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT MATERIAL BALANCE SUMMARY

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-12.51874	-2.79224	-2.43637
CO	2.68286	0.92062	-4.10433
CO2	n.a.	6.22046	-2.24954
N2	-131.71613	16.57277	-2.96847
CH4	100.00000	-4.37095	-0.72359
H2O	-----	n.a.	n.a.
CH3OH	-----	8.60474	19.16573

OVERALL ELEMENTAL BALANCE (Kg-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	71.8055	61.1635	4.2870	0.0434	-----	65.4940	8.7897
CO2	12.7562	13.0221	0.9127	0.0724	-----	14.0073	-9.8081
CH3OH	0.6047	0.6616	0.0464	0.0101	6.0588	6.7769	-1020.7332
OTHERS	0.3898	0.3511	0.0246	0.0017	0.2511	0.6285	-61.2254
TOTAL C	85.5561	75.1983	5.2708	0.1277	6.3099	86.9066	-1.5785
HYDROGEN:							
H2	94.7370	60.4081	4.2341	0.0206	-----	64.6628	31.7450
H2O	0.0000	0.0000	0.0000	0.0000	0.1213	0.1213	n.a.
OTHERS	3.8435	3.9444	0.2765	0.0458	25.0511	29.3179	-662.7801
TOTAL H	98.5806	64.3525	4.5106	0.0664	25.1724	94.1018	4.5432
OXYGEN:							
TOTAL O	97.9897	87.9225	6.1626	0.1992	6.2148	100.4991	-2.5609
NITROGEN:							
TOTAL N	1.7743	2.0427	0.1432	0.0067	-----	2.1926	-23.5758
TOTAL MASS FLOW (kg/hr)	2732.6948	2403.3452	168.4541	4.8793	205.0258	2781.7041	-1.7934

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]		FRESH FEED GAS
	GC#1	GC#2	[15-(50+62+68)]
MASS BALANCE (Z) :	0.35	-0.35	0.00
ELEMENTAL BALANCE (Z) :			
CARBON	0.92	0.16	1.52
HYDROGEN	0.26	0.39	6.32
OXYGEN	0.64	-0.80	-0.86
NITROGEN	11.02	-20.01	-78.30

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES : ANALYTICAL SUMMARY

DATE : 05-DEC-89
TIME : 15:05:07
TIME INTERVAL : FROM: 0000 26-AUG TO: 2400 26-AUG
NUMBER OF AVERAGED HOURS : 24
RUN ID NUMBER : E6A#2
FEED GAS TYPE: CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 158.4
OIL/SLURRY REACTOR INLET TEMP. (deg.C) : 67.5
AVG. REACTOR SLURRY TEMPERATURE (deg.C) : 249.2
REACTOR FREEBOARD TEMPERATURE (deg.C) : 245.1
OIL/SLURRY OUTLET TEMP. (deg.C) : 241.4
REACTOR FEED GAS PRESSURE (kPa) : 5452
REACTOR EFFLUENT GAS PRESSURE (kPa) : 5286
GAS SUPERFICIAL VELOCITY (cm/sec) : 7.6
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 0.0
SLURRY CONCENTRATION (wt%) : 39.1
CATALYST OXIDE IN REACTOR (kg oxide) : 526
GAS HOLD-UP (%) : 17.8
SPACE VELOCITY (1/kg-hr) : 5660
RECYCLE/FRESH FEED RATIO : 2.914
OIL/SLURRY CIRCULATION RATE (m3/hr) : 0.0
PROD. SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 106.55
PURGE GAS FLOW RATE <50> (ksmol/hr) : 7.49
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) : 725

STREAM #	1	55	15	15	32	32	62	69
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEOH PRODUC
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	56.69	27.65	35.32	35.18	25.35	25.32	7.31	-----
CO	39.17	56.06	51.63	51.77	51.54	51.78	30.90	-----
CO2	3.41	14.53	11.59	11.69	13.62	13.74	51.52	-----
N2	0.14	0.76	0.61	0.58	0.70	0.70	2.40	-----
CH4	0.01	0.23	0.18	0.18	0.21	0.22	0.21	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.70
CH3OH	0.01	0.60	0.49	0.41	7.98	8.04	7.20	94.74
DME	0.02	0.04	0.00	0.02	0.06	0.02	0.49	0.11
C2H5OH	-----	-----	-----	-----	-----	-----	-----	1.33
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.60
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.46
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.31
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	1.29
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.48
TOTAL :	99.43	99.87	99.82	99.83	99.47	99.82	100.03	100.00
DENS,g/cc	0.005	0.048	0.031	0.031	0.036	0.036	0.004	0.787
AV.MOL.WT	13.74	23.13	20.66	20.71	23.89	23.92	34.70	32.59
m3/hr	762.0	2220.5	2983.2	2982.5	2582.6	2580.4	3.8	-----
ksmol/hr	34.00	99.06	133.09	133.06	115.22	115.07	0.17	9.93
l/hr:prod	-----	-----	-----	-----	-----	-----	-----	365.63

LAPORTE LPNETHANOL PROCESS AVERAGE REPORT CONVERSION-SELECTIVITY-PRODUCTIVITY

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION (Z) :		39.0	37.6
CARBON MONOXIDE CONVERSION (Z) :		13.3	13.9
CARBON DIOXIDE CONVERSION (Z) :		-2.5	-0.9
RATIO H2 CONSUMED/CO CONSUMED :		1.96	1.95
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION (Z) :		36.6	37.0
CARBON MONOXIDE CONVERSION (Z) :		12.5	12.4
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION (Z) :		37.8	37.9
CARBON MONOXIDE CONVERSION (Z) :		12.9	12.9
RATIO H2 CONSUMED/CO CONSUMED :		2.01	2.01

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL *
CO (+CO2) SELECTIVITY TO METHANOL (Z) :	95.4	94.9
CO (+CO2) SELECTIVITY TO ETHANOL (Z) :		0.9

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	smol/hr-kg cat	kg/1000 Na3 fresh feed	kg/1000 Na3 reactor feed
As calculated ACROSS REACTOR	16.37	362.6	92.7
As Net MeOH produced, OVERALL balance	16.26	360.2	92.0

REACTOR FEED (H2/(CO+1.5CO2)) :	0.51
REACTOR FEED ((H2-CO2)/(CO+CO2)) :	0.37
APPROACH TO METHANOL EQUILIBRIUM (des.C) :	22.17
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) :	9.78
METHANOL COLLECTED AS % OF CALCULATED :	98.7
CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) :	9.62

LAPORTE LPHETHANOL PROCESS AVERAGE REPORT MATERIAL BALANCE SUMMARY

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	(% diff.)	(% diff.)	(% diff.)
H2	-29.26020	-0.31609	-0.91530
CO	-10.32318	-0.04993	-0.68399
CO2	n.a.	-0.01036	0.74621
H2	-109.85345	3.58845	-0.94597
CH4	99.25053	-3.57352	-1.44428
H2O	-----	n.a.	n.a.
CH3OH	-----	7.81984	0.41794

OVERALL ELEMENTAL BALANCE (Kg-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	68.8850	55.5346	4.1982	0.0561	-----	59.7889	13.2048
CO2	15.5547	14.3938	1.0881	0.0935	-----	15.5754	-0.1333
CH3OH	0.5488	0.5920	0.0447	0.0131	8.5096	9.1594	-1568.9930
OTHERS	0.2927	0.3071	0.0232	0.0022	0.2449	0.5974	-104.0666
TOTAL C	85.2812	70.8275	5.3543	0.1648	8.7745	85.1210	0.1879
HYDROGEN:							
H2	93.6208	54.7817	4.1413	0.0265	-----	58.9495	37.0337
H2O	0.0000	0.0000	0.0000	0.0000	0.2237	0.2237	n.a.
OTHERS	3.3129	3.5169	0.2659	0.0591	35.1863	39.0292	-1078.0731
TOTAL H	96.9337	58.2987	4.4072	0.0857	35.4099	98.2014	-1.3079
OXYGEN:							
TOTAL O	100.5698	84.9538	6.4222	0.2570	8.7416	100.3746	0.1941
NITROGEN:							
TOTAL N	1.5435	1.5058	0.1138	0.0087	-----	1.6283	-5.4940
TOTAL MASS FLOW (kg/hr)	2755.6667	2291.3220	173.2153	6.2958	287.7675	2758.6006	-0.1065

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]		FRESH FEED GAS
	GC#1	GC#2	[15-(50+62+68)]
MASS BALANCE (%) :	-0.15	0.16	-0.04
ELEMENTAL BALANCE (%) :			
CARBON	0.06	0.74	1.40
HYDROGEN	1.16	0.36	-3.34
OXYGEN	-0.30	0.53	1.43
NITROGEN	0.74	-4.51	-28.73

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

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=====
DATE : 05-DEC-90
TIME : 15:06:37
TIME INTERVAL : FROM: 0000 27-Aug
                TO: 2400 27-Aug

NUMBER OF AVERAGED HOURS : 24
RUN ID NUMBER : E6AP3
FEED GAS TYPE: CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) : 158.3
OIL/SLURRY REACTOR INLET TEMP. (des.C) : 37.0
AVG. REACTOR SLURRY TEMPERATURE (des.C) : 249.7
REACTOR FREEBOARD TEMPERATURE (des.C) : 246.3
OIL/SLURRY OUTLET TEMP. (des.C) : 242.4
REACTOR FEED GAS PRESSURE (kPa) : 5449
REACTOR EFFLUENT GAS PRESSURE (kPa) : 5285
GAS SUPERFICIAL VELOCITY (cm/sec) : 11.9
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 0.0
SLURRY CONCENTRATION (wt%) : 38.8
CATALYST OXIDE IN REACTOR (kg oxide) : 526
GAS HOLD-UP (%): 17.2
SPACE VELOCITY (1/kg-hr) : 5623
RECYCLE/FRESH FEED RATIO : 3.095
OIL/SLURRY CIRCULATION RATE (m3/hr) : 0.0
PROD. SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 107.71
PURGE GAS FLOW RATE <50> (ksmol/hr) : 7.92
HEAT TRANSFER COEFFICIENT (Watt/m2-des.C) : 685
  
```

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEOH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
=====	=====	=====	=====	=====	=====	=====	=====	=====
<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<WT%>
H2	56.31	28.48	35.61	35.58	26.28	26.31	7.31	-----
CO	39.44	55.47	51.34	51.38	51.30	51.38	30.90	-----
CO2	3.67	14.39	11.66	11.66	13.57	13.61	51.52	-----
N2	0.17	0.67	0.54	0.54	0.63	0.62	2.40	-----
CH4	0.00	0.21	0.17	0.16	0.19	0.20	0.21	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.46
CH3OH	0.00	0.60	0.47	0.40	7.61	7.67	7.20	95.55
DME	0.00	0.04	0.00	0.02	0.05	0.00	0.49	0.09
C2H5OH	-----	-----	-----	-----	-----	-----	-----	1.14
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.49
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.35
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.24
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	1.43
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.25
TOTAL :	99.59	99.85	99.80	99.75	99.63	99.79	100.03	100.00
DENS,g/cc	0.005	0.048	0.031	0.031	0.036	0.036	0.004	0.787
AV.MOL.WT	13.90	22.90	20.60	20.60	23.63	23.63	34.70	32.54
Ma3/hr	725.1	2236.8	2961.9	2961.9	2582.0	2582.0	3.7	-----
ksmol/hr	32.35	99.79	132.14	132.14	115.19	115.14	0.16	8.06
1/hr,prod	-----	-----	-----	-----	-----	-----	-----	333.39

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

	GC#1	GC#2
CALCULATED BY GAS COMPOSITION		
HYDROGEN CONVERSION (%) :	35.6	35.6
CARBON MONOXIDE CONVERSION (%) :	12.8	13.0
CARBON DIOXIDE CONVERSION (%) :	-1.8	-1.5
RATIO H2 CONSUMED/CO CONSUMED :	1.93	1.99
CALCULATED BY METHANOL IN EXIT GAS		
HYDROGEN CONVERSION (%) :	34.9	35.0
CARBON MONOXIDE CONVERSION (%) :	12.1	12.1
CALCULATED BY OVERALL BALANCE		
HYDROGEN CONVERSION (%) :	34.5	34.5
CARBON MONOXIDE CONVERSION (%) :	12.0	12.0
RATIO H2 CONSUMED/CO CONSUMED :	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL §
CO (+CO2) SELECTIVITY TO METHANOL (%) :	97.0	95.4
CO (+CO2) SELECTIVITY TO ETHANOL (%) :		0.8

§ Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

METH SOURCE	mmol/hr-kg cat	kg/1000 Na3 fresh feed	kg/1000 Na3 reactor feed
As calculated ACROSS REACTOR	15.61	363.4	89.0
As Net MeOH produced, OVERALL balance	14.97	348.4	85.3

REACTOR FEED $\{H_2/(CO+1.5CO_2)\}$:	0.52
REACTOR FEED $\{(H_2-CO_2)/(CO+CO_2)\}$:	0.38
APPROACH TO METHANOL EQUILIBRIUM (deg.C) :	24.45
APPROACH TO WATER-GAS EQUILIBRIUM (deg.C) :	-22.60
METHANOL COLLECTED AS % OF CALCULATED :	95.1
CALCULATED METHANOL PRODUCTION RATE (Kmmol/hr) :	8.22

LAPORE LPMETHANOL PROCESS AVERAGE REPORT MATERIAL BALANCE SUMMARY

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-25.14492	-0.91362	-1.37565
CO	-7.35766	0.32080	-1.19948
CO2	n.a.	0.89719	0.26141
N2	-102.06686	1.38632	-0.02713
CH4	100.00000	-0.88984	-3.51764
H2O	-----	n.a.	n.a.
CH3OH	-----	11.37576	3.26716

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	67.8935	55.3535	4.3930	0.0547	-----	59.8012	11.9190
CO2	15.4075	14.3598	1.1396	0.0911	-----	15.5906	-1.1981
CH3OH	0.5285	0.5963	0.0473	0.0127	7.8244	8.4807	-1504.7900
OTHERS	0.2643	0.2894	0.0230	0.0021	0.2419	0.5564	-110.5226
TOTAL C	84.0937	70.5990	5.6030	0.1606	8.0663	84.4289	-0.3986
HYDROGEN:							
H2	94.0307	56.8404	4.5111	0.0259	-----	61.3773	34.7263
H2O	0.0000	0.0000	0.0000	0.0000	0.1340	0.1340	n.a.
OTHERS	3.1181	3.4629	0.2748	0.0577	32.1845	35.9799	-1053.8973
TOTAL H	97.1488	60.3033	4.7859	0.0835	32.3185	97.4912	-0.3524
OXYGEN:							
TOTAL O	99.2634	84.7093	6.7228	0.2505	7.9829	99.6655	-0.4052
NITROGEN:							
TOTAL N	1.4271	1.3372	0.1061	0.0085	-----	1.4518	-1.7301
TOTAL MASS FLOW (ks/hr)	2722.0808	2285.1912	181.3607	6.1384	262.3867	273.0771	-0.4774

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS [15-(50+62+68)]
GC#1	GC#2	
0.00	0.00	-0.05
0.20	0.32	0.83
0.65	0.32	-2.07
-0.09	0.08	1.17
-0.09	-1.70	-4.21

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

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=====
DATE : 05-DEC-99
TIME : 15:14:25
TIME INTERVAL : FROM: 0300 26-Aug
                TO: 0300 29-Aug

NUMBER OF AVERAGED HOURS : 48
RUN ID NUMBER : E6A
FEED GAS TYPE: CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 158.4
OIL/SLURRY REACTOR INLET TEMP. (deg.C) : 47.9
AVG. REACTOR SLURRY TEMPERATURE (deg.C) : 249.4
REACTOR FREEBOARD TEMPERATURE (deg.C) : 245.8
OIL/SLURRY OUTLET TEMP. (deg.C) : 242.0
REACTOR FEED GAS PRESSURE (kPa) : 5450
REACTOR EFFLUENT GAS PRESSURE (kPa) : 5285
GAS SUPERFICIAL VELOCITY (cm/sec) : 19.4
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 0.0
SLURRY CONCENTRATION (wt%) : 39.0
CATALYST OXIDE IN REACTOR (kg oxide) : 526
GAS HOLD-UP (Z) : 17.5
SPACE VELOCITY (1/kg-hr) : 5633
RECYCLE/FRESH FEED RATIO : 3.060
OIL/SLURRY CIRCULATION RATE (m3/hr) : 0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (kmol/hr) : 107.49
PURGE GAS FLOW RATE <50> (kmol/hr) : 7.64
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) : 700
  
```

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEOH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT	1	2	1	2	2	1		
=====	=====	=====	=====	=====	=====	=====	=====	=====
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	56.47	29.05	35.41	35.40	25.85	25.88	7.31	-----
CO	39.28	55.66	51.42	51.46	51.33	51.44	30.90	-----
CO2	3.61	14.58	11.75	11.78	13.71	13.78	51.52	-----
N2	0.16	0.74	0.60	0.58	0.69	0.69	2.40	-----
CH4	0.00	0.21	0.17	0.16	0.20	0.21	0.21	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.58
CH3OH	0.00	0.60	0.48	0.40	7.76	7.81	7.20	95.18
DME	0.01	0.04	0.00	0.02	0.05	0.01	0.49	0.10
C2H5OH	-----	-----	-----	-----	-----	-----	-----	1.22
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.54
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.40
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.27
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	1.37
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.34
TOTAL :	99.52	99.88	99.83	99.80	99.59	99.80	100.03	100.00
DENS,g/cc	0.005	0.048	0.031	0.031	0.036	0.036	0.004	0.787
AV.MOL.WT	13.84	23.04	20.67	20.67	23.77	23.77	34.70	32.56
M3/hr	730.9	2236.1	2966.9	2967.1	2580.1	2580.1	3.8	-----
kmol/hr	32.61	99.76	132.36	132.37	115.11	115.05	0.17	8.27
1/hr,prod	-----	-----	-----	-----	-----	-----	-----	342.24

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
		-----	-----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	35.4	36.5
CARBON MONOXIDE CONVERSION	(%) :	13.0	13.3
CARBON DIOXIDE CONVERSION	(%) :	-2.0	-1.2
RATIO H2 CONSUMED/CO CONSUMED	:	1.93	1.99
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	35.7	35.9
CARBON MONOXIDE CONVERSION	(%) :	12.3	12.3
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	35.4	35.4
CARBON MONOXIDE CONVERSION	(%) :	12.2	12.2
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL %
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (%) :	96.4	95.2
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.8

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	kmol/hr-kg cat	kg/1000 Nm3 fresh feed	kg/1000 Nm3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	15.91	367.3	90.5
As Net MeOH produced, OVERALL balance	15.30	353.4	87.0

REACTOR FEED $\{H_2/(CO+1.5CO_2)\}$:	0.51
REACTOR FEED $\{(H_2-CO_2)/(CO+CO_2)\}$:	0.37
APPROACH TO METHANOL EQUILIBRIUM (deg.C) :	23.43
APPROACH TO WATER-GAS EQUILIBRIUM (deg.C) :	-7.42
METHANOL COLLECTED AS % OF CALCULATED :	95.5
CALCULATED METHANOL PRODUCTION RATE (Kmol/hr) :	9.38

LAPORTE LPMEETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1455)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	% diff.>	% diff.>	% diff.>
H2	-25.75684	-0.99763	-1.29133
CO	-7.40591	0.31816	-1.27165
CO2	n.a.	0.82107	0.18089
N2	-91.69733	2.86652	-0.61541
CH4	100.00000	-1.09486	1.86336
H2O	-----	n.a.	n.a.
CH3OH	-----	11.19566	3.06131

OVERALL ELEMENTAL BALANCE (Kg-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	68.1177	55.5271	4.2516	0.0561	-----	59.8347	12.1598
CO2	15.5932	14.5452	1.1137	0.0935	-----	15.7524	-1.0206
CH3OH	0.5294	0.5961	0.0456	0.0131	8.0011	8.6560	-1535.0997
OTHERS	0.2647	0.2893	0.0222	0.0022	0.2482	0.5618	-112.2070
TOTAL C	84.5051	70.9578	5.4330	0.1648	8.2493	84.8049	-0.3548
HYDROGEN:							
H2	93.7182	55.9661	4.2852	0.0265	-----	60.2778	35.6819
H2O	0.0000	0.0000	0.0000	0.0000	0.1734	0.1734	n.a.
OTHERS	3.1236	3.4619	0.2651	0.0591	32.9146	36.7007	-1074.9650
TOTAL H	96.8417	59.4280	4.5502	0.0857	33.0880	97.1519	-0.3203
OXYGEN:							
TOTAL O	99.8600	85.2535	6.5276	0.2570	8.1899	100.2281	-0.3686
NITROGEN:							
TOTAL N	1.5335	1.4765	0.1130	0.0087	-----	1.5982	-4.0853
TOTAL MASS FLOW (kg/hr)	2736.0935	2298.4998	175.9900	6.2958	269.3575	2750.1433	-0.5135

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]		FRESH FEED GAS
	GC#1	GC#2	[15-(50+62+68)]
MASS BALANCE (%) :	-0.01	0.00	-0.08
ELEMENTAL BALANCE (%) :			
CARBON	0.17	0.43	1.03
HYDROGEN	0.62	0.36	-2.39
OXYGEN	-0.14	0.23	1.26
NITROGEN	-0.01	-3.45	-16.69

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

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DATE : 05-DEC-89
TIME : 15:15:47
TIME INTERVAL : FROM: 0300 28-AUG
                TO: 0900 28-AUG
                5
NUMBER OF AVERAGED HOURS :
PUN ID NUMBER : E6B-1
FEED GAS TYPE: CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) : 166.0
OIL/SLURRY REACTOR INLET TEMP. (des.C) : 32.7
AVG. REACTOR SLURRY TEMPERATURE (des.C) : 250.1
REACTOR FREEBOARD TEMPERATURE (des.C) : 248.0
OIL/SLURRY OUTLET TEMP. (des.C) : 244.3
REACTOR FEED GAS PRESSURE (kPa) : 5557
REACTOR EFFLUENT GAS PRESSURE (kPa) : 5284
GAS SUPERFICIAL VELOCITY (cm/sec) : 16.2
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 0.0
SLURRY CONCENTRATION (wt%) : 39.1
CATALYST OXIDE IN REACTOR (kg oxide) : 486
GAS HOLD-UP (%) : 23.7
SPACE VELOCITY (1/kg-hr) : 8290
RECYCLE/FRESH FEED RATIO : 3.988
OIL/SLURRY CIRCULATION RATE (m3/hr) : 0.5
PROD. SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 149.63
PURGE GAS FLOW RATE <50> (ksmol/hr) : 6.57
HEAT TRANSFER COEFFICIENT (Watt/m2-des.C) : 900
  
```

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	HEOH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	59.05	28.21	34.93	34.83	26.36	26.32	7.31	-----
CO	36.28	54.40	50.85	50.48	50.50	50.42	30.90	-----
CO2	3.71	15.17	12.51	12.78	14.55	14.47	51.52	-----
N2	0.13	1.24	1.01	0.96	1.09	1.20	2.40	-----
CH4	0.01	0.25	0.21	0.22	0.24	0.26	0.21	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50
CH3OH	0.00	0.59	0.48	0.41	7.14	7.16	7.20	95.61
DME	0.00	0.02	0.00	0.00	0.03	0.00	0.49	0.08
C2H5OH	-----	-----	-----	-----	-----	-----	-----	1.11
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.48
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.34
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.24
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	1.37
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.27
TOTAL :	99.19	99.88	99.99	99.68	99.91	99.83	100.03	100.00
DENS,g/cc	0.005	0.049	0.032	0.032	0.036	0.036	0.004	0.798
AV.MOL.WT	13.13	23.09	20.92	20.96	23.74	23.73	34.70	32.52
Mm3/hr	824.8	3206.7	4044.9	4031.7	3562.5	3563.3	4.5	-----
ksmol/hr	36.80	143.06	190.46	179.87	158.94	158.90	0.20	9.96
1/hr,prod	-----	-----	-----	-----	-----	-----	-----	411.05

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

CONVERSIONS ACROSS REACTOR :

	GC#1	GC#2
CALCULATED BY GAS COMPOSITION		
HYDROGEN CONVERSION (Z) :	33.6	33.1
CARBON MONOXIDE CONVERSION (Z) :	12.7	11.6
CARBON DIOXIDE CONVERSION (Z) :	-1.9	-0.6
RATIO H2 CONSUMED/CO CONSUMED :	1.83	1.97
CALCULATED BY METHANOL IN EXIT GAS		
HYDROGEN CONVERSION (Z) :	33.4	33.9
CARBON MONOXIDE CONVERSION (Z) :	11.5	11.7
CALCULATED BY OVERALL BALANCE		
HYDROGEN CONVERSION (Z) :	31.7	31.9
CARBON MONOXIDE CONVERSION (Z) :	10.9	11.0
RATIO H2 CONSUMED/CO CONSUMED :	1.99	1.99

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL %
CO (+CO2) SELECTIVITY TO METHANOL (Z) :	97.9	97.6
CO (+CO2) SELECTIVITY TO ETHANOL (Z) :		0.8

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	mmol/hr-kg cat	kg/1000 Nm3 fresh feed	kg/1000 Nm3 reactor feed
As calculated ACROSS REACTOR	21.72	410.4	84.0
As Net MeOH produced, OVERALL balance	19.99	377.6	77.3

REACTOR FEED $\{CH_2/(CO+1.5CO_2)\}$: 0.30
 REACTOR FEED $\{(H_2-CO_2)/(CO+CO_2)\}$: 0.35

APPROACH TO METHANOL EQUILIBRIUM (des.C) : 25.18
 APPROACH TO WATER-GAS EQUILIBRIUM (des.C) : -29.25

METHANOL COLLECTED AS % OF CALCULATED : 91.5

CALCULATED METHANOL PRODUCTION RATE (Kmmol/hr) : 10.56

LAPORTE LPHETHANOL PROCESS AVERAGE REPORT MATERIAL BALANCE SUMMARY

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<Z diff.>	<Z diff.>	<Z diff.>
H2	-20.66662	-0.90364	-0.79334
CO	0.43181	0.41541	-1.50251
CO2	n.a.	0.34946	1.35529
N2	-143.65810	5.21877	-7.40560
CH4	99.18874	-9.51311	1.80945
H2O	---	n.a.	n.a.
CH3OH	---	11.41298	7.03544

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	Z
CARBON:							
CO	90.7971	77.8256	3.5755	0.0673	---	21.4683	10.2743
CO2	22.9871	21.7025	0.9971	0.1122	---	22.8117	0.7629
CH3OH	0.7419	0.8374	0.0385	0.0157	9.6651	10.5566	-1323.0128
OTHERS	0.3957	0.4149	0.0191	0.0026	0.2988	0.7354	-95.8326
TOTAL C	114.9217	100.7804	4.6300	0.1977	9.9639	115.5721	-0.5659
HYDROGEN:							
H2	125.2957	80.7155	3.7082	0.0318	---	84.4555	32.5950
H2O	0.0000	0.0000	0.0000	0.0000	0.1798	0.1798	n.a.
OTHERS	4.5502	4.9520	0.2275	0.0710	39.6563	44.9068	-886.9103
TOTAL H	129.8459	85.6675	3.9357	0.1028	39.8361	129.5421	0.2340
OXYGEN:							
TOTAL O	137.5131	122.0966	5.6093	0.3084	9.8612	137.8755	-0.2636
NITROGEN:							
TOTAL N	3.4535	3.5479	0.1630	0.0105	---	3.7214	-7.7582
TOTAL MASS FLOW (kg/hr)	3770.0222	3303.2974	151.7595	7.5550	323.9261	3786.5378	-0.4381

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]		FRESH FEED GAS
	GC#1	GC#2	[15-(50+62+68)]
MASS BALANCE (Z) :	0.07	-0.08	-0.02
ELEMENTAL BALANCE (Z) :			
CARBON	0.55	-0.26	-0.49
HYDROGEN	0.15	-0.91	-0.92
OXYGEN	0.18	-0.29	1.88
NITROGEN	-4.66	-0.33	-91.29

**LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY**

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=====
DATE : 05-DEC-89
TIME : 15:17:33
TIME INTERVAL : FROM: 0800 28-AUG TO: 2000 28-AUG
NUMBER OF AVERAGED HOURS : 12
RUN ID NUMBER : E68P2
FEED GAS TYPE: CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 168.1
OIL/SLURRY REACTOR INLET TEMP. (deg.C) : 32.3
AVG. REACTOR SLURRY TEMPERATURE (deg.C) : 250.0
REACTOR FREEBOARD TEMPERATURE (deg.C) : 247.6
OIL/SLURRY OUTLET TEMP. (deg.C) : 243.7
REACTOR FEED GAS PRESSURE (kPa) : 5567
REACTOR EFFLUENT GAS PRESSURE (kPa) : 5283
GAS SUPERFICIAL VELOCITY (cm/sec) : 16.8
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 0.0
SLURRY CONCENTRATION (wt%) : 39.5
CATALYST OXIDE IN REACTOR (kg oxide) : 486
GAS HOLD-UP (%) : 24.5
SPACE VELOCITY (1/kg-hr) : 8526
RECYCLE/FRESH FEED RATIO : 4.821
OIL/SLURRY CIRCULATION RATE (m3/hr) : 0.0
PROD. SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 156.28
PURGE GAS FLOW RATE <50> (ksmol/hr) : 3.06
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) : 864
  
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STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEOH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT	=====	=====	=====	=====	=====	=====	=====	=====
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	59.59	26.70	34.15	33.68	25.07	24.96	7.31	-----
CO	36.78	55.46	51.17	51.54	51.28	51.59	30.90	-----
CO2	2.99	15.77	13.15	13.06	15.08	14.89	51.52	-----
N2	0.15	0.97	0.81	0.80	0.93	0.90	2.40	-----
CH4	0.01	0.34	0.28	0.28	0.32	0.32	0.21	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.50
CH3OH	0.00	0.66	0.55	0.46	7.39	7.34	7.20	95.61
DME	0.00	0.02	0.00	0.00	0.01	0.00	0.49	0.08
C2H5OH	-----	-----	-----	-----	-----	-----	-----	1.11
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.48
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.34
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.24
ALKYLENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	1.37
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.27
TOTAL :	99.50	99.92	100.10	99.82	100.08	100.00	100.03	100.00
DENS,g/cc	0.005	0.050	0.032	0.032	0.037	0.037	0.004	0.787
AV.MOL.WT	12.92	23.57	21.22	21.31	24.17	24.16	34.70	32.52
M3/hr	712.3	3434.4	4149.7	4146.6	3650.1	3650.9	4.9	-----
ksmol/hr	31.78	153.22	185.13	184.99	162.84	162.81	0.22	10.17
1/hr,Prod	-----	-----	-----	-----	-----	-----	-----	420.14

LAPORTE LHMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

	GC#1	GC#2
CALCULATED BY GAS COMPOSITION		
HYDROGEN CONVERSION (Z) :	35.7	34.5
CARBON MONOXIDE CONVERSION (Z) :	11.3	12.4
CARBON DIOXIDE CONVERSION (Z) :	0.4	-1.6
RATIO H2 CONSUMED/CO CONSUMED :	2.11	1.81
CALCULATED BY METHANOL IN EXIT GAS		
HYDROGEN CONVERSION (Z) :	34.6	35.9
CARBON MONOXIDE CONVERSION (Z) :	11.5	11.7
CALCULATED BY OVERALL BALANCE		
HYDROGEN CONVERSION (Z) :	32.2	32.7
CARBON MONOXIDE CONVERSION (Z) :	10.8	10.7
RATIO H2 CONSUMED/CO CONSUMED :	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL *
CO (+CO2) SELECTIVITY TO METHANOL (Z) :	99.4	96.5
CO (+CO2) SELECTIVITY TO ETHANOL (Z) :		0.8

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEDH SOURCE	smol/hr-ks cat	ks/1000 H ₂ fresh feed	ks/1000 H ₂ reactor feed
As calculated ACROSS REACTOR	22.73	497.1	85.4
As Net MeOH produced, OVERALL balance	20.37	445.5	76.5

REACTOR FEED (H ₂ /(CO+1.5CO ₂)) :	0.47
REACTOR FEED ((H ₂ -CO ₂)/(CO+CO ₂)) :	0.32
APPROACH TO METHANOL EQUILIBRIUM (des.C) :	22.25
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) :	-27.84
METHANOL COLLECTED AS % OF CALCULATED :	89.3
CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) :	11.05

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	3.46468	-4.11396	-2.25296
CO	15.81789	1.36459	-3.88107
CO2	n.a.	3.79491	-0.85698
N2	-75.15054	3.51820	-0.47246
CH4	99.29939	1.17305	-2.06413
H2O	-----	n.a.	n.a.
CH3OH	-----	15.20282	9.29021

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	95.3452	84.9761	1.6980	0.0729	-----	26.7470	9.0180
CO2	24.1600	24.1629	0.4828	0.1215	-----	24.7672	-2.5132
CH3OH	0.8552	1.0085	0.0202	0.0170	9.8661	10.9118	-1175.9507
OTHERS	0.5180	0.5822	0.0116	0.0028	0.3050	0.9017	-74.0843
TOTAL C	120.8784	110.7297	2.2127	0.2142	10.1712	123.3277	-2.0263
HYDROGEN:							
H2	124.6110	81.8197	1.6350	0.0345	-----	83.4892	33.0001
H2O	0.0000	0.0000	0.0000	0.0000	0.1835	0.1835	n.a.
OTHERS	5.4927	6.3017	0.1259	0.0769	40.4813	46.9858	-755.4272
TOTAL H	130.1037	88.1215	1.7609	0.1114	40.6648	130.6585	-0.4264
OXYGEN:							
TOTAL O	144.5204	134.3410	2.6845	0.3341	10.0664	147.4259	-2.0104
NITROGEN:							
TOTAL N	2.9599	2.9725	0.0594	0.0113	-----	3.0432	-2.8148
TOTAL MASS FLOW (ks/hr)	3942.1924	3611.4070	72.1650	8.1846	330.6645	4022.4211	-2.0351

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS [15-(50+62+68)]
	GC#1	GC#2
MASS BALANCE (%) :	-0.17	0.16
ELEMENTAL BALANCE (%) :		
CARBON	-0.11	0.19
HYDROGEN	1.04	-1.42
OXYGEN	-0.04	-0.10
NITROGEN	2.25	-2.33

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

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DATE : 05-DEC-89
TIME : 15:19:02
TIME INTERVAL : FROM: 2000 28-AUG
                TO: 0800 29-AUG

NUMBER OF AVERAGED HOURS : 12
RUN ID NUMBER : E6R
FEED GAS TYPE: CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 167.4
OIL/SLURRY REACTOR INLET TEMP. (deg.C) : 32.6
AVG. REACTOR SLURRY TEMPERATURE (deg.C) : 250.4
REACTOR FREEBOARD TEMPERATURE (deg.C) : 247.2
OIL/SLURRY OUTLET TEMP. (deg.C) : 243.8
REACTOR FEED GAS PRESSURE (kPa) : 5570
REACTOR EFFLUENT GAS PRESSURE (kPa) : 5283
GAS SUPERFICIAL VELOCITY (cm/sec) : 17.1
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 0.0
SLURRY CONCENTRATION (wt%) : 40.2
CATALYST OXIDE IN REACTOR (kg oxide) : 486
GAS HOLD-UP (%) : 28.9
SPACE VELOCITY (1/kg-hr) : 8660
RECYCLE/FRESH FEED RATIO : 3.967
OIL/SLURRY CIRCULATION RATE (m3/hr) : 0.9
PROD. SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 153.43
PURGE GAS FLOW RATE <50> (ksmol/hr) : 3.43
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) : 655

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STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<WT%>
H2	60.84	27.45	35.11	35.02	25.26	25.06	7.31	-----
CO	35.67	54.09	49.86	49.98	49.82	49.85	30.90	-----
CO2	2.39	15.79	12.76	12.70	14.84	14.80	51.52	-----
N2	0.14	1.46	1.16	1.16	1.34	1.34	2.40	-----
CH4	0.00	0.49	0.39	0.39	0.46	0.46	0.21	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.50
CH3OH	0.00	0.60	0.51	0.45	8.22	8.21	7.20	95.61
DME	0.00	0.03	0.00	0.00	0.00	0.00	0.49	0.08
C2H5OH	-----	-----	-----	-----	-----	-----	-----	1.11
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.48
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.34
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.24
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	1.37
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.27
TOTAL :	99.04	99.92	99.78	99.71	99.93	99.73	100.03	100.00
DENS, g/cc	0.005	0.049	0.032	0.032	0.037	0.037	0.003	0.788
AV. MOL. WT	12.43	23.34	20.88	20.88	24.09	24.13	34.70	32.52
Nm3/hr	847.6	3362.2	4207.6	4209.7	3646.3	3643.2	5.3	-----
ksmol/hr	37.81	150.00	187.71	187.81	162.67	162.46	0.24	11.72
l/hr, prod	-----	-----	-----	-----	-----	-----	-----	483.50

**LAPORTE LPMEETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY**

CONVERSIONS ACROSS REACTOR :

		<u>GC#1</u>	<u>GC#2</u>
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(Z) :	38.2	37.5
CARBON MONOXIDE CONVERSION	(Z) :	13.4	13.7
CARBON DIOXIDE CONVERSION	(Z) :	-0.4	-1.2
RATIO H ₂ CONSUMED/CO CONSUMED	:	2.00	1.92
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(Z) :	37.6	38.1
CARBON MONOXIDE CONVERSION	(Z) :	13.2	13.3
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(Z) :	35.6	35.7
CARBON MONOXIDE CONVERSION	(Z) :	12.6	12.5
RATIO H ₂ CONSUMED/CO CONSUMED	:	2.00	2.00

SELECTIVITIES :

	<u>ACROSS REACTOR</u> <u>GC Average</u>	<u>OVERALL</u> <u>%</u>
CO (+CO ₂) SELECTIVITY TO METHANOL (Z) :	99.7	96.8
CO (+CO ₂) SELECTIVITY TO ETHANOL (Z) :	-----	0.8

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

<u>MEDH SOURCE</u>	<u>mol/hr-kg cat</u>	<u>kg/1000 Me₃ fresh feed</u>	<u>kg/1000 Me₃ reactor feed</u>
As calculated ACROSS REACTOR	25.63	471.0	94.8
As Net MeOH produced, OVERALL balance	23.47	431.3	86.8

REACTOR FEED (H₂/(CO+1.5CO₂)) : 0.51
 REACTOR FEED ((H₂-CO₂)/(CO+CO₂)) : 0.36

APPROACH TO METHANOL EQUILIBRIUM (deg.C) : 19.05
 APPROACH TO WATER-GAS EQUILIBRIUM (deg.C) : -21.53

METHANOL COLLECTED AS % OF CALCULATED : 91.2

CALCULATED METHANOL PRODUCTION RATE (Kmol/hr) : 12.46

LAPORTE LPHETHANOL PROCESS AVERAGE REPORT MATERIAL BALANCE SUMMARY

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-11.81879	-2.47761	-2.54181
CO	0.14335	0.79759	-2.50011
CO2	n.a.	2.99521	-0.89936
N2	n.a.	2.86703	-3.04547
CH4	100.00000	0.34389	-0.54184
H2O	-----	n.a.	n.a.
CH3OH	-----	5.73888	7.97869

OVERALL ELEMENTAL BALANCE (Kg-atoms/hr) :

	INPUTS		OUTPUTS				(IN-OUT)/IN
STREAM #	15	55	50	62	68	TOTAL	
STREAM NAME	REACTOR FEED	RECYCLE	PURGE GAS	FLASH GAS	MeOH PRODUCT		%
CARBON:							
CO	93.8669	81.1330	1.8573	0.0785	-----	83.0688	11.5036
CO2	23.8517	23.6844	0.5422	0.1309	-----	24.3575	-2.1203
CH3OH	0.8449	0.8963	0.0205	0.0183	11.3685	12.3036	-1356.2708
OTHERS	0.7325	0.8250	0.0189	0.0030	0.3515	1.1984	-63.6113
TOTAL C	119.2960	106.5388	2.4389	0.2307	11.7199	120.9282	-1.3682
HYDROGEN:							
H2	131.5414	82.3480	1.8851	0.0371	-----	84.2702	35.9363
H2O	0.0000	0.0000	0.0000	0.0000	0.2115	0.2115	n.a.
OTHERS	6.3093	6.7951	0.1556	0.0828	46.6455	53.6789	-750.7916
TOTAL H	137.8507	89.1432	2.0406	0.1199	46.8570	138.1607	-0.2249
OXYGEN:							
TOTAL O	142.4152	129.4432	2.9632	0.3598	11.5992	144.3653	-1.3693
NITROGEN:							
TOTAL N	4.3572	4.3799	0.1003	0.0122	-----	4.4924	-3.1025
TOTAL MASS FLOW (kg/hr)	3921.4504	3503.9155	80.2107	8.8142	381.0157	3973.9561	-1.3389

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]		FRESH FEED GAS
	GC#1	GC#2	[15-(50+62+68)]
MASS BALANCE (%) :	-0.07	0.07	0.00
ELEMENTAL BALANCE (%) :			
CARBON	0.05	0.00	0.02
HYDROGEN	0.49	-0.59	-6.53
OXYGEN	-0.03	-0.20	2.45
NITROGEN	-0.02	-0.06	-6.21

LAPORTE LPNETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

DATE : 05-DEC-89
 TIME : 15:20:28
 TIME INTERVAL : FROM: 0800 29-AUG TO: 2000 29-AUG
 NUMBER OF AVERAGED HOURS : 12
 RUN ID NUMBER : E6C
 FEED GAS TYPE: CO-RICH GAS
 REACTOR FEED GAS INLET TEMP. (des.C) : 157.7
 OIL/SLURRY REACTOR INLET TEMP. (des.C) : 29.6
 AVG. REACTOR SLURRY TEMPERATURE (des.C) : 250.2
 REACTOR FREEBOARD TEMPERATURE (des.C) : 243.8
 OIL/SLURRY OUTLET TEMP. (des.C) : 239.5
 REACTOR FEED GAS PRESSURE (kPa) : 5463
 REACTOR EFFLUENT GAS PRESSURE (kPa) : 5283
 GAS SUPERFICIAL VELOCITY (cm/sec) : 12.8
 LIQUID SUPERFICIAL VELOCITY (cm/sec) : 0.0
 SLURRY CONCENTRATION (wt%) : 39.7
 CATALYST OXIDE IN REACTOR (kg oxide) : 486
 GAS HOLD-UP (%) : 24.7
 SPACE VELOCITY (1/kg-hr) : 6575
 RECYCLE/FRESH FEED RATIO : 2.944
 OIL/SLURRY CIRCULATION RATE (m3/hr) : 0.8
 PROD. SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 110.18
 PURGE GAS FLOW RATE <50> (ksmol/hr) : 3.74
 HEAT TRANSFER COEFFICIENT (Watt/m2-des.C) : 984

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDH PRODUC
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
	<MOL>	<MOL>	<MOL>	<MOL>	<MOL>	<MOL>	<MOL>	<WT>
H2	60.78	26.30	35.28	35.14	24.03	23.82	7.31	-----
CO	36.16	55.99	50.84	50.92	50.55	50.83	30.90	-----
CO2	1.95	14.78	11.51	11.56	13.79	13.79	51.52	-----
N2	0.13	1.67	1.26	1.29	1.47	1.51	2.40	-----
CH4	0.00	0.58	0.44	0.45	0.51	0.53	0.21	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.66
CH3OH	0.03	0.60	0.49	0.41	9.46	9.22	7.20	96.28
DME	0.00	0.03	0.00	0.01	0.02	0.00	0.49	0.07
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.86
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.36
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.26
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.17
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	1.10
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.24
TOTAL :	99.05	99.94	99.83	99.77	99.83	99.72	100.03	100.00
DENS, g/cc	0.004	0.049	0.031	0.031	0.037	0.037	0.004	0.788
AV. MOL. WT	12.38	23.48	20.63	20.66	24.29	24.32	34.70	32.35
M3/hr	810.4	2385.9	3183.6	3196.2	2710.3	2708.6	4.4	-----
ksmol/hr	36.16	106.44	142.03	142.59	120.92	120.79	0.20	10.90
1/hr, PROD	-----	-----	-----	-----	-----	-----	-----	447.39

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(Z) :	42.6	42.0
CARBON MONOXIDE CONVERSION	(Z) :	14.9	15.9
CARBON DIOXIDE CONVERSION	(Z) :	-1.9	-1.2
RATIO H2 CONSUMED/CO CONSUMED	:	1.98	1.83
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(Z) :	41.7	43.3
CARBON MONOXIDE CONVERSION	(Z) :	14.5	14.9
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(Z) :	43.5	43.5
CARBON MONOXIDE CONVERSION	(Z) :	15.0	14.9
RATIO H2 CONSUMED/CO CONSUMED	:	2.01	2.01

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL *
CO (+CO2) SELECTIVITY TO METHANOL (Z) :	97.8	97.0
CO (+CO2) SELECTIVITY TO ETHANOL (Z) :		0.6

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	smol/hr-kg cat	kg/1000 Me3 fresh feed	kg/1000 Me3 reactor feed
As calculated ACROSS REACTOR	21.90	421.0	106.7
As Net MeOH produced, OVERALL balance	21.87	420.4	106.6

REACTOR FEED $\{H_2/(CO+1.5CO_2)\}$: 0.51
 REACTOR FEED $\{(H_2-CO_2)/(CO+CO_2)\}$: 0.38

APPROACH TO METHANOL EQUILIBRIUM (deg.C) : 13.82
 APPROACH TO WATER-GAS EQUILIBRIUM (deg.C) : 16.14

METHANOL COLLECTED AS % OF CALCULATED : 99.5

CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) : 10.65

LAPORTE LPMEETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<Z diff.>	<Z diff.>	<Z diff.>
H2	-27.69372	-0.27479	0.21779
CO	-13.34131	0.08456	-1.03470
CO2	n.a.	-0.28243	1.67879
N2	-936.21417	-0.81392	-3.80607
CH4	100.00000	-3.93599	-3.70021
H2O	-----	n.a.	n.a.
CH3OH	-----	9.08695	1.50092

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	Z
CARBON:							
CO	72.6073	59.5965	2.0927	0.0659	-----	61.7551	14.9465
CO2	16.4835	15.7320	0.5524	0.1098	-----	16.3943	0.5413
CH3OH	0.5881	0.6360	0.0223	0.0154	10.5934	11.2672	-1015.8375
OTHERS	0.6702	0.6812	0.0239	0.0025	0.2180	0.9256	-38.1199
TOTAL C	90.3491	76.6459	2.6913	0.1936	10.8114	90.3422	0.0077
HYDROGEN:							
H2	100.2130	55.9882	1.9660	0.0312	-----	57.9853	42.1379
H2O	0.0000	0.0000	0.0000	0.0000	0.2583	0.2583	n.a.
OTHERS	5.0046	5.2052	0.1828	0.0695	43.2456	48.7031	-873.1625
TOTAL H	105.2176	61.1934	2.1487	0.1006	43.5040	106.9467	-1.6434
OXYGEN:							
TOTAL O	106.1768	91.7286	3.2210	0.3019	10.7893	106.0408	0.1280
NITROGEN:							
TOTAL N	3.6788	3.5551	0.1248	0.0102	-----	3.6902	-0.3089
TOTAL MASS FLOW (kg/hr)	2945.9302	2499.2444	87.7584	7.3976	352.5604	2946.9607	-0.0350

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]		FRESH FEED GAS
	GC#1	GC#2	[15-(50+62+68)]
MASS BALANCE (Z) :	-0.30	0.30	-0.03
ELEMENTAL BALANCE (Z) :			
CARBON	0.01	0.50	0.68
HYDROGEN	0.73	-1.20	-4.00
OXYGEN	-0.30	0.23	1.26
NITROGEN	-1.96	3.37	-43.68

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY
=====

DATE :	05-DEC-89
TIME :	15:22:02
TIME INTERVAL :	FROM: 2000 29-Aug
	TO: 2000 30-Aug
NUMBER OF AVERAGED HOURS :	24
RUN ID NUMBER :	E6C
FEED GAS TYPE:	CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) :	149.7
OIL/SLURRY REACTOR INLET TEMP. (des.C) :	26.8
AVG. REACTOR SLURRY TEMPERATURE (des.C) :	250.0
REACTOR FREEBOARD TEMPERATURE (des.C) :	240.7
OIL/SLURRY OUTLET TEMP. (des.C) :	236.1
REACTOR FEED GAS PRESSURE (kPa) :	5387
REACTOR EFFLUENT GAS PRESSURE (kPa) :	5282
GAS SUPERFICIAL VELOCITY (cm/sec) :	9.1
LIQUID SUPERFICIAL VELOCITY (cm/sec) :	0.0
SLURRY CONCENTRATION (wtZ) :	39.0
CATALYST OXIDE IN REACTOR (kg oxide) :	486
GAS HOLD-UP (Z) :	17.6
SPACE VELOCITY (1/kg-hr) :	4672
RECYCLE/FRESH FEED RATIO :	2.485
OIL/SLURRY CIRCULATION RATE (m3/hr) :	0.0
PROD. SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) :	78.70
PURGE GAS FLOW RATE <50> (ksmol/hr) :	6.45
HEAT TRANSFER COEFFICIENT (Watt/m2-des.C) :	541

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
=====	=====	=====	=====	=====	=====	=====	=====	=====
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	57.17	26.47	34.16	34.94	23.30	23.14	7.31	-----
CO	38.65	56.32	51.00	50.98	51.20	50.85	30.90	-----
CO2	3.42	15.49	13.96	12.63	15.47	15.34	51.52	-----
N2	0.15	0.79	0.41	0.55	0.75	0.64	2.40	-----
CH4	0.01	0.28	0.13	0.20	0.24	0.25	0.21	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.69
CH3OH	0.00	0.56	0.43	0.34	8.78	9.55	7.20	96.64
DME	0.00	0.04	0.00	0.00	0.06	0.00	0.49	0.06
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.75
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.29
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.24
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.14
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.98
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.21
TOTAL :	99.39	99.67	99.82	99.66	99.85	99.62	100.03	100.00
DENS,g/cc	0.005	0.046	0.031	0.031	0.037	0.037	0.004	0.789
AV.MOL.WT	13.62	22.59	20.63	20.62	24.46	24.44	34.70	32.28
Mm3/hr	651.8	1619.4	2271.3	2271.3	1915.6	1916.3	4.8	-----
ksmol/hr	29.08	72.25	101.33	101.33	85.46	95.46	0.22	7.52
l/hr,prod	-----	-----	-----	-----	-----	-----	-----	307.49

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(Z) :	42.8	43.8
CARBON MONOXIDE CONVERSION	(Z) :	15.9	15.3
CARBON DIOXIDE CONVERSION	(Z) :	7.3	-3.3
RATIO H2 CONSUMED/CO CONSUMED	:	1.81	1.96
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(Z) :	44.7	40.5
CARBON MONOXIDE CONVERSION	(Z) :	15.0	13.9
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(Z) :	43.5	42.5
CARBON MONOXIDE CONVERSION	(Z) :	14.4	14.4
RATIO H2 CONSUMED/CO CONSUMED	:	2.02	2.02

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL *
CO (+CO2) SELECTIVITY TO METHANOL (Z) :	89.1	99.5
CO (+CO2) SELECTIVITY TO ETHANOL (Z) :		0.5

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	kmol/hr-kg cat	kg/1000 Na3 fresh feed	kg/1000 Na3 reactor feed
As calculated ACROSS REACTOR	15.32	366.2	105.1
As Net MeOH produced, OVERALL balance	15.16	362.4	104.0

REACTOR FEED $\{H_2/(CO+1.5CO_2)\}$:	0.50
REACTOR FEED $\{(H_2-CO_2)/(CO+CO_2)\}$:	0.35
APPROACH TO METHANOL EQUILIBRIUM (des.C) :	14.66
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) :	12.98
METHANOL COLLECTED AS % OF CALCULATED :	98.2
CALCULATED METHANOL PRODUCTION RATE (Kmol/hr) :	7.45

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT MATERIAL BALANCE SUMMARY

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<Z diff.>	<Z diff.>	<Z diff.>
H2	-27.38776	0.96042	-4.70624
CO	-7.81990	0.52107	-1.46461
CO2	n.a.	-5.02519	6.88741
N2	-861.59174	9.28725	2.13016
CH4	99.35894	1.23831	-7.67759
H2O	-----	n.a.	n.a.
CH3OH	-----	15.73267	-3.59148

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	Z
CARBON:							
CO	51.6572	40.6892	3.6352	0.0715	-----	44.3959	14.0568
CO2	12.7978	11.1910	0.9998	0.1192	-----	12.3100	3.8117
CH3OH	0.3415	0.4052	0.0362	0.0167	7.3177	7.7758	-2177.0679
OTHERS	0.2027	0.2601	0.0232	0.0028	0.0752	0.3612	-78.2518
TOTAL C	64.9991	52.5455	4.6945	0.2101	7.3929	64.8429	0.2403
HYDROGEN:							
H2	70.8083	38.2472	3.4171	0.0338	-----	41.6981	41.1112
H2O	0.0000	0.0000	0.0000	0.0000	0.1859	0.1859	n.a.
OTHERS	2.1766	2.6035	0.2326	0.0754	29.7971	32.7086	-1402.7609
TOTAL H	72.9848	40.8508	3.6497	0.1092	29.9830	74.5926	-2.2029
OXYGEN:							
TOTAL O	77.5942	63.5053	5.6736	0.3276	7.5163	77.0228	0.7364
NITROGEN:							
TOTAL N	1.1146	1.1415	0.1020	0.0111	-----	1.2546	-12.5575
TOTAL MASS FLOW (ks/hr)	2089.3914	1632.0464	145.8091	8.0272	242.6257	2028.5083	2.9139

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS
	GC#1	GC#2
	-----	-----
MASS BALANCE (Z) :	0.04	-0.11
ELEMENTAL BALANCE (Z) :		
CARBON	2.14	0.32
HYDROGEN	-2.23	2.75
OXYGEN	3.15	-0.21
NITROGEN	-31.70	-15.01
		[15-(50+62+68)]

		-0.50
		-1.45
		-2.19
		-29.64

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

DATE : 05-DEC-90
TIME : 15:23:57
TIME INTERVAL : FROM: 2000 30-AUG TO: 2100 30-AUG
NUMBER OF AVERAGED HOURS : 1
RUN ID NUMBER : E6B
FEED GAS TYPE: CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 151.6
OIL/SLURRY REACTOR INLET TEMP. (deg.C) : 28.1
AVG. REACTOR SLURRY TEMPERATURE (deg.C) : 249.7
REACTOR FREEBOARD TEMPERATURE (deg.C) : 242.4
OIL/SLURRY OUTLET TEMP. (deg.C) : 238.2
REACTOR FEED GAS PRESSURE (kPa) : 5394
REACTOR EFFLUENT GAS PRESSURE (kPa) : 5275
GAS SUPERFICIAL VELOCITY (cm/sec) : 9.1
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 0.0
SLURRY CONCENTRATION (wt%) : 37.7
CATALYST OXIDE IN REACTOR (kg oxide) : 485
GAS HOLD-UP (%) : 19.0
SPACE VELOCITY (1/kg-hr) : 4707
RECYCLE/FRESH FEED RATIO : 2.711
OIL/SLURRY CIRCULATION RATE (m3/hr) : 0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 80.17
PURGE GAS FLOW RATE <50> (ksmol/hr) : 5.62
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) : 576

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEOH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	56.63	25.24	35.47	35.02	23.98	22.69	7.31	-----
CO	38.99	57.18	51.47	51.39	51.24	51.80	30.90	-----
CO2	3.72	16.07	12.20	12.24	14.65	15.01	51.52	-----
N2	0.13	0.68	0.49	0.51	0.60	0.61	2.40	-----
CH4	0.00	0.23	0.18	0.16	0.20	0.21	0.21	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.52
CH3OH	0.00	0.56	0.41	0.32	9.28	9.55	7.20	95.79
DME	0.00	0.04	0.00	0.00	0.04	0.00	0.49	0.08
C2H5OH	-----	-----	-----	-----	-----	-----	-----	1.09
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.47
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.34
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.24
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	1.24
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.22
TOTAL :	99.47	100.00	100.23	99.65	99.99	99.88	100.03	100.00
DENS,g/cc	0.005	0.049	0.031	0.032	0.037	0.038	0.004	0.788
AV.MOL.WT	13.81	24.01	20.75	20.83	24.48	24.87	34.70	32.48
Nm3/hr	616.3	1671.0	2286.1	2287.4	1934.4	1919.1	9.5	-----
ksmol/hr	27.50	74.55	101.99	102.05	86.30	85.58	0.42	7.05
l/hr,prod	-----	-----	-----	-----	-----	-----	-----	290.69

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
		----	----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	46.3	42.1
CARBON MONOXIDE CONVERSION	(%) :	15.5	15.7
CARBON DIOXIDE CONVERSION	(%) :	-3.3	-1.2
RATIO H2 CONSUMED/CO CONSUMED	:	2.06	1.93
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	42.9	43.0
CARBON MONOXIDE CONVERSION	(%) :	14.8	14.6
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	39.1	39.6
CARBON MONOXIDE CONVERSION	(%) :	13.6	13.6
RATIO H2 CONSUMED/CO CONSUMED	:	1.99	1.99

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL %
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (%) :	97.6	95.3
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.7

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	kmol/hr-kg cat	kg/1000 Mm3 fresh feed	kg/1000 Mm3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	15.88	401.1	108.1
As Net MeOH produced, OVERALL balance	14.23	359.4	96.8

REACTOR FEED {H2/(CO+1.5CO2)} :	0.50
REACTOR FEED {(H2-CO2)/(CO+CO2)} :	0.36
APPROACH TO METHANOL EQUILIBRIUM (deg.C) :	14.90
APPROACH TO WATER-GAS EQUILIBRIUM (deg.C) :	-6.28
METHANOL COLLECTED AS % OF CALCULATED :	88.8
CALCULATED METHANOL PRODUCTION RATE (Kmol/hr) :	7.72

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT MATERIAL BALANCE SUMMARY

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<Z diff.>	<Z diff.>	<Z diff.>
H2	-20.24310	-3.92411	2.06049
CO	-2.54205	1.69820	-3.98425
CO2	n.a.	3.93993	-3.75094
N2	-688.06683	4.09770	-7.38691
CH4	100.00000	4.77475	-7.38467
H2O	-----	n.a.	n.a.
CH3OH	-----	20.84391	8.48100

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	52.4423	42.6273	3.2135	0.1402	-----	45.9809	12.3210
CO2	12.4906	11.9801	0.9031	0.2537	-----	13.1169	-5.0137
CH3OH	0.3310	0.4182	0.0315	0.0327	6.8476	7.3300	-2114.5127
OTHERS	0.1633	0.2311	0.0174	0.0054	0.2116	0.4655	-185.1032
TOTAL C	65.4273	55.2566	4.1656	0.4119	7.0592	66.8933	-2.2407
HYDROGEN:							
H2	71.4743	37.6325	2.8370	0.0663	-----	40.5358	43.2862
H2O	0.0000	0.0000	0.0000	0.0000	0.1322	0.1322	n.a.
OTHERS	1.9771	2.5374	0.1913	0.1478	28.0252	30.9017	-1462.9882
TOTAL H	73.4513	40.1699	3.0283	0.2141	28.1575	71.5697	2.5617
OXYGEN:							
TOTAL O	77.7546	67.0354	5.0535	0.6424	6.9823	79.7136	-2.5194
NITROGEN:							
TOTAL N	1.0409	1.0139	0.0764	0.0218	-----	1.1121	-6.8391
TOTAL MASS FLOW (ks/hr)	2125.6550	1789.9285	134.9357	15.7396	229.0748	2169.6787	-2.0711

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]		FRESH FEED GAS
	GC#1	GC#2	[15-(50+62+68)]
MASS BALANCE (Z) :	-0.62	0.62	0.00
ELEMENTAL BALANCE (Z) :			
CARBON	-0.02	0.48	0.91
HYDROGEN	3.34	-1.19	-0.82
OXYGEN	-0.55	0.27	0.69
NITROGEN	-4.51	0.51	-37.36

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY
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DATE : 05-DEC-89
TIME : 15:25:22
TIME INTERVAL : FROM: 2100 30-Aus
                TO:  2400 30-Aus
                4
NUMBER OF AVERAGED HOURS :
RUN ID NUMBER : E6D
FEED GAS TYPE: CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) : 158.4
OIL/SLURRY REACTOR INLET TEMP. (des.C) : 47.9
AVG. REACTOR SLURRY TEMPERATURE (des.C) : 249.4
REACTOR FREEBOARD TEMPERATURE (des.C) : 245.8
OIL/SLURRY OUTLET TEMP. (des.C) : 242.0
REACTOR FEED GAS PRESSURE (kPa) : 5450
REACTOR EFFLUENT GAS PRESSURE (kPa) : 5285
GAS SUPERFICIAL VELOCITY (cm/sec) : 10.4
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 0.0
SLURRY CONCENTRATION (wt%) : 37.7
CATALYST OXIDE IN REACTOR (kg oxide) : 485
GAS HOLD-UP (%) : 18.0
SPACE VELOCITY (1/kg-hr) : 4661
RECYCLE/FRESH FEED RATIO : 2.277
OIL/SLURRY CIRCULATION RATE (m3/hr) : 0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 77.84
PURGE GAS FLOW RATE <50> (ksmol/hr) : 7.64
HEAT TRANSFER COEFFICIENT (Watt/m2-des.C) : 700
  
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STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEOH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
=====	=====	=====	=====	=====	=====	=====	=====	=====
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	56.47	28.05	35.21	34.94	23.30	23.14	7.31	-----
CO	39.28	55.66	50.76	50.98	51.20	50.85	30.90	-----
CO2	3.61	14.58	12.67	12.63	15.47	15.34	51.52	-----
N2	0.16	0.74	0.57	0.55	0.75	0.64	2.40	-----
CH4	0.00	0.21	0.21	0.20	0.24	0.25	0.21	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.58
CH3OH	0.00	0.60	0.47	0.35	8.78	9.55	7.20	95.19
DME	0.01	0.04	0.00	0.00	0.06	0.00	0.49	0.10
C2H5OH	-----	-----	-----	-----	-----	-----	-----	1.22
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.54
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.40
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.27
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	1.37
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.34
TOTAL :	99.52	99.88	99.90	99.64	99.87	99.76	100.03	100.09
DENS,g/cc	0.005	0.048	0.033	0.032	0.038	0.038	0.004	0.787
AV.MOL.WT	13.84	23.04	22.14	20.91	24.75	24.79	34.70	32.56
Na3/hr	691.2	1573.6	2264.8	2264.8	1968.7	1967.1	3.8	-----
ksmol/hr	30.84	70.20	101.04	101.04	87.83	87.72	0.17	7.52
l/hr:prod	-----	-----	-----	-----	-----	-----	-----	311.13

LAPORTE LPETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

CONVERSIONS ACROSS REACTOR :

	GC#1	GC#2
CALCULATED BY GAS COMPOSITION		
HYDROGEN CONVERSION (Z) :	42.9	42.0
CARBON MONOXIDE CONVERSION (Z) :	13.0	12.7
CARBON DIOXIDE CONVERSION (Z) :	-5.1	-6.5
RATIO H2 CONSUMED/CO CONSUMED :	2.29	2.27
CALCULATED BY METHANOL IN EXIT GAS		
HYDROGEN CONVERSION (Z) :	44.4	41.7
CARBON MONOXIDE CONVERSION (Z) :	15.4	14.3
CALCULATED BY OVERALL BALANCE		
HYDROGEN CONVERSION (Z) :	42.4	42.8
CARBON MONOXIDE CONVERSION (Z) :	14.7	14.7
RATIO H2 CONSUMED/CO CONSUMED :	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL %
CO (+CO2) SELECTIVITY TO METHANOL (Z) :	130.1	95.1
CO (+CO2) SELECTIVITY TO ETHANOL (Z) :		0.8

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	smol/hr-ks cat	kg/1000 Na3 fresh feed	kg/1000 Na3 reactor feed
As calculated ACROSS REACTOR	15.70	353.7	107.9
As Net MeOH produced, OVERALL balance	15.09	340.0	103.8

REACTOR FEED (H2/(CO+1.5CO2)) :	0.50
REACTOR FEED ((H2-CO2)/(CO+CO2)) :	0.35
APPROACH TO METHANOL EQUILIBRIUM (deg.C) :	15.28
APPROACH TO WATER-GAS EQUILIBRIUM (deg.C) :	1.79
METHANOL COLLECTED AS % OF CALCULATED :	95.4
CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) :	7.63

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
-----	<% diff.>	<% diff.>	<% diff.>
H2	-18.92625	4.85329	-6.75783
CO	-1.57207	-0.63346	3.52965
CO2	n.a.	-12.45032	15.78517
N2	-81.28513	2.83635	12.36246
CH4	100.00000	-34.33471	22.91426
H2O	-----	n.a.	n.a.
CH3OH	-----	14.56873	-0.48557

STREAM #	INPUTS		OUTPUTS				(IN-OUT)/IN
	15	55	50	62	68	TOTAL	
STREAM NAME	REACTOR FEED	RECYCLE	PURGE GAS	FLASH GAS	MeOH PRODUCT		%
CARBON:							
C0	51.5108	39.0742	4.2516	0.0561	-----	43.3819	15.7811
C02	12.7615	10.2354	1.1137	0.0935	-----	11.4426	10.3354
CH3OH	0.3584	0.4195	0.0456	0.0131	7.2738	7.7520	-2063.0845
OTHERS	0.1980	0.2036	0.0222	0.0022	0.2256	0.4535	-128.9998
TOTAL C	64.8288	49.9327	5.4330	0.1648	7.4994	63.0799	2.7747
HYDROGEN:							
H2	70.6076	39.3831	4.2852	0.0265	-----	43.6948	38.1160
H2O	0.0000	0.0000	0.0000	0.0000	0.1577	0.1577	n.a.
OTHERS	2.2257	2.4361	0.2651	0.0591	29.9224	32.6828	-1368.4459
TOTAL H	72.8333	41.8193	4.5502	0.0857	30.0801	76.5353	-5.0828
OXYGEN:							
TOTAL O	77.3922	59.9926	6.5276	0.2570	7.4454	74.2726	4.0955
NITROGEN:							
TOTAL N	1.1054	1.0390	0.1130	0.0087	-----	1.1607	-5.0074
TOTAL MASS FLOW							
(kg/hr)	2112.3684	1617.4460	175.9900	6.2958	244.8704	2044.6023	3.2081

	REACTOR FEED GAS	[15 - 32]	FRESH FEED GAS
	GC#1	GC#2	[15-(50+62+68)]
MASS BALANCE (%) :	2.75	-2.91	-0.09
ELEMENTAL BALANCE (%) :			
CARBON	-2.93	-2.72	1.02
HYDROGEN	-1.49	-0.17	0.37
OXYGEN	-3.29	-3.26	0.78
NITROGEN	2.53	-19.82	-23.39

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

DATE : 08-Nov-90
TIME : 10:37:10
TIME INTERVAL : FROM: 0400 31-Aug TO: 0400 01-Sep
NUMBER OF AVERAGED HOURS : 24
RUN ID NUMBER : E6E
FEED GAS TYPE: CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 148.9
OIL/SLURRY REACTOR INLET TEMP. (deg.C) : 28.5
AVG. REACTOR SLURRY TEMPERATURE (deg.C) : 250.1
REACTOR FREEBOARD TEMPERATURE (deg.C) : 240.0
OIL/SLURRY OUTLET TEMP. (deg.C) : 235.6
REACTOR FEED GAS PRESSURE (kPa) : 5388
REACTOR EFFLUENT GAS PRESSURE (kPa) : 5287
GAS SUPERFICIAL VELOCITY (cm/sec) : 8.5
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 0.0
SLURRY CONCENTRATION (wt%): 34.9
CATALYST OXIDE IN REACTOR (kg oxide) : 403
GAS HOLD-UP (Z) : 19.0
SPACE VELOCITY (1/kg-hr) : 5327
RECYCLE/FRESH FEED RATIO : 2.439
OIL/SLURRY CIRCULATION RATE (m3/hr) : 0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 72.36
PURGE GAS FLOW RATE <50> (ksmol/hr) : 4.41
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) : 545

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT	=====	=====	=====	=====	=====	=====	=====	=====
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	59.03	25.23	35.34	34.93	22.72	22.72	7.31	-----
CO	36.95	56.74	51.21	51.14	51.18	51.10	30.90	-----
CO2	2.32	15.63	11.94	11.93	14.47	14.49	51.52	-----
N2	0.15	1.39	1.05	1.00	1.25	1.27	2.40	-----
CH4	0.00	0.38	0.29	0.28	0.35	0.35	0.21	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.43
CH3OH	0.00	0.55	0.44	0.35	9.86	9.93	7.20	96.01
DME	0.00	0.03	0.00	0.01	0.04	0.00	0.49	0.08
C2H5OH	-----	-----	-----	-----	-----	-----	-----	1.04
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.44
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.34
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.21
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	1.22
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.23
TOTAL :	98.46	99.95	100.27	99.65	99.87	99.86	100.03	100.00
DENS,g/cc	0.004	0.049	0.032	0.032	0.038	0.038	0.004	0.789
AV.MOL.WT	12.80	23.92	20.73	20.78	24.78	24.77	34.70	32.48
M3/hr	624.4	1523.1	2151.5	2147.4	1800.5	1800.8	9.1	-----
ksmol/hr	27.86	67.95	95.98	95.80	80.32	80.30	0.40	7.27
1/hr,Prod	-----	-----	-----	-----	-----	-----	-----	299.09

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		GC#1 ----	GC#2 ----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(Z) :	46.2	45.5
CARBON MONOXIDE CONVERSION	(Z) :	16.5	16.1
CARBON DIOXIDE CONVERSION	(Z) :	-1.6	-1.7
RATIO H2 CONSUMED/CO CONSUMED	:	1.93	1.93
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(Z) :	44.6	45.3
CARBON MONOXIDE CONVERSION	(Z) :	15.4	15.5
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(Z) :	43.0	43.6
CARBON MONOXIDE CONVERSION	(Z) :	14.9	15.0
RATIO H2 CONSUMED/CO CONSUMED	:	1.99	1.99

SELECTIVITIES :

	ACROSS REACTOR GC Average -----	OVERALL *
CO (+CO2) SELECTIVITY TO METHANOL (Z) :	97.0	96.5
CO (+CO2) SELECTIVITY TO ETHANOL (Z) :	-----	0.7

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	kmol/hr-kg cat -----	kg/1000 Nm3 fresh feed -----	kg/1000 Nm3 reactor feed -----
As calculated ACROSS REACTOR	18.78	388.6	113.0
As Net MeOH produced, OVERALL balance	17.68	365.7	106.3

REACTOR FEED (H2/(CO+1.5CO2)) :	0.51
REACTOR FEED ((H2-CO2)/(CO+CO2)) :	0.36
APPROACH TO METHANOL EQUILIBRIUM (des.C) :	10.73
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) :	-8.02
METHANOL COLLECTED AS % OF CALCULATED :	93.4
CALCULATED METHANOL PRODUCTION RATE (Kmol/hr) :	7.57

LAPORTE LPMEETHANOL PROCESS AVERAGE REPORT MATERIAL BALANCE SUMMARY

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<Z diff.>	<Z diff.>	<Z diff.>
H2	-37.82037	0.36670	-0.21611
CO	-14.25002	-0.29738	-0.20331
CO2	n.a.	-1.44250	0.75869
N2	-821.19110	2.86457	-1.21991
CH4	100.00000	-3.88840	1.86374
H2O	-----	n.a.	n.a.
CH3OH	-----	10.15192	5.29131

OVERALL ELEMENTAL BALANCE (Kg-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	Z
CARBON:							
CO	48.9938	38.5546	2.5042	0.1346	-----	41.1934	15.9212
CO2	11.4293	10.6205	0.6898	0.2243	-----	11.5347	-0.9220
CH3OH	0.3350	0.3728	0.0242	0.0314	7.0715	7.4998	-2138.9961
OTHERS	0.2874	0.2990	0.0194	0.0052	0.2180	0.5416	-88.4264
TOTAL C	61.0455	49.8470	3.2376	0.3954	7.2894	60.7695	0.4521
HYDROGEN:							
H2	66.9281	34.2874	2.2270	0.0637	-----	36.5781	45.3472
H2O	0.0000	0.0000	0.0000	0.0000	0.1127	0.1127	n.a.
OTHERS	2.4703	2.6464	0.1719	0.1419	28.9397	31.8999	-1191.3196
TOTAL H	69.3984	36.9338	2.3989	0.2056	29.0524	68.5907	1.1640
OXYGEN:							
TOTAL O	72.1969	60.1889	3.9094	0.6167	7.1932	71.9082	0.3999
NITROGEN:							
TOTAL N	1.9161	1.8890	0.1227	0.0209	-----	2.0326	-6.0818
TOTAL MASS FLOW (kg/hr)	1990.7905	1625.3562	105.5693	15.1100	235.9956	1982.0311	0.4400

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]		FRESH FEED GAS
	GC#1	GC#2	[15-(50+62+68)]
MASS BALANCE (Z) :	-0.02	0.02	-0.03
ELEMENTAL BALANCE (Z) :			
CARBON	0.58	0.08	0.15
HYDROGEN	1.54	-0.13	3.74
OXYGEN	0.25	-0.15	-1.15
NITROGEN	-1.24	-4.80	-71.83

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

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=====
DATE : 05-DEC-89
TIME : 15:28:30
TIME INTERVAL : FROM: 0600 01-Sep
                TO: 0600 02-Sep

NUMBER OF AVERAGED HOURS : 24
RUN ID NUMBER : E6F
FEED GAS TYPE: CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) : 161.5
OIL/SLURRY REACTOR INLET TEMP. (des.C) : 28.0
AVG. REACTOR SLURRY TEMPERATURE (des.C) : 250.1
REACTOR FREEBOARD TEMPERATURE (des.C) : 245.2
OIL/SLURRY OUTLET TEMP. (des.C) : 241.9
REACTOR FEED GAS PRESSURE (kPa) : 5527
REACTOR EFFLUENT GAS PRESSURE (kPa) : 5282
GAS SUPERFICIAL VELOCITY (cm/sec) : 15.2
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 0.0
SLURRY CONCENTRATION (wt%) : 36.7
CATALYST OXIDE IN REACTOR (kg oxide) : 403
GAS HOLD-UP (%) : 30.0
SPACE VELOCITY (1/kg-hr) : 9462
RECYCLE/FRESH FEED RATIO : 3.457
OIL/SLURRY CIRCULATION RATE (m3/hr) : 0.0
PROD. SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 135.35
PURGE GAS FLOW RATE <50> (ksmol/hr) : 3.36
HEAT TRANSFER COEFFICIENT (Watt/m2-des.C) : 619
  
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STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT	=====	=====	=====	=====	=====	=====	=====	=====
	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<WT%>
H2	59.27	26.11	35.13	34.71	23.84	24.06	7.31	-----
CO	35.65	56.04	51.08	50.96	51.08	51.04	30.90	-----
CO2	2.42	15.35	12.27	12.24	14.40	14.43	51.52	-----
N2	0.14	1.46	1.14	1.13	1.33	1.34	2.40	-----
CH4	0.00	0.43	0.35	0.33	0.39	0.41	0.21	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.53
CH3OH	0.00	0.59	0.47	0.41	8.91	8.92	7.20	96.70
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.49	0.05
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.79
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.31
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.24
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.14
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	1.02
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.22
TOTAL :	97.49	99.98	100.44	99.79	99.96	100.21	100.03	100.00
DENS, g/cc	0.005	0.050	0.032	0.032	0.037	0.037	0.004	0.788
AV. MOL. WT	12.60	23.64	20.84	20.90	24.43	24.38	34.70	32.34
Mm3/hr	855.9	2958.5	3819.8	3814.4	3263.1	3266.5	13.0	-----
ksmol/hr	38.18	131.99	170.41	170.17	145.58	145.66	0.58	11.76
1/hr, PROD	-----	-----	-----	-----	-----	-----	-----	482.81

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(Z) :	41.4	41.2
CARBON MONOXIDE CONVERSION	(Z) :	14.6	14.3
CARBON DIOXIDE CONVERSION	(Z) :	-0.6	-0.6
RATIO H2 CONSUMED/CO CONSUMED	:	1.96	1.97
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(Z) :	40.7	41.6
CARBON MONOXIDE CONVERSION	(Z) :	14.0	14.2
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(Z) :	39.3	39.9
CARBON MONOXIDE CONVERSION	(Z) :	13.5	13.6
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL *
CO (+CO2) SELECTIVITY TO METHANOL (Z) :	98.8	98.3
CO (+CO2) SELECTIVITY TO ETHANOL (Z) :		0.6

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	kmol/hr-ks cat	ks/1000 Na3 fresh feed	ks/1000 Na3 reactor feed
As calculated ACROSS REACTOR	30.35	458.0	102.8
As Net MeOH produced, OVERALL balance	28.65	432.3	97.0

REACTOR FEED (H2/(CO+1.5CO2)) : 0.50
REACTOR FEED ((H2-CO2)/(CO+CO2)) : 0.36

APPROACH TO METHANOL EQUILIBRIUM (des.C) : 15.22
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) : -5.27

METHANOL COLLECTED AS % OF CALCULATED : 93.9

CALCULATED METHANOL PRODUCTION RATE (Kmol/hr) : 12.23

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT MATERIAL BALANCE SUMMARY

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-12.47931	-3.45486	-1.95813
CO	-3.13257	0.98125	-2.26066
CO2	n.a.	1.67672	-0.63534
N2	n.a.	2.90546	-2.83238
CH4	100.00000	1.05392	-2.74008
H2O	-----	n.a.	n.a.
CH3OH	-----	9.15640	5.05978

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	86.7204	73.9668	1.8836	0.1920	-----	76.0424	12.3131
CO2	20.8292	20.2603	0.5159	0.3202	-----	21.0964	-1.2829
CH3OH	0.7019	0.7726	0.0197	0.0448	11.4813	12.3183	-1655.0758
OTHERS	0.5616	0.5676	0.0145	0.0074	0.2353	0.8247	-46.8557
TOTAL C	108.8130	95.5673	2.4336	0.5643	11.7166	110.2818	-1.3498
HYDROGEN:							
H2	118.1343	68.9248	1.7552	0.0909	-----	70.7708	40.0930
H2O	0.0000	0.0000	0.0000	0.0000	0.2239	0.2239	n.a.
OTHERS	5.0538	5.3607	0.1365	0.2025	46.7487	52.4484	-937.8084
TOTAL H	123.1881	74.2854	1.8917	0.2934	46.9725	123.4430	-0.2069
OXYGEN:							
TOTAL O	129.0807	115.2601	2.9351	0.8801	11.6473	130.7226	-1.2720
NITROGEN:							
TOTAL N	3.8459	3.8541	0.0981	0.0298	-----	3.9821	-3.5399
TOTAL MASS FLOW (ks/hr)	3556.6233	3120.2256	79.4564	21.5632	380.4789	3601.7241	-1.2681

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS [15-(50+62+68)]
	GC#1	GC#2
MASS BALANCE (Z) :	-0.04	0.00
ELEMENTAL BALANCE (Z) :		
CARBON	0.32	-0.05
HYDROGEN	0.62	-0.32
OXYGEN	0.16	-0.14
NITROGEN	-0.52	-0.69

APPENDIX B
RUN E-7
DETAILED DATA ACQUISITION SHEETS

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

DATE : 05-DEC-90
TIME : 09:01:08
TIME INTERVAL : FROM: 0400 01-Sep TO: 0400 02-Sep
NUMBER OF AVERAGED HOURS : 24
RUN ID NUMBER : E7.1
FEED GAS TYPE: CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 141.5
OIL/SLURRY REACTOR INLET TEMP. (deg.C) : 28.0
AVG. REACTOR SLURRY TEMPERATURE (deg.C) : 250.1
REACTOR FREEBOARD TEMPERATURE (deg.C) : 245.2
OIL/SLURRY OUTLET TEMP. (deg.C) : 241.9
REACTOR FEED GAS PRESSURE (kPa) : 5527
REACTOR EFFLUENT GAS PRESSURE (kPa) : 5282
GAS SUPERFICIAL VELOCITY (cm/sec) : 15.2
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 0.0
SLURRY CONCENTRATION (wt%) : 36.7
CATALYST OXIDE IN REACTOR (kg oxide) : 403
GAS HOLD-UP (%) : 30.0
SPACE VELOCITY (1/kg-hr) : 9462
RECYCLE/FRESH FEED RATIO : 3.457
OIL/SLURRY CIRCULATION RATE (m3/hr) : 0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 135.35
PURGE GAS FLOW RATE <50> (ksmol/hr) : 3.36
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) : 619

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEOH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
=====	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	59.27	26.11	35.13	34.71	23.84	24.06	7.31	-----
CO	35.65	56.04	51.08	50.96	51.08	51.04	30.90	-----
CO2	2.42	15.35	12.27	12.24	14.40	14.43	51.52	-----
N2	0.14	1.46	1.14	1.13	1.33	1.34	2.40	-----
CH4	0.00	0.43	0.35	0.33	0.39	0.41	0.21	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.53
CH3OH	0.00	0.59	0.47	0.41	8.91	8.92	7.20	96.70
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.49	0.05
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.79
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.31
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.24
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.14
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	1.02
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.22
TOTAL :	97.49	99.98	100.44	99.79	99.96	100.21	100.03	100.00
DENS,g/cc	0.005	0.050	0.032	0.032	0.037	0.037	0.004	0.788
AV.MOL.WT	12.60	23.64	20.84	20.90	24.43	24.38	34.70	32.34
Mm3/hr	855.9	2958.5	3819.8	3814.4	3263.1	3266.5	13.0	-----
ksmol/hr	38.18	131.99	170.41	170.17	145.58	145.66	0.59	11.76
l/hr:prod	-----	-----	-----	-----	-----	-----	-----	482.81

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

CONVERSIONS ACROSS REACTOR :

	GC#1	GC#2
CALCULATED BY GAS COMPOSITION		
HYDROGEN CONVERSION (Z) :	41.4	41.2
CARBON MONOXIDE CONVERSION (Z) :	14.6	14.3
CARBON DIOXIDE CONVERSION (Z) :	-0.6	-0.6
RATIO H2 CONSUMED/CO CONSUMED :	1.96	1.97
CALCULATED BY METHANOL IN EXIT GAS		
HYDROGEN CONVERSION (Z) :	40.7	41.6
CARBON MONOXIDE CONVERSION (Z) :	14.0	14.2
CALCULATED BY OVERALL BALANCE		
HYDROGEN CONVERSION (Z) :	39.3	39.9
CARBON MONOXIDE CONVERSION (Z) :	13.5	13.4
RATIO H2 CONSUMED/CO CONSUMED :	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL %
CO (+CO2) SELECTIVITY TO METHANOL (Z) :	98.8	99.3
CO (+CO2) SELECTIVITY TO ETHANOL (Z) :		0.6

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	mol/hr-kg cat	kg/1000 Na3 fresh feed	kg/1000 Na3 reactor feed
As calculated ACROSS REACTOR	30.35	458.0	102.8
As Net MeOH produced, OVERALL balance	28.65	432.3	97.0
REACTOR FEED $\{H_2/(CO+1.5CO_2)\}$:		0.59	
REACTOR FEED $\{(H_2-CO_2)/(CO+CO_2)\}$:		0.36	
APPROACH TO METHANOL EQUILIBRIUM (des.C) :		15.22	
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) :		-5.27	
METHANOL COLLECTED AS % OF CALCULATED :		93.9	
CALCULATED METHANOL PRODUCTION RATE (Kmol/hr) :		12.23	

LAPORTE LPHETHANOL PROCESS AVERAGE REPORT MATERIAL BALANCE SUMMARY

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	% diff.>	% diff.>	% diff.>
H2	-12.47931	-3.45486	-1.95813
CO	-3.13257	0.98125	-2.26066
CO2	n.a.	1.67672	-0.63534
N2	n.a.	2.90546	-2.83238
CH4	100.00000	1.05392	-2.74008
H2O	-----	n.a.	n.a.
CH3OH	-----	9.15640	5.05978

OVERALL ELEMENTAL BALANCE (Kg-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	86.7204	73.9668	1.8836	0.1920	-----	76.0424	12.3131
CO2	20.8292	20.2603	0.5159	0.3202	-----	21.0964	-1.2820
CH3OH	0.7019	0.7726	0.0197	0.0448	11.4813	12.3183	-1655.0758
OTHERS	0.5616	0.5676	0.0145	0.0074	0.2353	0.8247	-46.8557
TOTAL C	108.8130	95.5673	2.4336	0.5643	11.7166	110.2818	-1.3498
HYDROGEN:							
H2	118.1343	68.9248	1.7352	0.0909	-----	70.7708	40.0930
H2O	0.0000	0.0000	0.0000	0.0000	0.2239	0.2239	n.a.
OTHERS	5.0538	5.3607	0.1365	0.2025	46.7487	52.4484	-97.8084
TOTAL H	123.1881	74.2854	1.8917	0.2934	46.9725	123.4430	-0.2069
OXYGEN:							
TOTAL O	129.0807	115.2601	2.9351	0.8801	11.6473	130.7226	-1.2720
NITROGEN:							
TOTAL N	3.8459	3.8541	0.0981	0.0298	-----	3.9821	-3.5399
TOTAL MASS FLOW (kg/hr)	3556.6233	3120.2256	79.4564	21.5632	380.4789	3601.7241	-1.2681

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS [15-(50+62+68)]
MASS BALANCE (%) :	GC#1	GC#2
ELEMENTAL BALANCE (%) :	-----	-----
CARBON	-0.04	0.00
HYDROGEN	0.32	-0.05
OXYGEN	0.62	-0.32
NITROGEN	0.16	-0.14
	-0.52	-0.69
		-19.60

LAPORTE LPHETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

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DATE : 04-DEC-90
TIME : 09:02:29
TIME INTERVAL : FROM: 0400 02-Sep TO: 0400 03-Sep

NUMBER OF AVERAGED HOURS : 22
RUN ID NUMBER : E7.2
FEED GAS TYPE: CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 159.4
OIL/SLURRY REACTOR INLET TEMP. (deg.C) : 25.6
AUG. REACTOR SLURRY TEMPERATURE (deg.C) : 249.9
REACTOR FREEBOARD TEMPERATURE (deg.C) : 245.1
OIL/SLURRY OUTLET TEMP. (deg.C) : 241.8
REACTOR FEED GAS PRESSURE (kPa) : 5528
REACTOR EFFLUENT GAS PRESSURE (kPa) : 5282
GAS SUPERFICIAL VELOCITY (cm/sec) : 15.5
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 0.0
SLURRY CONCENTRATION (wt%) : 37.2
CATALYST OXIDE IN REACTOR (kg oxide) : 402
GAS HOLD-UP (%): 31.6
SPACE VELOCITY (1/kg-hr) : 0400
RECYCLE/FRESH FEED RATIO : 3.421
OIL/SLURRY CIRCULATION RATE (m3/hr) : 0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 135.69
PURGE GAS FLOW RATE <50> (ksmol/hr) : 3.56
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) : 625
  
```

STREAM #	1	55	15	15	32	32	62	6R
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEOH PRODUC
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
H2	59.99	25.69	35.06	34.51	23.37	23.87	5.99	-----
CO	35.86	56.21	51.07	51.09	51.10	51.24	26.41	-----
CO2	2.60	15.90	12.61	12.59	14.82	14.86	59.64	-----
N2	0.14	1.29	1.00	0.99	1.17	1.17	1.22	-----
CH4	0.01	0.40	0.31	0.31	0.36	0.37	0.29	-----
H2O	0.00	0.00	0.00	0.00	0.11	0.03	0.00	0.65
CH3OH	0.00	0.52	0.46	0.39	8.72	9.72	6.23	97.04
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.30	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.60
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.23
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.19
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.10
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.93
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.23
TOTAL :	97.59	100.01	100.52	99.87	99.66	100.27	100.08	100.00
DENS,g/cc	0.005	0.050	0.032	0.032	0.037	0.037	0.004	0.789
AV.MOL.WT	12.73	23.84	20.92	21.01	24.59	24.50	36.26	31.10
M3/hr	865.7	2961.8	3856.6	3827.4	3278.7	3284.7	12.8	-----
ksmol/hr	38.62	132.13	172.06	170.75	146.27	146.48	0.57	12.36
l/hr,prod	-----	-----	-----	-----	-----	-----	-----	487.01

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		GC%	GC%
		----	----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	42.0	42.0
CARBON MONOXIDE CONVERSION	(%) :	14.5	14.3
CARBON DIOXIDE CONVERSION	(%) :	-0.4	-0.8
RATIO H2 CONSUMED/CO CONSUMED	:	1.98	1.98
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	39.7	41.1
CARBON MONOXIDE CONVERSION	(%) :	13.6	13.9
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	40.9	41.8
CARBON MONOXIDE CONVERSION	(%) :	13.9	14.0
RATIO H2 CONSUMED/CO CONSUMED	:	2.01	2.01

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL %
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (%) :	96.3	99.5
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.4

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEDH SOURCE	smol/hr-kg cat	kg/1000 Na3 fresh feed	kg/1000 Na3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	29.89	445.7	100.8
As Net MeOH produced, OVERALL balance	29.03	432.9	97.9
REACTOR FEED (H2/(CO+1.5CO2)) :		0.49	
REACTOR FEED ((H2-CO2)/(CO+CO2)) :		0.34	
APPROACH TO METHANOL EQUILIBRIUM (des.C) :		15.18	
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) :		6.96	
METHANOL COLLECTED AS % OF CALCULATED :		96.7	
CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) :		12.04	

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<Z diff.>	<Z diff.>	<Z diff.>
H2	-11.42094	-3.87623	-2.08255
CO	-2.56609	1.00306	-2.26151
CO2	n.a.	2.34165	-1.24619
N2	n.a.	3.87405	-2.72442
CH4	99.14852	0.57456	-3.41578
H2O	-----	n.a.	10.65481
CH3OH	-----	4.47817	-0.43484

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	87.2382	74.2722	1.9989	0.1653	-----	76.4365	12.3819
CO2	21.4979	21.0092	0.5654	0.3733	-----	21.9480	-2.0934
CH3OH	0.6615	0.6925	0.0186	0.0390	12.0662	12.8163	-1837.5061
OTHERS	0.5293	0.5285	0.0142	0.0056	0.1236	0.6719	-26.9306
TOTAL C	109.9269	96.5025	2.5972	0.5832	12.1897	111.8726	-1.7700
HYDROGEN:							
H2	117.8544	67.8902	1.8271	0.0750	-----	69.7923	40.7809
H2O	0.0000	0.0000	0.0000	0.0000	0.2875	0.2875	n.a.
OTHERS	4.7633	4.8841	0.1314	0.1744	48.8825	54.0725	-1075.1938
TOTAL H	122.6177	72.7743	1.9586	0.2494	49.1701	124.1523	-1.2516
OXYGEN:							
TOTAL O	130.8955	116.9832	3.1484	0.9528	12.3561	133.4405	-1.9443
NITROGEN:							
TOTAL N	3.3809	3.4090	0.0917	0.0153	-----	3.5161	-2.9970
TOTAL MASS FLOW (ks/hr)	3587.5408	3150.0627	84.7785	22.6971	384.2757	3641.8142	-1.5128

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS
	GC#1	GC#2
	-----	-----
MASS BALANCE (%) :	0.25	-0.26
ELEMENTAL BALANCE (%) :		
CARBON	0.64	0.20
HYDROGEN	2.09	0.63
OXYGEN	0.45	-0.10
NITROGEN	0.35	-1.24
		1.04

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY
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DATE :	06-DEC-80
TIME :	08:03:54
TIME INTERVAL :	FROM: 0600 03-Sep
	TO: 0600 04-Sep
NUMBER OF AVERAGED HOURS :	24
RUN ID NUMBER :	E7.3
FEED GAS TYPE:	CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) :	157.9
OIL/SLURRY REACTOR INLET TEMP. (des.C) :	23.9
AVG. REACTOR SLURRY TEMPERATURE (des.C) :	249.8
REACTOR FREEBOARD TEMPERATURE (des.C) :	245.0
OIL/SLURRY OUTLET TEMP. (des.C) :	241.4
REACTOR FEED GAS PRESSURE (kPa) :	5526
REACTOR EFFLUENT GAS PRESSURE (kPa) :	5281
GAS SUPERFICIAL VELOCITY (cm/sec) :	15.5
LIQUID SUPERFICIAL VELOCITY (cm/sec) :	0.0
SLURRY CONCENTRATION (wt%) :	37.7
CATALYST OXIDE IN REACTOR (ks oxide) :	402
GAS HOLD-UP (%) :	32.7
SPACE VELOCITY (1/ks-hr) :	9516
RECYCLE/FRESH FEED RATIO :	3.395
OIL/SLURRY CIRCULATION RATE (m3/hr) :	0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) :	135.55
PURGE GAS FLOW RATE <50> (ksmol/hr) :	3.51
HEAT TRANSFER COEFFICIENT (Watt/m2-des.C) :	630

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEOH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	58.65	25.96	34.90	34.76	23.65	23.91	5.07	-----
CO	35.87	56.13	50.98	51.00	51.05	51.10	23.30	-----
CO2	2.57	15.72	12.42	12.43	14.64	14.65	45.26	-----
N2	0.13	1.33	1.03	1.03	1.21	1.21	0.40	-----
CH4	0.00	0.44	0.34	0.34	0.40	0.40	0.35	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.59
CH3OH	0.00	0.54	0.46	0.39	8.78	8.77	5.56	97.07
DME	0.00	0.00	0.00	0.00	0.00	0.02	0.17	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.58
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.23
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.19
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.10
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.98
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.25
TOTAL :	97.22	100.12	100.13	99.95	99.71	100.09	100.12	100.00
DENS,g/cc	0.005	0.050	0.032	0.032	0.037	0.037	0.004	0.789
AV.MOL.WT	12.76	23.75	20.90	20.92	24.50	24.45	37.34	32.27
M3/hr	871.7	2959.8	3833.7	3831.5	3272.5	3275.9	13.2	-----
ksmol/hr	38.89	132.04	171.04	170.94	146.00	146.08	0.59	12.04
l/hr*Prod	-----	-----	-----	-----	-----	-----	-----	492.56

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

0600 03-Sep 88 - 0600 04-Sep 88

CONVERSIONS ACROSS REACTOR :

	GC#1	GC#2
CALCULATED BY GAS COMPOSITION		
HYDROGEN CONVERSION (Z) :	41.5	41.9
CARBON MONOXIDE CONVERSION (Z) :	14.4	14.5
CARBON DIOXIDE CONVERSION (Z) :	-0.8	-0.6
RATIO H2 CONSUMED/CO CONSUMED :	1.98	1.97
CALCULATED BY METHANOL IN EXIT GAS		
HYDROGEN CONVERSION (Z) :	40.3	40.9
CARBON MONOXIDE CONVERSION (Z) :	13.8	14.0
CALCULATED BY OVERALL BALANCE		
HYDROGEN CONVERSION (Z) :	40.3	40.4
CARBON MONOXIDE CONVERSION (Z) :	13.7	13.7
RATIO H2 CONSUMED/CO CONSUMED :	2.01	2.01

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL *
CO (+CO2) SELECTIVITY TO METHANOL (Z) :	97.3	99.9
CO (+CO2) SELECTIVITY TO ETHANOL (Z) :		0.4

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	mol/hr-kg cat	kg/1000 Nm3 fresh feed	kg/1000 Nm3 reactor feed
As calculated ACROSS REACTOR	30.04	444.6	101.1
As Net MeOH produced, OVERALL balance	29.38	434.8	98.9
REACTOR FEED (H2/(CO+1.5CO2)) :		0.50	
REACTOR FEED ((H2-CO2)/(CO+CO2)) :		0.35	
APPROACH TO METHANOL EQUILIBRIUM (deg.C) :		15.55	
APPROACH TO WATER-GAS EQUILIBRIUM (deg.C) :		1.06	
METHANOL COLLECTED AS % OF CALCULATED :		97.4	
CALCULATED METHANOL PRODUCTION RATE (Kmol/hr) :		12.09	

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT MATERIAL BALANCE SUMMARY

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	CPURE GASES - 11 FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-10.73520	-4.08117	-2.01229
CO	-2.54726	1.00932	-2.29179
CO2	n.a.	2.34178	-1.70444
N2	n.a.	2.55188	-2.20383
CH4	n.a.	-0.03221	-2.52582
H2O	-----	n.a.	n.a.
CH3OH	-----	6.50546	2.24518

OVERALL ELEMENTAL BALANCE (Kg-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	87.1770	74.1162	1.9706	0.1532	-----	76.2401	12.5457
CO2	21.2473	20.7573	0.5519	0.4292	-----	21.7384	-2.3116
CH3OH	0.6622	0.7083	0.0188	0.0365	11.7721	12.5358	-1793.0857
OTHERS	0.5812	0.5810	0.0154	0.0045	0.1204	0.7214	-24.1295
TOTAL C	109.6677	96.1628	2.5568	0.6235	11.8926	111.2357	-1.4298
HYDROGEN:							
H2	118.8343	68.5572	1.8228	0.0667	-----	70.4467	40.7185
H2O	0.0000	0.0000	0.0000	0.0000	0.2545	0.2545	n.a.
OTHERS	4.9735	5.1570	0.1371	0.1621	47.6907	53.1469	-968.6085
TOTAL H	123.8077	73.7142	1.9599	0.2288	47.9452	123.8481	-0.0326
OXYGEN:							
TOTAL O	130.3338	116.3391	3.0932	1.0493	12.0437	132.5254	-1.6816
NITROGEN:							
TOTAL N	3.5213	3.5124	0.0934	0.0053	-----	3.6110	-2.5487
TOTAL MASS FLOW (kg/hr)	3575.9685	3136.0430	83.3812	24.5587	388.6517	3632.6348	-1.5846

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]		FRESH FEED GAS
	GC#1	GC#2	[15-(50+62+68)]
MASS BALANCE (Z) :	0.04	-0.03	-0.07
ELEMENTAL BALANCE (Z) :			
CARBON	0.23	0.32	-0.83
HYDROGEN	0.94	0.90	-9.90
OXYGEN	0.08	0.18	-1.49
NITROGEN	-0.38	-0.34	2.44

LAPORTE LPNETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES : ANALYTICAL SUMMARY

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DATE :                                06-DEC-89
TIME :                                08:05:23
TIME INTERVAL :                       FROM: 0600 04-Sep
                                         TO: 0600 05-Sep

NUMBER OF AVERAGED HOURS :            24
RUN ID NUMBER :                       E7.4
FEED GAS TYPE:                        CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 157.4
OIL/SLURRY REACTOR INLET TEMP. (deg.C) : 25.0
AVG. REACTOR SLURRY TEMPERATURE (deg.C) : 249.8
REACTOR FREEBOARD TEMPERATURE (deg.C) : 245.0
OIL/SLURRY OUTLET TEMP. (deg.C) :    241.5
REACTOR FEED GAS PRESSURE (kPa) :     5525
REACTOR EFFLUENT GAS PRESSURE (kPa) :  5283
GAS SUPERFICIAL VELOCITY (cm/sec) :   15.2
LIQUID SUPERFICIAL VELOCITY (cm/sec) :  0.0
SLURRY CONCENTRATION (wt%) :          37.7
CATALYST OXIDE IN REACTOR (kg oxide) : 402
GAS HOLD-UP (Z) :                     32.9
SPACE VELOCITY (1/kg-hr) :            9520
RECYCLE/FRESH FEED RATIO :            3.399
OIL/SLURRY CIRCULATION RATE (m3/hr) :  0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (kmol/hr) : 135.71
PURGE GAS FLOW RATE <50> (kmol/hr) :   3.65
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) : 631
  
```

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
=====	=====	=====	=====	=====	=====	=====	=====	=====
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	57.94	25.97	34.72	34.87	23.67	23.82	5.07	-----
CO	35.84	56.25	51.12	51.01	51.16	51.22	23.30	-----
CO2	2.60	15.57	12.32	12.31	14.55	14.55	65.26	-----
N2	0.13	1.44	1.12	1.12	1.32	1.31	0.40	-----
CH4	0.00	0.43	0.34	0.33	0.40	0.40	0.35	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.55
CH3OH	0.00	0.49	0.43	0.34	8.76	8.78	5.56	97.14
DME	0.00	0.00	0.00	0.00	0.00	0.02	0.17	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.57
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.22
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.17
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.10
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.99
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.24
TOTAL :	96.52	100.17	100.03	99.99	99.83	100.11	100.12	100.00
DENS,m/cc	0.005	0.050	0.032	0.032	0.037	0.037	0.004	0.791
AV.MOL.WT	12.84	23.71	20.93	20.88	24.49	24.46	37.34	32.27
Mm3/hr	871.0	2960.2	3827.2	3831.1	3269.5	3271.6	13.2	-----
kmol/hr	38.86	132.06	170.74	170.92	145.86	145.89	0.59	12.02
l/hr,PROD	-----	-----	-----	-----	-----	-----	-----	490.56

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
		-----	-----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(Z) :	41.4	42.1
CARBON MONOXIDE CONVERSION	(Z) :	14.4	14.4
CARBON DIOXIDE CONVERSION	(Z) :	-1.0	-0.9
RATIO H2 CONSUMED/CO CONSUMED	:	1.96	2.00
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(Z) :	40.8	41.0
CARBON MONOXIDE CONVERSION	(Z) :	13.8	14.0
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(Z) :	40.5	40.3
CARBON MONOXIDE CONVERSION	(Z) :	13.7	13.7
RATIO H2 CONSUMED/CO CONSUMED	:	2.01	2.01

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL %
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (Z) :	76.3	100.7
CO (+CO2) SELECTIVITY TO ETHANOL (Z) :	-----	0.4

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	mmol/hr-kg cat	kg/1000 Na3 fresh feed	kg/1000 Na3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	30.18	446.8	101.6
As Net MeOH produced, OVERALL balance	29.37	434.8	98.9

REACTOR FEED (H2/(CO+1.5CO2)) :	0.50
REACTOR FEED ((H2-CO2)/(CO+CO2)) :	0.36
APPROACH TO METHANOL EQUILIBRIUM (des.C) :	15.65
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) :	-1.84
METHANOL COLLECTED AS % OF CALCULATED :	96.9
CALCULATED METHANOL PRODUCTION RATE (Kmmol/hr) :	12.15

LAPORTE LPMEETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

*****

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<Z diff.>	<Z diff.>	<Z diff.>
H2	-10.87073	-4.90681	-2.17788
CO	-2.10807	1.16409	-2.50274
CO2	n.a.	2.46814	-1.58543
N2	n.a.	1.94310	-1.63547
CH4	n.a.	0.67601	-0.41319
H2O	-----	n.a.	n.a.
CH3OH	-----	10.45140	2.51166

OVERALL ELEMENTAL BALANCE (Kg-atoms/hr) :

	INPUTS		OUTPUTS				(IN-OUT)/IN
STREAM # STREAM NAME	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	Z
CARBON:							
CO	87.1849	74.2848	2.0539	0.1532	-----	76.4919	12.2647
CO2	21.0399	20.5620	0.5685	0.4292	-----	21.5398	-2.4708
CH3OH	0.5760	0.6432	0.0178	0.0345	11.7644	12.4619	-2063.5066
OTHERS	0.5640	0.5679	0.0157	0.0045	0.1203	0.7084	-25.5893
TOTAL C	109.3648	96.0579	2.6559	0.6235	11.8846	111.2219	-1.6981
HYDROGEN:							
H2	119.1977	68.5929	1.8965	0.0667	-----	70.5561	40.8075
H2O	0.0000	0.0000	0.0000	0.0000	0.2370	0.2370	n.a.
OTHERS	4.5601	4.8444	0.1339	0.1621	47.6587	52.7991	-1057.8418
TOTAL H	123.7578	73.4373	2.0305	0.2288	47.8956	123.5922	0.1339
OXYGEN:							
TOTAL O	129.8407	116.0520	3.2087	1.0493	12.0252	132.3354	-1.9213
NITROGEN:							
TOTAL N	3.8285	3.8034	0.1052	0.0053	-----	3.9138	-2.2268
TOTAL MASS FLOW (kg/hr)	3568.7520	3131.1853	86.5747	24.5587	388.0543	3630.3730	-1.7267

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]		FRESH FEED GAS
	GC#1	GC#2	[15-(50+62+68)]
MASS BALANCE (Z) :	0.10	-0.10	-0.05
ELEMENTAL BALANCE (Z) :			
CARBON	0.17	0.14	-1.52
HYDROGEN	0.37	1.00	-1.38
OXYGEN	-0.01	-0.01	-2.10
NITROGEN	0.02	-0.58	-9.29

LAPORTE LPHETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY
=====

DATE :	06-DEC-89
TIME :	08:07:02
TIME INTERVAL :	FROM: 0400 05-Sep
	TO: 0600 06-Sep
NUMBER OF AVERAGED HOURS :	24
RUN ID NUMBER :	E7.5
FEED GAS TYPE:	CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) :	159.4
OIL/SLURRY REACTOR INLET TEMP. (des.C) :	25.0
AVG. REACTOR SLURRY TEMPERATURE (des.C) :	250.0
REACTOR FREEBOARD TEMPERATURE (des.C) :	245.5
OIL/SLURRY OUTLET TEMP. (des.C) :	242.4
REACTOR FEED GAS PRESSURE (kPa) :	5526
REACTOR EFFLUENT GAS PRESSURE (kPa) :	5283
GAS SUPERFICIAL VELOCITY (cm/sec) :	15.2
LIQUID SUPERFICIAL VELOCITY (cm/sec) :	0.0
SLURRY CONCENTRATION (wt%) :	38.0
CATALYST OXIDE IN REACTOR (kg oxide) :	402
GAS HOLD-UP (%) :	33.6
SPACE VELOCITY (1/ks-hr) :	9502
RECYCLE/FRESH FEED RATIO :	3.496
OIL/SLURRY CIRCULATION RATE (m3/hr) :	0.0
PROD. SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) :	136.40
PURGE GAS FLOW RATE <50> (ksmol/hr) :	3.81
HEAT TRANSFER COEFFICIENT (Watt/m2-des.C) :	623

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	NEOH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
=====	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	57.21	26.01	34.46	34.94	23.75	23.62	5.07	-----
CO	36.23	56.25	51.27	51.11	51.13	51.59	23.30	-----
CO2	2.87	15.56	12.77	12.34	14.51	15.08	65.26	-----
N2	0.15	1.45	1.17	1.12	1.32	1.39	0.40	-----
CH4	0.01	0.50	0.38	0.38	0.45	0.45	0.35	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.56
CH3OH	0.01	0.46	0.38	0.31	8.72	8.68	5.56	97.11
DME	0.01	0.00	0.00	0.00	0.00	0.01	0.17	0.03
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.57
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.22
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.16
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.10
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.97
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.28
TOTAL :	96.49	100.23	100.44	100.21	99.90	100.84	100.12	100.00
DENS, g/cc	0.005	0.050	0.032	0.032	0.037	0.037	0.004	0.792
AV. MOL. WT	13.08	23.70	21.09	20.88	24.45	24.60	37.34	32.28
M3/hr	850.2	2971.9	3803.8	3822.1	3267.6	3257.7	13.0	-----
ksmol/hr	37.93	132.59	169.70	170.51	145.78	145.27	0.58	11.92
l/hr, prod	-----	-----	-----	-----	-----	-----	-----	461.68

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

*****

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
		<u> </u>	<u> </u>
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(Z) :	41.3	41.9
CARBON MONOXIDE CONVERSION	(Z) :	13.8	14.5
CARBON DIOXIDE CONVERSION	(Z) :	-1.1	-0.5
RATIO H2 CONSUMED/CO CONSUMED	:	2.01	1.98
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(Z) :	40.9	40.9
CARBON MONOXIDE CONVERSION	(Z) :	13.8	14.0
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(Z) :	40.3	39.6
CARBON MONOXIDE CONVERSION	(Z) :	13.5	13.5
RATIO H2 CONSUMED/CO CONSUMED	:	2.01	2.01

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL *
	<u> </u>	<u> </u>
CO (+CO2) SELECTIVITY TO METHANOL (Z) :	99.5	100.9
CO (+CO2) SELECTIVITY TO ETHANOL (Z) :	<u> </u>	0.4

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

METH SOURCE	mol/hr-ks cat	ks/1000 Na3 fresh feed	ks/1000 Na3 reactor feed
	<u> </u>	<u> </u>	<u> </u>
As calculated ACROSS REACTOR	30.02	455.1	101.2
As Net MeOH produced, OVERALL balance	28.88	437.8	97.4

REACTOR FEED (H2/(CO+1.5CO2)) :	0.50
REACTOR FEED ((H2-CO2)/(CO+CO2)) :	0.36
APPROACH TO METHANOL EQUILIBRIUM (des.C) :	15.69
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) :	-2.03
METHANOL COLLECTED AS % OF CALCULATED :	95.8
CALCULATED METHANOL PRODUCTION RATE (Kmol/hr) :	12.08

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT MATERIAL BALANCE SUMMARY

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-6.73760	-6.03752	-2.56487
CO	-0.98675	1.32702	-3.13851
CO2	n.a.	3.11974	-2.33829
N2	-527.16040	3.51815	-2.91601
CH4	n.a.	2.81540	-4.30863
H2O	-----	n.a.	n.a.
CH3OH	-----	13.82493	3.85437

OVERALL ELEMENTAL BALANCE (Kg-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	87.1495	74.5796	2.1458	0.1511	-----	76.8764	11.7878
CO2	21.0414	20.6304	0.5936	0.4233	-----	21.6472	-2.8794
CH3OH	0.5315	0.6129	0.0176	0.0360	11.5609	12.2275	-2200.7605
OTHERS	0.6480	0.6629	0.0191	0.0045	0.1182	0.8047	-24.1862
TOTAL C	109.3703	96.4858	2.7760	0.6149	11.6791	111.5558	-1.9983
HYDROGEN:							
H2	119.1549	68.9712	1.9844	0.0658	-----	71.0213	40.3958
H2O	0.0000	0.0000	0.0000	0.0000	0.2372	0.2372	n.a.
OTHERS	4.7176	5.1034	0.1468	0.1598	46.8344	52.2445	-1007.4339
TOTAL H	123.8725	74.0746	2.1312	0.2256	47.0716	123.5030	0.2983
OXYGEN:							
TOTAL O	129.7637	116.4532	3.3505	1.0349	11.8188	132.6574	-2.2300
NITROGEN:							
TOTAL N	3.8195	3.8450	0.1106	0.0052	-----	3.9608	-3.6995
TOTAL MASS FLOW (kg/hr)	3560.3230	3142.2854	90.4082	24.2200	381.5109	3638.4241	-2.1937

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS
	GC#1	[15-(50+62+68)]
	-----	-----
MASS BALANCE (%) :	0.10	0.00
ELEMENTAL BALANCE (%) :		
CARBON	-0.20	-1.51
HYDROGEN	0.24	-13.75
OXYGEN	-0.35	-1.74
NITROGEN	-1.75	-1.78

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

```

DATE :                                06-DEC-89
TIME :                                08:08:36
TIME INTERVAL :                        FROM: 0600 06-Sep
                                         TO: 0600 07-Sep

NUMBER OF AVERAGED HOURS :             24
RUN ID NUMBER :                        E7.6
FEED GAS TYPE:                         CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 160.9
OIL/SLURRY REACTOR INLET TEMP. (deg.C) : 25.8
AVG. REACTOR SLURRY TEMPERATURE (deg.C) : 249.9
REACTOR FREEBOARD TEMPERATURE (deg.C) : 245.5
OIL/SLURRY OUTLET TEMP. (deg.C) :      242.6
REACTOR FEED GAS PRESSURE (kPa) :      5531
REACTOR EFFLUENT GAS PRESSURE (kPa) :   5284
GAS SUPERFICIAL VELOCITY (cm/sec) :    15.5
LIQUID SUPERFICIAL VELOCITY (cm/sec) :   0.0
SLURRY CONCENTRATION (wt%) :            37.8
CATALYST OXIDE IN REACTOR (kg oxide) :  -401
GAS HOLD-UP (%) :                       33.3
SPACE VELOCITY (1/kg-hr) :              9569
RECYCLE/FRESH FEED RATIO :              3.399
OIL/SLURRY CIRCULATION RATE (m3/hr) :   0.0
PROD. SEPARATOR GAS FLOWRATE <50> + <55> (kmoles/hr) : 136.35
PURGE GAS FLOW RATE <50> (kmoles/hr) :   3.77
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) : 618
  
```

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDM PRODUC
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
=====	=====	=====	=====	=====	=====	=====	=====	=====
	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<WT%>
H2	57.72	26.27	34.66	35.42	23.85	23.86	5.07	-----
CO	35.70	56.06	50.83	50.95	51.09	51.02	23.30	-----
CO2	2.70	16.01	12.77	12.68	14.88	14.95	65.26	-----
N2	0.10	1.09	0.84	0.86	1.00	0.98	0.40	-----
CH4	0.00	0.46	0.36	0.35	0.42	0.43	0.35	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.54
CH3OH	0.02	0.50	0.43	0.35	8.72	8.71	5.56	97.18
DME	0.00	0.00	0.00	0.00	0.00	0.02	0.17	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.55
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.20
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.16
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.09
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.99
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.27
TOTAL :	96.24	100.39	99.89	100.62	99.95	99.98	100.12	100.00
DENS, g/cc	0.005	0.050	0.032	0.032	0.037	0.037	0.004	0.791
AV. MOL. WT	12.87	23.72	21.00	20.84	24.49	24.50	37.34	32.28
M3/hr	874.2	2971.8	3831.0	3846.2	3273.0	3272.4	13.3	-----
kmoles/hr	39.00	132.58	170.91	171.59	146.02	145.93	0.59	12.02
l/hr,prod	-----	-----	-----	-----	-----	-----	-----	460.54

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
		----	----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(Z) :	41.2	42.7
CARBON MONOXIDE CONVERSION	(Z) :	14.3	14.7
CARBON DIOXIDE CONVERSION	(Z) :	0.0	0.1
RATIO H2 CONSUMED/CO CONSUMED	:	1.97	2.02
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(Z) :	40.5	39.9
CARBON MONOXIDE CONVERSION	(Z) :	13.8	13.9
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(Z) :	40.5	39.5
CARBON MONOXIDE CONVERSION	(Z) :	13.7	13.7
RATIO H2 CONSUMED/CO CONSUMED	:	2.01	2.01

SELECTIVITIES :

	ACROSS REACTOR	OVERALL
	GC Average	*
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (Z) :	95.6	101.3
CO (+CO2) SELECTIVITY TO ETHANOL (Z) :	-----	0.4

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	smol/hr-ks cat	ks/1000 Ma3 fresh feed	ks/1000 Ma3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	30.01	442.1	100.5
As Net MeOH produced, OVERALL balance	29.42	433.4	98.5

REACTOR FEED (H2/(CO+1.5CO2)) :	0.51
REACTOR FEED ((H2-CO2)/(CO+CO2)) :	0.36
APPROACH TO METHANOL EQUILIBRIUM (des.C) :	15.95
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) :	-4.96
METHANOL COLLECTED AS % OF CALCULATED :	97.6
CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) :	12.06

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<Z diff.>	<Z diff.>	<Z diff.>
H2	-11.40173	-5.99164	-2.95100
CO	-2.49076	0.93493	-2.67033
CO2	n.a.	2.34360	-2.45999
N2	-329.91574	0.57235	-1.96517
CH4	n.a.	1.52850	-2.65083
H2O	-----	n.a.	n.a.
CH3OH	-----	10.45140	2.00078

OVERALL ELEMENTAL BALANCE (Kg-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	87.4244	74.3261	2.1131	0.1543	-----	76.5935	12.3889
CO2	21.7574	21.2265	0.6035	0.4322	-----	22.2622	-2.3200
CH3OH	0.5999	0.6622	0.0188	0.0368	11.7660	12.4838	-1980.8391
OTHERS	0.6006	0.6099	0.0173	0.0046	0.1202	0.7520	-25.2164
TOTAL C	110.3823	96.8247	2.7527	0.6278	11.8862	112.0914	-1.5483
HYDROGEN:							
H2	121.5533	69.6591	1.9804	0.0672	-----	71.7067	41.0080
H2O	0.0000	0.0000	0.0000	0.0000	0.2326	0.2326	n.a.
OTHERS	4.8020	5.0882	0.1447	0.1632	47.6650	53.0610	-1004.9785
TOTAL H	126.3553	74.7473	2.1251	0.2303	47.8976	125.0003	1.0724
OXYGEN:							
TOTAL O	131.5392	117.4413	3.3389	1.0566	12.0209	133.8577	-1.7626
NITROGEN:							
TOTAL N	2.9513	2.8903	0.0822	0.0053	-----	2.9778	-0.8964
TOTAL MASS FLOW (kg/hr)	3575.9058	3144.8699	89.4086	24.7281	398.0354	3647.0422	-1.9893

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS
	GC#1	[15-(50+62+68)]
MASS BALANCE (Z) :	0.35	0.00
ELEMENTAL BALANCE (Z) :		
CARBON	0.31	0.64
HYDROGEN	0.50	2.61
OXYGEN	0.28	0.57
NITROGEN	0.35	1.05

LAPORTE LPHETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES : ANALYTICAL SUMMARY

DATE : 06-DEC-99
TIME : 08:10:08
TIME INTERVAL : FROM: 0600 07-Sep TO: 0600 08-Sep

NUMBER OF AVERAGED HOURS : 21
RUN ID NUMBER : E7.7
FEED GAS TYPE: CO-RICH GAS

REACTOR FEED GAS INLET TEMP. (deg.C) : 159.3
OIL/SLURRY REACTOR INLET TEMP. (deg.C) : 25.4
AVG. REACTOR SLURRY TEMPERATURE (deg.C) : 249.8
REACTOR FREEBOARD TEMPERATURE (deg.C) : 245.4
OIL/SLURRY OUTLET TEMP. (deg.C) : 242.6
REACTOR FEED GAS PRESSURE (kPa) : 5526
REACTOR EFFLUENT GAS PRESSURE (kPa) : 5284
GAS SUPERFICIAL VELOCITY (cm/sec) : 15.5
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 0.0
SLURRY CONCENTRATION (wt%) : 37.9
CATALYST OXIDE IN REACTOR (kg oxide) : 401
GAS HOLD-UP (%) : 33.5
SPACE VELOCITY (1/kg-hr) : 9535
RECYCLE/FRESH FEED RATIO : 3.347
OIL/SLURRY CIRCULATION RATE (m3/hr) : 0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 135.36
PURGE GAS FLOW RATE <50> (ksmol/hr) : 3.78
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) : 622

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEOH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
H2	57.87	26.83	35.01	35.89	24.22	23.97	5.07	-----
CO	35.59	55.78	50.55	50.61	50.70	50.66	23.30	-----
CO2	2.73	16.05	12.71	12.66	14.96	15.01	65.26	-----
N2	0.10	1.14	0.85	0.88	1.03	1.01	0.40	-----
CH4	0.00	0.47	0.37	0.35	0.43	0.43	0.35	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.60
CH3OH	0.00	0.46	0.38	0.32	8.78	8.80	5.56	97.22
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.53
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.20
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.15
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.09
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.94
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.23
TOTAL :	96.29	100.72	99.87	100.71	100.12	99.88	100.12	100.00
DENS,g/cc	0.005	0.050	0.032	0.032	0.037	0.037	0.004	0.792
AV.MOL.WT	12.84	23.59	20.90	20.72	24.41	24.48	37.34	32.24
Mm3/hr	881.1	2949.3	3813.2	3830.5	3255.7	3251.1	13.5	-----
ksmol/hr	39.31	131.58	170.12	170.89	145.25	144.98	0.60	12.12
l/hr:prod	-----	-----	-----	-----	-----	-----	-----	493.26

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
		----	----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	41.6	42.6
CARBON MONOXIDE CONVERSION	(%) :	14.6	14.9
CARBON DIOXIDE CONVERSION	(%) :	-0.7	-0.4
RATIO H2 CONSUMED/CO CONSUMED	:	1.98	2.04
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	40.7	39.8
CARBON MONOXIDE CONVERSION	(%) :	14.1	14.1
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	40.6	39.5
CARBON MONOXIDE CONVERSION	(%) :	14.0	13.9
RATIO H2 CONSUMED/CO CONSUMED	:	2.01	2.01

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL *
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (%) :	96.8	101.3
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.4

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	smol/hr-kg cat	kg/1000 Na3 fresh feed	kg/1000 Na3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	30.27	442.1	101.7
As Net MeOH produced, OVERALL balance	29.65	433.1	99.6
REACTOR FEED $\{H_2/(CO+1.5CO_2)\}$:		0.52	
REACTOR FEED $\{(H_2-CO)/(CO+CO_2)\}$:		0.37	
APPROACH TO METHANOL EQUILIBRIUM (deg.C) :		16.39	
APPROACH TO WATER-GAS EQUILIBRIUM (deg.C) :		0.46	
METHANOL COLLECTED AS % OF CALCULATED :		97.5	
CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) :		12.16	

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT MATERIAL BALANCE SUMMARY

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-11.39832	-5.65340	-3.32891
CO	-3.18884	1.02637	-2.73959
CO2	n.a.	2.50875	-1.99590
N2	-333.31195	2.30402	-3.32162
CH4	100.00000	3.28280	-2.23483
H2O	-----	n.a.	n.a.
CH3OH	-----	8.87300	1.88678

OVERALL ELEMENTAL BALANCE (Kg-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	86.4874	73.3942	2.1076	0.1564	-----	75.6582	12.5212
CO2	21.6347	21.1183	0.6064	0.4381	-----	22.1628	-2.4411
CH3OH	0.5543	0.6083	0.0175	0.0373	11.8541	12.5171	-2158.2192
OTHERS	0.5981	0.6184	0.0178	0.0046	0.1212	0.7620	-27.3981
TOTAL C	109.2745	95.7391	2.7493	0.6364	11.9752	111.1001	-1.6706
HYDROGEN:							
H2	122.6649	70.6047	2.0275	0.0681	-----	72.7003	40.7326
H2O	0.0000	0.0000	0.0000	0.0000	0.2603	0.2603	n.a.
OTHERS	4.6096	4.9067	0.1409	0.1654	48.0222	53.2352	-1054.8712
TOTAL H	127.2745	75.5115	2.1684	0.2335	48.2824	126.1957	0.8476
OXYGEN:							
TOTAL O	130.3111	116.2390	3.3379	1.0710	12.1180	132.7660	-1.8839
NITROGEN:							
TOTAL N	3.0077	3.0000	0.0861	0.0054	-----	3.0915	-2.7873
TOTAL MASS FLOW (kg/hr)	3540.8413	3103.9246	89.1326	25.0668	390.6844	3608.8083	-1.9195

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]		FRESH FEED GAS
	GC#1	GC#2	[15-(50+62+68)]
MASS BALANCE (Z) :	0.14	-0.13	-0.03
ELEMENTAL BALANCE (Z) :			
CARBON	0.24	0.48	-1.97
HYDROGEN	0.93	2.66	-11.40
OXYGEN	0.08	0.35	-2.42
NITROGEN	-1.31	0.52	-16.41

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

```

DATE : 06-DEC-99
TIME : 08:12:02
TIME INTERVAL : FROM: 0500 08-Sep
                TO: 0500 09-Sep

NUMBER OF AVERAGED HOURS : 13
RUN ID NUMBER : E7.8
FEED GAS TYPE: CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) : 159.7
OIL/SLURRY REACTOR INLET TEMP. (des.C) : 24.3
AVG. REACTOR SLURRY TEMPERATURE (des.C) : 249.8
REACTOR FREEBOARD TEMPERATURE (des.C) : 245.6
OIL/SLURRY OUTLET TEMP. (des.C) : 242.8
REACTOR FEED GAS PRESSURE (kPa) : 5529
REACTOR EFFLUENT GAS PRESSURE (kPa) : 5284
GAS SUPERFICIAL VELOCITY (cm/sec) : 15.5
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 0.0
SLURRY CONCENTRATION (wt%) : 37.9
CATALYST OXIDE IN REACTOR (ks oxide) : 401
GAS HOLD-UP (%) : 33.7
SPACE VELOCITY (1/ks-hr) : 9604
RECYCLE/FRESH FEED RATIO : 3.319
OIL/SLURRY CIRCULATION RATE (m3/hr) : 0.0
PROD. SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 136.12
PURGE GAS FLOW RATE <50> (ksmol/hr) : 3.91
HEAT TRANSFER COEFFICIENT (Watt/m2-des.C) : 623
  
```

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDH PRODUC
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT	=====	=====	=====	=====	=====	=====	=====	=====
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	58.94	26.47	34.33	35.77	23.90	23.45	5.07	-----
CO	35.67	56.19	51.05	50.95	51.12	51.12	23.30	-----
CO2	2.74	15.77	12.58	12.52	14.75	14.77	65.26	-----
N2	0.11	1.11	0.87	0.88	1.02	1.01	0.40	-----
CH4	0.00	0.46	0.36	0.35	0.42	0.42	0.35	-----
H2O	0.00	0.00	0.01	0.00	0.00	0.02	0.00	0.60
CH3OH	0.00	0.46	0.38	0.31	8.65	8.64	5.56	97.22
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.53
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.20
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.15
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.09
ALKANES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.98
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.20
TOTAL :	97.46	100.46	99.57	100.78	99.85	99.44	100.12	100.00
DENS,g/cc	0.005	0.051	0.032	0.032	0.037	0.037	0.005	0.793
AV.MOL.WT	12.74	23.63	21.03	20.73	24.45	24.56	37.34	32.23
Mm3/hr	892.9	2963.5	3826.9	3856.3	3269.7	3262.4	13.2	-----
ksmol/hr	39.83	132.21	170.73	172.04	145.87	145.48	0.59	12.12
l/hr,prod	-----	-----	-----	-----	-----	-----	-----	492.58

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
		----	----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	41.8	43.3
CARBON MONOXIDE CONVERSION	(%) :	14.6	14.9
CARBON DIOXIDE CONVERSION	(%) :	-0.1	0.1
RATIO H2 CONSUMED/CO CONSUMED	:	1.92	2.04
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	40.7	39.3
CARBON MONOXIDE CONVERSION	(%) :	13.7	13.8
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	41.3	39.3
CARBON MONOXIDE CONVERSION	(%) :	13.8	13.7
RATIO H2 CONSUMED/CO CONSUMED	:	2.01	2.01

SELECTIVITIES :

	ACROSS REACTOR	OVERALL
	GC Average	%
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (%) :	92.9	100.0
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.4

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEDH SOURCE	smol/hr-ks cat	kg/1000 Nm3 fresh feed	kg/1000 Nm3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	29.90	430.8	99.7
As Net MeOH produced, OVERALL balance	29.66	427.3	99.9

REACTOR FEED (H2/(CO+1.5CO2)) :	0.51
REACTOR FEED ((H2-CO2)/(CO+CO2)) :	0.37
APPROACH TO METHANOL EQUILIBRIUM (des.C) :	16.40
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) :	2.33
METHANOL COLLECTED AS % OF CALCULATED :	98.7
CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) :	12.00

LAPORTE LPNETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<Z diff.>	<Z diff.>	<Z diff.>
H2	-15.56417	-5.24136	-3.44510
CO	-4.41814	0.95233	-2.77530
CO2	n.a.	1.82971	-1.76300
N2	-383.01080	-0.17276	-1.72566
CH4	100.00000	0.99036	-2.57804
H2O	-----	n.a.	n.a.
CH3OH	---	12.26628	0.82806

OVERALL ELEMENTAL BALANCE (Kg-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	Z
CARBON:							
CO	87.6535	74.2894	2.1970	0.1532	-----	76.6396	12.5672
CO2	21.5397	20.8497	0.6166	0.4292	-----	21.8955	-1.6519
CH3OH	0.5362	0.6112	0.0181	0.0365	11.8541	12.5199	-2234.8547
OTHERS	0.6021	0.6082	0.0180	0.0045	0.1212	0.7519	-24.8693
TOTAL C	110.3335	96.3584	2.8497	0.6235	11.9753	111.8069	-1.3354
HYDROGEN:							
H2	123.0790	69.9925	2.0699	0.0667	-----	72.1291	41.3961
H2O	0.0000	0.0000	0.0000	0.0000	0.2603	0.2603	n.a.
OTHERS	4.5535	4.8774	0.1442	0.1621	48.0224	53.2062	-1068.4775
TOTAL H	127.6324	74.8699	2.2142	0.2288	48.2827	125.5955	1.5959
OXYGEN:							
TOTAL O	131.2711	116.5999	3.4483	1.0493	12.1203	133.2178	-1.4830
NITROGEN:							
TOTAL N	3.0279	2.9351	0.0868	0.0053	-----	3.0271	0.0263
TOTAL MASS FLOW (kg/hr)	3566.4332	3124.1460	92.3920	24.5587	390.6374	3631.7339	-1.8310

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS
	GC#1	[15-(50+62+68)]
MASS BALANCE (Z) :	0.44	0.00
ELEMENTAL BALANCE (Z) :		
CARBON	0.75	0.92
HYDROGEN	1.04	3.88
OXYGEN	0.60	0.80
NITROGEN	1.03	1.72

LAPORTE LPNETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY
=====

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DATE :                                06-DEC-89
TIME :                                08:13:30
TIME INTERVAL :                       FROM: 0600 09-Sep
                                         TO: 0600 10-Sep

NUMBER OF AVERAGED HOURS :            24
RUN ID NUMBER :                       E7.9
FEED GAS TYPE:                       CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 160.9
OIL/SLURRY REACTOR INLET TEMP. (deg.C) : 25.4
AVG. REACTOR SLURRY TEMPERATURE (deg.C) : 249.8
REACTOR FREEBOARD TEMPERATURE (deg.C) : 245.6
OIL/SLURRY OUTLET TEMP. (deg.C) :     242.6
REACTOR FEED GAS PRESSURE (kPa) :     5531
REACTOR EFFLUENT GAS PRESSURE (kPa) :  5284
GAS SUPERFICIAL VELOCITY (cm/sec) :   15.5
LIQUID SUPERFICIAL VELOCITY (cm/sec) :  0.0
SLURRY CONCENTRATION (wt%) :          37.9
CATALYST OXIDE IN REACTOR (kg oxide) : 401
GAS HOLD-UP (%) :                    33.6
SPACE VELOCITY (1/kg-hr) :            9590
RECYCLE/FRESH FEED RATIO :            3.460
OIL/SLURRY CIRCULATION RATE (m3/hr) : 0.0
PROD. SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 137.01
PURGE GAS FLOW RATE <50> (ksmol/hr) : 3.81
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) : 617
  
```

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEOH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT	=====	=====	=====	=====	=====	=====	=====	=====
	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<WT%>
H2	58.92	26.06	34.79	35.03	23.72	23.39	5.07	-----
CO	35.91	36.19	50.81	51.12	51.22	51.26	23.30	-----
CO2	2.75	15.91	12.65	12.66	14.87	14.88	65.24	-----
N2	0.11	1.13	0.88	0.88	1.03	1.03	0.40	-----
CH4	0.00	0.48	0.39	0.37	0.44	0.45	0.35	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.58
CH3OH	0.03	0.49	0.43	0.34	8.57	8.45	5.56	97.22
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.52
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.19
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.15
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.09
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	1.08
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.14
TOTAL :	97.73	100.27	99.95	100.40	99.84	99.50	100.12	100.00
DENS,g/cc	0.005	0.050	0.032	0.032	0.037	0.037	0.004	0.791
AV.MOL.WT	12.79	23.75	20.95	20.92	24.52	24.58	37.34	32.23
M3/hr	862.9	2985.8	3844.7	3848.7	3283.5	3279.5	12.9	-----
ksmol/hr	38.50	133.20	171.53	171.70	146.49	146.24	0.56	11.73
1/hr:prod	-----	-----	-----	-----	-----	-----	-----	478.05

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

	GC#1	GC#2
CALCULATED BY GAS COMPOSITION		
HYDROGEN CONVERSION (Z) :	42.7	42.2
CARBON MONOXIDE CONVERSION (Z) :	13.9	14.5
CARBON DIOXIDE CONVERSION (Z) :	-0.3	-0.2
RATIO H2 CONSUMED/CO CONSUMED :	2.09	1.99
CALCULATED BY METHANOL IN EXIT GAS		
HYDROGEN CONVERSION (Z) :	39.0	39.8
CARBON MONOXIDE CONVERSION (Z) :	13.3	13.6
CALCULATED BY OVERALL BALANCE		
HYDROGEN CONVERSION (Z) :	39.2	38.9
CARBON MONOXIDE CONVERSION (Z) :	13.4	13.3
RATIO H2 CONSUMED/CO CONSUMED :	2.01	2.01

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL %
CO (+CO2) SELECTIVITY TO METHANOL (Z) :	95.2	99.7
CO (+CO2) SELECTIVITY TO ETHANOL (Z) :	—	0.4

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	smol/hr-kg cat	kg/1000 Me3 fresh feed	kg/1000 Me3 reactor feed
As calculated ACROSS REACTOR	29.46	438.1	98.2
As Net MeOH produced, OVERALL balance	28.73	428.1	96.0

REACTOR FEED (H2/(CO+1.5CO2)) :	0.50
REACTOR FEED ((H2-CO2)/(CO+CO2)) :	0.35
APPROACH TO METHANOL EQUILIBRIUM (deg.C) :	16.35
APPROACH TO WATER-GAS EQUILIBRIUM (deg.C) :	-1.82
METHANOL COLLECTED AS % OF CALCULATED :	97.3
CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) :	11.80

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1455)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-13.88041	-4.79557	-2.85430
CO	-2.75287	1.01200	-2.80895
CO2	n.a.	2.30992	-2.00452
N2	-366.78021	2.36360	-2.78483
CH4	100.00000	0.63874	-2.38595
H2O	-----	n.a.	n.a.
CH3OH	-----	12.37174	2.93745

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	87.7740	74.8476	2.1409	0.1501	-----	77.1386	12.1169
CO2	21.7375	21.1928	0.6062	0.4203	-----	22.2194	-2.2169
CH3OH	0.5786	0.6488	0.0186	0.0358	11.4753	12.1785	-2004.6332
OTHERS	0.6353	0.6394	0.0183	0.0044	0.1173	0.7794	-22.6897
TOTAL C	110.7255	97.3286	2.7840	0.6106	11.5926	112.3158	-1.4363
HYDROGEN:							
H2	120.2944	69.4261	1.9859	0.0653	-----	71.4773	40.5813
H2O	0.0000	0.0000	0.0000	0.0000	0.2435	0.2435	n.a.
OTHERS	4.8558	5.1527	0.1474	0.1587	46.4879	51.9467	-969.7899
TOTAL H	125.1502	74.5789	2.1332	0.2240	46.7314	123.6676	1.1847
OXYGEN:							
TOTAL O	131.8276	117.8820	3.3719	1.0276	11.7330	134.0145	-1.6589
NITROGEN:							
TOTAL N	3.0220	3.0104	0.0861	0.0052	-----	3.1017	-2.6383
TOTAL MASS FLOW (ks/hr)	3592.0051	3163.6052	90.4912	24.0506	378.1549	3656.3020	-1.7900

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]		FRESH FEED GAS
	GC#1	GC#2	[15-(50+62+68)]
MASS BALANCE (%) :	-0.08	0.00	-0.07
ELEMENTAL BALANCE (%) :			
CARBON	0.42	0.65	-0.62
HYDROGEN	3.50	2.31	-9.10
OXYGEN	0.27	0.52	-1.13
NITROGEN	0.16	0.14	-7.73

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

```

DATE : 06-DEC-89
TIME : 08:14:55
TIME INTERVAL : FROM: 0600 10-Sep
                TO: 0600 11-Sep

NUMBER OF AVERAGED HOURS : 18
RUN ID NUMBER : E7.10
FEED GAS TYPE: CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) : 161.3
OIL/SLURRY REACTOR INLET TEMP. (des.C) : 27.0
AVG. REACTOR SLURRY TEMPERATURE (des.C) : 249.9
REACTOR FREEBOARD TEMPERATURE (des.C) : 245.3
OIL/SLURRY OUTLET TEMP. (des.C) : 242.6
REACTOR FEED GAS PRESSURE (kPa) : 5530
REACTOR EFFLUENT GAS PRESSURE (kPa) : 5286
GAS SUPERFICIAL VELOCITY (cm/sec) : 15.2
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 0.0
SLURRY CONCENTRATION (wt%) : 37.8
CATALYST OXIDE IN REACTOR (kg oxide) : 401
GAS HOLD-UP (%) : 33.6
SPACE VELOCITY (1/kg-hr) : 9569
RECYCLE/FRESH FEED RATIO : 3.266
OIL/SLURRY CIRCULATION RATE (m3/hr) : 0.0
PROD. SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 135.09
PURGE GAS FLOW RATE <50> (ksmol/hr) : 4.03
HEAT TRANSFER COEFFICIENT (Watt/m2-des.C) : 612
  
```

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
H2	59.74	26.58	35.49	35.36	24.13	24.18	5.07	-----
CO	35.54	55.66	50.39	50.61	50.78	50.39	23.30	-----
CO2	2.72	15.72	12.40	12.43	14.62	14.56	65.26	-----
N2	0.13	1.21	0.99	0.94	1.10	1.17	0.40	-----
CH4	0.00	0.46	0.35	0.35	0.41	0.41	0.35	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.62
CH3OH	0.00	0.50	0.41	0.36	9.75	8.81	5.56	97.26
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.52
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.21
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.15
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.09
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.99
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.15
TOTAL :	98.12	100.14	100.04	100.05	99.79	99.58	100.12	100.00
DENS, g/cc	0.005	0.050	0.032	0.032	0.037	0.037	0.004	0.791
AV. MOL. WT	12.62	23.58	20.75	20.78	24.38	24.34	37.34	32.21
Na3/hr	899.6	2937.9	3838.8	3837.5	3270.8	3273.4	12.8	-----
ksmol/hr	40.13	131.07	171.26	171.20	145.92	145.97	0.57	12.05
l/hr, Prod	-----	-----	-----	-----	-----	-----	-----	490.76

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
		----	----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	41.9	41.8
CARBON MONOXIDE CONVERSION	(%) :	14.7	14.5
CARBON DIOXIDE CONVERSION	(%) :	-0.1	-0.2
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.02
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	40.0	40.2
CARBON MONOXIDE CONVERSION	(%) :	14.1	14.0
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	39.6	39.7
CARBON MONOXIDE CONVERSION	(%) :	13.9	13.8
RATIO H2 CONSUMED/CO CONSUMED	:	2.01	2.01

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL %
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (%) :	96.5	99.3
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.4

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	smol/hr-ks cat	ks/1000 Na3 fresh feed	ks/1000 Na3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	30.31	432.9	101.5
As Net MeOH produced, OVERALL balance	29.52	421.7	98.9

REACTOR FEED (H2/(CO+1.5CO2)) : 0.51
 REACTOR FEED ((H2-CO2)/(CO+CO2)) : 0.36

APPROACH TO METHANOL EQUILIBRIUM (des.C) : 15.41
 APPROACH TO WATER-GAS EQUILIBRIUM (des.C) : 3.40

METHANOL COLLECTED AS % OF CALCULATED : 97.0

CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) : 12.15

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-17.54119	-2.93104	-2.07396
CO	-4.43701	0.65298	-1.67925
CO2	n.a.	1.91194	-1.49075
N2	n.a.	1.75655	-1.99980
CH4	100.00000	0.61313	-4.24435
H2O	-----	n.a.	n.a.
CH3OH	-----	5.25704	2.18682

OVERALL ELEMENTAL BALANCE (Kg-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	86.6458	72.9518	2.2419	0.1480	-----	75.3416	13.0464
CO2	21.2805	20.6037	0.6332	0.4144	-----	21.6513	-1.7423
CH3OH	0.6202	0.6546	0.0201	0.0353	11.7839	12.4939	-1914.5758
OTHERS	0.5992	0.6029	0.0185	0.0044	0.1205	0.7463	-0.5544
TOTAL C	109.1458	94.8130	2.9137	0.6020	11.9044	110.2332	-0.9963
HYDROGEN:							
H2	121.0748	69.6751	2.1412	0.0644	-----	71.8807	40.6311
H2O	0.0000	0.0000	0.0000	0.0000	0.2672	0.2672	n.a.
OTHERS	4.8775	5.0300	0.1546	0.1565	47.7382	53.0793	-998.2387
TOTAL H	125.9523	74.7051	2.2958	0.2209	48.0055	125.2272	0.5757
OXYGEN:							
TOTAL O	129.8271	114.8137	3.5284	1.0132	12.0526	131.4079	-1.2176
NITROGEN:							
TOTAL N	3.2186	3.1718	0.0975	0.0051	-----	3.2744	-1.7322
TOTAL MASS FLOW (kg/hr)	3557.5989	3090.5544	94.9774	23.7119	388.2151	3597.4587	-1.1204

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS
	GC#1	[15-(50+62+68)]
MASS BALANCE (%) :	-0.02	-0.08
ELEMENTAL BALANCE (%) :		
CARBON	0.49	-0.42
HYDROGEN	1.75	-5.36
OXYGEN	0.34	-0.69
NITROGEN	-0.78	1.72

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY
=====

DATE : 06-DEC-89
TIME : 09:16:28
TIME INTERVAL : FROM: 0600 11-Sep
TO: 0600 12-Sep
NUMBER OF AVERAGED HOURS : 24
RUN ID NUMBER : E7.11
FEED GAS TYPE: CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) : 163.4
OIL/SLURRY REACTOR INLET TEMP. (des.C) : 27.7
AVG. REACTOR SLURRY TEMPERATURE (des.C) : 250.0
REACTOR FREEBOARD TEMPERATURE (des.C) : 245.4
OIL/SLURRY OUTLET TEMP. (des.C) : 242.8
REACTOR FEED GAS PRESSURE (kPa) : 5532
REACTOR EFFLUENT GAS PRESSURE (kPa) : 5286
GAS SUPERFICIAL VELOCITY (cm/sec) : 15.5
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 0.0
SLURRY CONCENTRATION (wt%) : 37.8
CATALYST OXIDE IN REACTOR (kg oxide) : 400
GAS HOLD-UP (X) : 33.5
SPACE VELOCITY (1/kg-hr) : 9542
RECYCLE/FRESH FEED RATIO : 3.227
OIL/SLURRY CIRCULATION RATE (m3/hr) : 0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 134.63
PURGE GAS FLOW RATE <50> (ksmol/hr) : 4.37
HEAT TRANSFER COEFFICIENT (Watt/m2-des.C) : 409

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEOH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
=====	=====	=====	=====	=====	=====	=====	=====	=====
	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<WTX>
H2	59.56	26.30	35.80	35.05	24.04	24.39	5.07	-----
CO	35.41	56.25	50.01	51.07	51.19	50.15	23.30	-----
CO2	2.74	15.72	12.47	12.47	14.63	14.65	65.26	-----
N2	0.13	1.06	1.03	0.82	0.96	1.23	0.40	-----
CH4	0.00	0.38	0.33	0.29	0.34	0.39	0.35	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.64
CH3OH	0.00	0.57	0.43	0.40	8.72	8.79	5.56	97.29
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.52
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.27
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.15
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.09
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.94
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.15
TOTAL :	97.83	100.28	100.08	100.09	99.89	99.68	100.12	100.00
DENS,g/cc	0.005	0.050	0.031	0.032	0.037	0.037	0.004	0.788
AV.MOL.WT	12.63	23.67	20.68	20.88	24.41	24.31	37.34	32.20
Mm3/hr	904.9	2919.8	3842.6	3824.6	3271.4	3278.2	12.5	-----
ksmol/hr	40.37	130.26	171.43	170.63	145.95	146.18	0.56	11.91
l/hr,prod	-----	-----	-----	-----	-----	-----	-----	486.68

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(Z) :	41.9	41.3
CARBON MONOXIDE CONVERSION	(Z) :	14.4	14.3
CARBON DIOXIDE CONVERSION	(Z) :	-0.2	-0.4
RATIO H2 CONSUMED/CO CONSUMED	:	2.07	1.99
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(Z) :	39.5	40.3
CARBON MONOXIDE CONVERSION	(Z) :	14.1	13.8
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(Z) :	38.7	39.8
CARBON MONOXIDE CONVERSION	(Z) :	13.8	13.6
RATIO H2 CONSUMED/CO CONSUMED	:	2.01	2.01

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL *
CO (+CO2) SELECTIVITY TO METHANOL (Z) :	97.9	100.0
CO (+CO2) SELECTIVITY TO ETHANOL (Z) :		0.4

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	smol/hr-kg cat	kg/1000 Na3 fresh feed	kg/1000 Na3 reactor feed
As calculated ACROSS REACTOR	30.15	428.0	101.3
As Net MeOH produced, OVERALL balance	29.20	414.4	98.1
REACTOR FEED (H2/(CO+1.5CO2)) :		0.50	
REACTOR FEED ((H2-CO2)/(CO+CO2)) :		0.36	
APPROACH TO METHANOL EQUILIBRIUM (des.C) :		16.33	
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) :		5.07	
METHANOL COLLECTED AS % OF CALCULATED :		96.3	
CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) :		12.09	

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT MATERIAL BALANCE SUMMARY

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-18.90787	-2.57568	-1.00537
CO	-3.83965	0.48835	-1.55560
CO2	n.a.	1.41768	-1.01557
N2	-478.50800	2.37964	-2.02997
CH4	100.00000	0.03503	-3.53424
H2O	-----	n.a.	n.a.
CH3OH	-----	8.59944	2.22167

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	87.1392	73.2718	2.4570	0.1448	-----	75.8736	12.9282
CO2	21.2772	20.4770	0.6867	0.4055	-----	21.5692	-1.3725
CH3OH	0.6824	0.7466	0.0250	0.0345	11.6434	12.4496	-1724.4221
OTHERS	0.4948	0.4950	0.0166	0.0043	0.1191	0.6350	-28.3268
TOTAL C	109.5936	94.9904	3.1853	0.5891	11.7625	110.5274	-0.8571
HYDROGEN:							
H2	119.6095	68.5173	2.2976	0.0630	-----	70.8779	49.7423
H2O	0.0000	0.0000	0.0000	0.0000	0.2725	0.2725	n.a.
OTHERS	4.7088	4.9663	0.1665	0.1531	47.1693	52.4552	-1013.9804
TOTAL H	124.3183	73.4836	2.4641	0.2161	47.4418	123.6056	0.5733
OXYGEN:							
TOTAL O	130.3759	114.9724	3.8554	0.9914	11.9106	131.7299	-1.0385
NITROGEN:							
TOTAL N	2.7983	2.7615	0.0926	0.0050	-----	2.8591	-2.1736
TOTAL MASS FLOW (ks/hr)	3562.6909	3083.2769	103.3923	23.2038	383.5213	3593.3938	-0.8618

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS
	GC#1	GC#2
	-----	-----
MASS BALANCE (Z) :	-0.29	0.00
ELEMENTAL BALANCE (Z) :		
CARBON	0.20	0.27
HYDROGEN	2.08	0.99
OXYGEN	0.04	0.17
NITROGEN	-1.88	-0.14
		-0.05
		-0.88
		-4.23
		-1.51
		7.04

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

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DATE :                                06-DEC-89
TIME :                                08:18:05
TIME INTERVAL :                      FROM: 0600 12-Sep
                                         TO: 0600 13-Sep

NUMBER OF AVERAGED HOURS :           24
RUN ID NUMBER :                       E7.12
FEED GAS TYPE:                        CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 164.3
OIL/SLURRY REACTOR INLET TEMP. (deg.C) : 29.6
AVG. REACTOR SLURRY TEMPERATURE (deg.C) : 249.7
REACTOR FREEBOARD TEMPERATURE (deg.C) : 245.3
OIL/SLURRY OUTLET TEMP. (deg.C) :    242.6
REACTOR FEED GAS PRESSURE (kPa) :     5535
REACTOR EFFLUENT GAS PRESSURE (kPa) :  5285
GAS SUPERFICIAL VELOCITY (cm/sec) :   15.5
LIQUID SUPERFICIAL VELOCITY (cm/sec) :  0.0
SLURRY CONCENTRATION (wt%) :          37.8
CATALYST OXIDE IN REACTOR (kg oxide) : 400
GAS HOLD-UP (%) :                     33.6
SPACE VELOCITY (1/kg-hr) :            9555
RECYCLE/FRESH FEED RATIO :            3.317
OIL/SLURRY CIRCULATION RATE (m3/hr) : 0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 135.41
PURGE GAS FLOW RATE <50> (ksmol/hr) : 4.18
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) : 611
  
```

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDH PRODUCT
ON-LINE EC#	1	2	1	2	2	1		
COMPONENT								
	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<WT%>
H2	59.56	26.29	34.77	34.87	24.04	23.86	5.07	-----
CO	35.85	56.06	50.88	51.04	51.07	50.99	23.30	-----
CO2	2.82	15.94	12.66	12.67	14.89	14.85	65.26	-----
N2	0.11	1.02	0.81	0.80	0.93	0.96	0.40	-----
CH4	0.01	0.39	0.31	0.30	0.36	0.37	0.35	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.62
CH3OH	0.00	0.62	0.19	0.42	8.65	8.62	5.56	97.28
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.53
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.21
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.15
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.09
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.09
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.93
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.09
OIL	-----	-----	-----	-----	-----	-----	-----	0.16
TOTAL :	98.35	100.32	99.92	100.11	99.93	99.67	100.12	100.00
DENS, g/cc	0.005	0.050	0.032	0.032	0.037	0.037	0.004	0.787
AV. MOL. WT	12.73	23.71	20.97	20.95	24.45	24.48	37.34	32.21
M3/hr	886.7	2941.4	3827.6	3828.0	3280.2	3278.2	12.6	-----
ksmol/hr	39.56	131.23	170.76	170.79	146.34	146.19	0.56	11.84
l/hr:prod	-----	-----	-----	-----	-----	-----	-----	484.63

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

	GC#1	GC#2
	----	----
CALCULATED BY GAS COMPOSITION		
HYDROGEN CONVERSION (Z) :	41.2	40.9
CARBON MONOXIDE CONVERSION (Z) :	14.2	14.3
CARBON DIOXIDE CONVERSION (Z) :	-0.5	-0.7
RATIO H2 CONSUMED/CO CONSUMED :	1.99	1.95
CALCULATED BY METHANOL IN EXIT GAS		
HYDROGEN CONVERSION (Z) :	39.6	40.1
CARBON MONOXIDE CONVERSION (Z) :	13.5	13.7
CALCULATED BY OVERALL BALANCE		
HYDROGEN CONVERSION (Z) :	39.8	39.7
CARBON MONOXIDE CONVERSION (Z) :	13.5	13.5
RATIO H2 CONSUMED/CO CONSUMED :	2.01	2.01

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL *
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (Z) :	96.8	99.2
CO (+CO2) SELECTIVITY TO ETHANOL (Z) :		0.4

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	kmol/hr-kg cat	kg/1000 Me3 fresh feed	kg/1000 Me3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	29.58	428.2	99.2
As Net MeOH produced, OVERALL balance	29.06	420.7	97.4

REACTOR FEED (H2/(CO+1.5CO2)) :	0.50
REACTOR FEED ((H2-CO2)/(CO+CO2)) :	0.35
APPROACH TO METHANOL EQUILIBRIUM (des.C) :	16.67
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) :	1.73
METHANOL COLLECTED AS % OF CALCULATED :	97.7
CALCULATED METHANOL PRODUCTION RATE (Kmol/hr) :	11.85

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[12 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-16.87796	-2.56758	-1.27938
CO	-4.42135	0.66320	-1.76507
CO2	n.a.	1.79524	-0.92857
N2	-379.63919	1.14370	-1.66740
CH4	99.12793	0.66078	-0.65560
H2O	-----	n.a.	n.a.
CH3OH	-----	11.07403	1.63841

OVERALL ELEMENTAL BALANCE (Kg-atoms/hr) :

	INPUTS		OUTPUTS				(IN-OUT)/IN
STREAM # STREAM NAME	15 REACTOR FEED	55 RECYCLE	50 E GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	87.1644	73.5654	2.3445	0.1458	-----	76.0557	12.7445
CO2	21.6374	20.9175	0.6466	0.4085	-----	21.9926	-1.6415
CH3OH	0.7257	0.8161	0.0260	0.0348	11.5807	12.4575	-1616.6420
OTHERS	0.5123	0.5118	0.0163	0.0043	0.1184	0.6508	-27.0334
TOTAL C	110.0398	95.8107	3.0534	0.5934	11.6991	111.1567	-1.0150
HYDROGEN:							
H2	119.0996	68.9987	2.1989	0.0635	-----	71.2612	49.1668
H2O	0.0000	0.0000	0.0000	0.0000	0.2626	0.2626	n.a.
OTHERS	4.9521	5.3114	0.1693	0.1542	46.9149	52.5498	-961.1636
TOTAL H	124.0517	74.3101	2.3682	0.2177	47.1774	124.0735	-0.0175
OXYGEN:							
TOTAL O	131.1649	116.2164	3.7037	0.9987	11.8418	132.7607	-1.2166
NITROGEN:							
TOTAL N	2.7324	2.6770	0.0853	0.0050	-----	2.7673	-1.2776
TOTAL MASS FLOW (kg/hr)	3577.7708	3111.3730	99.1576	23.3731	381.4260	3615.3298	-1.0498

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]		FRESH FEED GAS
	GC#1	GC#2	[15-(50+62+68)]
MASS BALANCE (Z) :	0.02	-0.01	-0.08
ELEMENTAL BALANCE (Z) :			
CARBON	0.40	0.29	-0.30
HYDROGEN	1.46	0.74	-5.57
OXYGEN	0.25	0.14	-0.81
NITROGEN	-1.51	0.39	-3.79

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

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=====
DATE :                                06-DEC-89
TIME :                                08:19:36
TIME INTERVAL :                       FROM: 0600 13-Sep
                                         TO:  0600 14-Sep

NUMBER OF AVERAGED HOURS :            24
RUN ID NUMBER :                       E7.13
FEED GAS TYPE:                        CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) : 165.3
OIL/SLURRY REACTOR INLET TEMP. (des.C) : 29.8
AVG. REACTOR SLURRY TEMPERATURE (des.C) : 249.9
REACTOR FREEBOARD TEMPERATURE (des.C) : 245.7
OIL/SLURRY OUTLET TEMP. (des.C) :     243.0
REACTOR FEED GAS PRESSURE (kPa) :     5536
REACTOR EFFLUENT GAS PRESSURE (kPa) :   5286
GAS SUPERFICIAL VELOCITY (cm/sec) :    15.5
LIQUID SUPERFICIAL VELOCITY (cm/sec) :    0.0
SLURRY CONCENTRATION (wt%) :           37.8
CATALYST OXIDE IN REACTOR (kg oxide) :   400
GAS HOLD-UP (%) :                      33.7
SPACE VELOCITY (1/kg-hr) :              9601
RECYCLE/FRESH FEED RATIO :              3.337
OIL/SLURRY CIRCULATION RATE (m3/hr) :    0.0
PROD. SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 136.14
PURGE GAS FLOW RATE <50> (ksmol/hr) :    4.21
HEAT TRANSFER COEFFICIENT (Watt/m2-des.C) : 603
  
```

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT	=====	=====	=====	=====	=====	=====	=====	=====
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	59.10	26.54	34.74	34.98	24.19	23.76	5.07	-----
CO	35.95	55.93	50.98	50.97	51.02	50.98	23.30	-----
CO2	2.81	15.71	12.57	12.48	14.67	14.72	65.26	-----
N2	0.10	1.00	0.78	0.77	0.91	0.92	0.40	-----
CH4	0.00	0.41	0.31	0.31	0.37	0.37	0.35	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.62
CH3OH	0.00	0.59	0.48	0.44	8.67	8.64	5.56	97.33
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.54
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.20
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.16
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.09
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.89
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.15
TOTAL :	97.97	100.18	99.86	99.95	99.83	99.39	100.12	100.00
DENS, g/cc	0.005	0.050	0.032	0.032	0.037	0.037	0.004	0.788
AV. MOL. WT	12.79	23.60	20.96	20.88	24.37	24.48	37.34	32.20
Mm3/hr	886.2	2957.3	3836.9	3843.5	3293.2	3285.8	12.4	-----
ksmol/hr	39.54	131.93	171.18	171.47	146.92	146.52	0.55	11.91
l/hr, prod	-----	-----	-----	-----	-----	-----	-----	486.68

LAPORTE L-METHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

000 13-Sep 89 - 0600 14-Sep 89

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
		----	----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	41.4	40.7
CARBON MONOXIDE CONVERSION	(%) :	14.4	14.2
CARBON DIOXIDE CONVERSION	(%) :	-0.3	-0.7
RATIO H2 CONSUMED/CO CONSUMED	:	1.97	1.96
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	39.8	40.0
CARBON MONOXIDE CONVERSION	(%) :	13.6	13.7
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	40.0	39.7
CARBON MONOXIDE CONVERSION	(%) :	13.6	13.5
RATIO H2 CONSUMED/CO CONSUMED	:	2.01	2.01

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL %
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (%) :	96.2	99.5
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.4

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	mol/hr-kg cat	kg/1000 Na3 fresh feed	kg/1000 Na3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	29.76	430.8	99.3
As Net MeOH produced, OVERALL balance	29.25	423.4	97.6

REACTOR FEED (H2/(CO+1.5CO2)) : 0.50
 REACTOR FEED ((H2-CO2)/(CO+CO2)) : 0.35

APPROACH TO METHANOL EQUILIBRIUM (des.C) : 16.81
 APPROACH TO WATER-GAS EQUILIBRIUM (des.C) : 2.15

METHANOL COLLECTED AS % OF CALCULATED : 97.9

CALCULATED METHANOL PRODUCTION RATE (Kmol/hr) : 11.91

LAPORTE LPNETHANOL PROCESS AVERAGE REPORT MATERIAL BALANCE SUMMARY

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-14.85378	-2.74062	-1.75552
CO	-3.65279	0.68714	-1.77488
CO2	n.a.	2.00640	-1.10249
N2	-335.80307	2.83663	-2.01458
CH4	100.00000	1.73189	-3.08036
H2O	-----	n.a.	n.a.
CH3OH	-----	2.88250	2.06360

OVERALL ELEMENTAL BALANCE (Kg-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
C	87.3986	73.7904	2.3543	0.1437	-----	76.2884	12.7121
CO	21.3995	20.7267	0.6613	0.4026	-----	21.7906	-1.8275
CH3OH	0.7500	0.7723	0.0246	0.0343	11.6500	12.4812	-1564.1002
OTHERS	0.5316	0.5409	0.0173	0.0043	0.1191	0.6815	-28.2168
TOTAL C	110.0797	95.8394	3.0575	0.5848	11.7691	111.2417	-1.0556
HYDROGEN:							
H2	119.9609	70.0303	2.2343	0.0626	-----	72.3271	39.7077
H2O	0.0000	0.0000	0.0000	0.0000	0.2640	0.2640	n.a.
OTHERS	5.1263	5.2529	0.1676	0.1520	47.1954	52.7678	-979.3486
TOTAL H	125.0872	75.2831	2.4019	0.2146	47.4594	125.3590	-0.2173
OXYGEN:							
TOTAL O	130.9477	116.0162	3.7015	0.9842	11.9106	132.6125	-1.2713
NITROGEN:							
TOTAL N	2.6406	2.6387	0.0842	0.0049	-----	2.7278	-3.3001
TOTAL MASS FLOW (kg/hr)	3580.3066	3113.6299	99.3398	23.0344	383.5213	3619.5251	-1.0954

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS [15-(50+62+68)]
	GC#1	GC#2
MASS BALANCE (%) :	-0.02	0.00
ELEMENTAL BALANCE (%) :		
CARBON	0.57	0.26
HYDROGEN	1.50	0.69
OXYGEN	0.43	0.11
NITROGEN	-1.01	-1.26

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

```

DATE :                                06-DEC-89
TIME :                                08:21:10
TIME INTERVAL :                       FROM: 0600 14-Sep
                                         TO:  0600 15-Sep

NUMBER OF AVERAGED HOURS :            22
RUN ID NUMBER :                       E7.14
FEED GAS TYPE :                       CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 165.8
OIL/SLURRY REACTOR INLET TEMP. (deg.C) : 39.7
AVG. REACTOR SLURRY TEMPERATURE (deg.C) : 249.7
REACTOR FREEBOARD TEMPERATURE (deg.C) : 245.7
OIL/SLURRY OUTLET TEMP. (deg.C) :     242.9
REACTOR FEED GAS PRESSURE (kPa) :     5532
REACTOR EFFLUENT GAS PRESSURE (kPa) :  5286
GAS SUPERFICIAL VELOCITY (cm/sec) :   15.2
LIQUID SUPERFICIAL VELOCITY (cm/sec) :  0.0
SLURRY CONCENTRATION (wt%) :          37.7
CATALYST OXIDE IN REACTOR (kg oxide) :  400
GAS HOLD-UP (%) :                     33.4
SPACE VELOCITY (1/kg-hr) :            9544
RECYCLE/FRESH FEED RATIO :            3.233
OIL/SLURRY CIRCULATION RATE (m3/hr) :  0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 134.46
PURGE GAS FLOW RATE <50> (ksmol/hr) :  4.34
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) : 402
  
```

STREAM #	1	55	15	15	32	32	62	69
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDM PRODUC
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
H2	59.59	26.55	35.21	34.93	24.22	23.76	5.07	-----
CO	36.10	55.79	50.89	50.82	50.84	50.77	23.30	-----
CO2	2.46	15.65	12.43	12.46	14.61	14.58	65.26	-----
N2	0.16	1.33	1.03	1.02	1.20	1.19	0.40	-----
CH4	0.00	0.36	0.30	0.28	0.32	0.34	0.35	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.64
CH3OH	0.00	0.59	0.46	0.40	8.64	8.60	5.56	97.37
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.51
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.19
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.15
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.09
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.89
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.14
TOTAL :	98.31	100.26	100.33	99.90	99.85	99.27	100.12	100.00
DENS,g/cc	0.005	0.050	0.031	0.032	0.037	0.037	0.004	0.788
AV.MOL.WT	12.66	23.60	20.85	20.89	24.35	24.45	37.34	32.10
Mm3/hr	902.2	2916.7	3854.9	3818.9	3276.2	3269.5	12.4	-----
ksmol/hr	40.25	130.12	171.98	170.37	146.16	145.80	0.55	11.95
l/hr,prod	-----	-----	-----	-----	-----	-----	-----	488.04

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	42.8	40.5
CARBON MONOXIDE CONVERSION	(%) :	15.4	14.2
CARBON DIOXIDE CONVERSION	(%) :	0.5	-0.6
RATIO H2 CONSUMED/CO CONSUMED	:	1.92	1.95
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	38.8	40.2
CARBON MONOXIDE CONVERSION	(%) :	13.4	13.8
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	39.3	40.0
CARBON MONOXIDE CONVERSION	(%) :	13.6	13.7
RATIO H2 CONSUMED/CO CONSUMED	:	2.01	2.01

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL %
CO (+CO2) SELECTIVITY TO METHANOL (%) :	92.1	98.9
CO (+CO2) SELECTIVITY TO ETHANOL (%) :		0.4

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	smol/hr-ks cat	kg/1000 Nm3 fresh feed	kg/1000 Nm3 reactor feed
As calculated ACROSS REACTOR	29.62	420.9	99.4
As Net MeOH produced, OVERALL balance	29.36	417.2	98.6

REACTOR FEED (H2/(CO+1.5CO2)) :	0.50
REACTOR FEED {(H2-CO2)/(CO+CO2)} :	0.36
APPROACH TO METHANOL EQUILIBRIUM (deg.C) :	17.04
APPROACH TO WATER-GAS EQUILIBRIUM (deg.C) :	4.65
METHANOL COLLECTED AS % OF CALCULATED :	98.6
CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) :	11.85

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1455)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-19.11647	-1.67323	-0.93145
CO	-6.20853	0.62250	-1.14349
CO2	n.a.	0.59034	-0.42688
N2	-609.86145	3.18901	-2.09993
CH4	100.00000	-1.83528	-3.95399
H2O	-----	n.a.	n.a.
CH3OH	-----	10.54568	1.01272

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	86.5835	72.5963	2.4192	0.1437	-----	75.1592	13.1946
CO2	21.2285	20.3644	0.6786	0.4026	-----	21.4456	-1.0230
CH3OH	0.6814	0.7617	0.0254	0.0343	11.6858	12.5077	-1735.5967
OTHERS	0.4770	0.4684	0.0156	0.0043	0.1195	0.6078	-27.4076
TOTAL C	108.9704	94.1908	3.1389	0.5848	11.8053	109.7199	-0.6877
HYDROGEN:							
H2	119.0225	69.0959	2.3026	0.0626	-----	71.4611	39.9601
H2O	0.0000	0.0000	0.0000	0.0000	0.2732	0.2732	n.a.
OTHERS	4.6337	4.9206	0.1640	0.1520	47.2212	52.4578	-1032.1047
TOTAL H	123.6562	74.0165	2.4666	0.2146	47.4945	124.1921	-0.4334
OXYGEN:							
TOTAL O	129.7218	114.0868	3.8019	0.9842	11.9477	130.8206	-0.8470
NITROGEN:							
TOTAL N	3.4756	3.4613	0.1153	0.0049	-----	3.5816	-3.0491
TOTAL MASS FLOW (kg/hr)	3559.0903	3070.9294	102.3372	23.0344	384.5950	3580.8962	-0.6127

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]		FRESH FEED GAS
	GC#1	GC#2	[15-(50+62+68)]
MASS BALANCE (Z) :	0.54	0.00	-0.08
ELEMENTAL BALANCE (Z) :			
CARBON	1.68	0.19	-0.06
HYDROGEN	3.84	0.36	-4.60
OXYGEN	1.47	0.05	-1.36
NITROGEN	2.01	-0.93	6.61

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY
=====

DATE :	06-DEC-89
TIME :	08:22:54
TIME INTERVAL :	FROM: 0600 15-Sep
	TO: 1600 15-Sep
NUMBER OF AVERAGED HOURS :	10
RUN ID NUMBER :	E7.15
FEED GAS TYPE:	CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) :	162.8
OIL/SLURRY REACTOR INLET TEMP. (deg.C) :	28.4
AVG. REACTOR SLURRY TEMPERATURE (deg.C) :	250.0
REACTOR FREEBOARD TEMPERATURE (deg.C) :	245.6
OIL/SLURRY OUTLET TEMP. (deg.C) :	242.5
REACTOR FEED GAS PRESSURE (kPa) :	5530
REACTOR EFFLUENT GAS PRESSURE (kPa) :	5286
GAS SUPERFICIAL VELOCITY (cm/sec) :	15.4
LIQUID SUPERFICIAL VELOCITY (cm/sec) :	0.0
SLURRY CONCENTRATION (wt%) :	37.7
CATALYST OXIDE IN REACTOR (kg oxide) :	400
GAS HOLD-UP (%) :	33.4
SPACE VELOCITY (1/kg-hr) :	9580
RECYCLE/FRESH FEED RATIO :	3.207
OIL/SLURRY CIRCULATION RATE (m3/hr) :	0.0
PROD. SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) :	134.83
PURGE GAS FLOW RATE <50> (ksmol/hr) :	4.50
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) :	603

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDM PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT	=====	=====	=====	=====	=====	=====	=====	=====
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	60.70	26.86	34.93	35.13	24.50	24.57	5.07	-----
CO	36.23	55.17	50.63	50.37	50.37	50.38	23.30	-----
CO2	2.29	15.35	12.33	12.22	14.36	14.36	65.26	-----
N2	0.21	1.90	1.35	1.48	1.74	1.59	0.40	-----
CH4	0.00	0.36	0.27	0.27	0.32	0.31	0.35	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.63
CH3OH	0.00	0.58	0.47	0.40	8.63	8.62	5.55	97.39
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.07
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.49
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.19
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.14
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.09
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.91
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.14
TOTAL :	99.42	100.22	99.98	99.87	99.91	99.83	100.12	100.00
DENS,g/cc	0.005	0.050	0.032	0.032	0.037	0.037	0.004	0.788
AV.MOL.WT	12.51	23.47	20.88	20.80	24.25	24.23	37.34	32.19
M3/hr	911.1	2921.3	3824.5	3832.3	3291.3	3297.5	12.3	-----
ksmol/hr	40.65	130.33	170.62	170.97	146.83	146.82	0.55	11.81
l/hr,prod	-----	-----	-----	-----	-----	-----	-----	492.59

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

=====

0500 15-Sep 99 - 1600 15-Sep 99

CONVERSIONS ACROSS REACTOR :

		GC#1 ----	GC#2 ----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	39.5	40.1
CARBON MONOXIDE CONVERSION	(%) :	14.3	14.1
CARBON DIOXIDE CONVERSION	(%) :	-0.2	-0.9
RATIO H2 CONSUMED/CO CONSUMED	:	1.90	1.98
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	39.8	39.9
CARBON MONOXIDE CONVERSION	(%) :	13.7	13.9
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	39.5	39.2
CARBON MONOXIDE CONVERSION	(%) :	13.6	13.6
RATIO H2 CONSUMED/CO CONSUMED	:	2.01	2.01

SELECTIVITIES :

	ACROSS REACTOR GC Average -----	OVERALL % -----
CO (+CO2) SELECTIVITY TO METHANOL (%) :	98.2	97.3
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.3

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	smol/hr-ks cat -----	ks/1000 Na3 fresh feed -----	ks/1000 Na3 reactor feed -----
As calculated ACROSS REACTOR	29.81	419.4	99.7
As Net MeOH produced, OVERALL balance	29.05	408.7	97.2

REACTOR FEED $\{H_2/(CO+1.5CO_2)\}$: 0.51
 REACTOR FEED $\{(H_2-CO_2)/(CO+CO_2)\}$: 0.37

APPROACH TO METHANOL EQUILIBRIUM (deg.C) : 17.09
 APPROACH TO WATER-GAS EQUILIBRIUM (deg.C) : 2.39

METHANOL COLLECTED AS % OF CALCULATED : 96.9

CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) : 11.92

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-23.00382	-0.63143	-0.77502
CO	-6.75738	0.58453	-0.75146
CO2	n.a.	0.22370	-0.08074
N2	n.a.	1.43867	-0.70586
CH4	100.00000	0.13816	-2.29536
H2O	-----	n.a.	n.a.
CH3OH	-----	8.95292	2.32540

OVERALL ELEMENTAL BALANCE (Kg-atoms/hr) :

	INPUTS		OUTPUTS				(IN-OUT)/IN
STREAM # STREAM NAME	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	86.1187	71.8993	2.4813	0.1426	-----	74.5231	13.4646
CO2	20.8928	20.0109	0.6906	0.3993	-----	21.1029	-0.9957
CH3OH	0.6859	0.7534	0.0260	0.0340	11.5589	12.3723	-1703.7855
OTHERS	0.4633	0.4718	0.0163	0.0043	0.1182	0.6105	-31.7705
TOTAL C	108.1607	93.1353	3.2142	0.5802	11.6771	108.6068	-0.4124
HYDROGEN:							
H2	120.1148	70.0186	2.4164	0.0621	-----	72.4971	39.6435
H2O	0.0000	0.0000	0.0000	0.0000	0.2664	0.2664	n.a.
OTHERS	4.5970	4.8928	0.1689	0.1510	46.7084	51.9211	-1029.4640
TOTAL H	124.7117	74.9114	2.5853	0.2131	46.9748	124.6845	0.0218
OXYGEN:							
TOTAL O	128.5902	112.6783	3.8886	0.9763	11.8153	129.3585	-0.5975
NITROGEN:							
TOTAL N	5.0505	4.9552	0.1710	0.0049	-----	5.1311	-1.5951
TOTAL MASS FLOW (kg/hr)	3556.0493	3058.1980	105.5408	22.8493	380.2999	3566.8882	-0.3048

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]		FRESH FEED GAS
	GC#1	GC#2	[15-(50+62+68)]
MASS BALANCE (%) :	0.12	-0.11	-0.03
ELEMENTAL BALANCE (%) :			
CARBON	0.41	-0.03	1.17
HYDROGEN	-0.37	0.18	-0.97
OXYGEN	0.31	-0.16	-0.58
NITROGEN	-1.05	-0.88	-4.05

LAPORTE LPHETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

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DATE :                                06-DEC-89
TIME :                                08:24:19
TIME INTERVAL :                       FROM: 1800 18-Sep
                                         TO:  0600 19-Sep

NUMBER OF AVERAGED HOURS :            12
RUN ID NUMBER :                       E7.16
FEED GAS TYPE:                        CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) : 163.0
OIL/SLURRY REACTOR INLET TEMP. (des.C) : 29.4
AVG. REACTOR SLURRY TEMPERATURE (des.C) : 249.8
REACTOR FREEBOARD TEMPERATURE (des.C) : 244.5
OIL/SLURRY OUTLET TEMP. (des.C) :      241.8
REACTOR FEED GAS PRESSURE (kPa) :      5519
REACTOR EFFLUENT GAS PRESSURE (kPa) :    5283
GAS SUPERFICIAL VELOCITY (cm/sec) :     15.5
LIQUID SUPERFICIAL VELOCITY (cm/sec) :    0.0
SLURRY CONCENTRATION (wt%) :            38.0
CATALYST OXIDE IN REACTOR (kg oxide) :    400
GAS HOLD-UP (Z) :                      34.3
SPACE VELOCITY (1/kg-hr) :              9615
RECYCLE/FRESH FEED RATIO :              3.274
OIL/SLURRY CIRCULATION RATE (m3/hr) :    0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 135.79
PURGE GAS FLOW RATE <50> (ksmol/hr) :    4.34
HEAT TRANSFER COEFFICIENT (Watt/m2-des.C) : 613
  
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STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
H2	59.97	26.87	35.65	35.42	24.56	24.38	5.39	-----
CO	36.01	55.90	50.78	50.78	50.83	50.63	24.14	-----
CO2	2.51	15.35	12.33	12.28	14.37	14.44	63.22	-----
N2	0.11	1.24	0.97	0.91	1.12	1.15	0.82	-----
CH4	0.00	0.32	0.28	0.25	0.29	0.32	0.23	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.60
CH3OH	0.00	0.64	0.49	0.46	8.62	8.71	6.20	97.37
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.50
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.18
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.14
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.08
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.96
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.13
TOTAL :	98.60	100.33	100.49	100.10	99.79	99.64	100.09	100.00
DENS, g/cc	0.005	0.050	0.031	0.031	0.037	0.037	0.004	0.787
AV.MOL.WT	12.61	23.47	20.74	20.75	24.23	24.28	36.96	32.20
Mm3/hr	900.0	2946.4	3846.8	3846.3	3294.2	3290.6	12.3	-----
ksmol/hr	40.15	131.45	171.62	171.59	146.96	146.74	0.55	11.87
l/hr,prod	-----	-----	-----	-----	-----	-----	-----	485.77

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		<u>GC#1</u>	<u>GC#2</u>
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(Z) :	41.5	40.6
CARBON MONOXIDE CONVERSION	(Z) :	14.7	14.3
CARBON DIOXIDE CONVERSION	(Z) :	-0.2	-0.3
RATIO H2 CONSUMED/CO CONSUMED	:	1.98	1.99
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(Z) :	39.0	39.1
CARBON MONOXIDE CONVERSION	(Z) :	13.7	13.6
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(Z) :	38.8	39.0
CARBON MONOXIDE CONVERSION	(Z) :	13.5	13.5
RATIO H2 CONSUMED/CO CONSUMED	:	2.01	2.01

SELECTIVITIES :

	<u>ACROSS REACTOR</u> <u>GC Average</u>	<u>OVERALL</u> <u>%</u>
CO (+CO2) SELECTIVITY TO METHANOL (Z) :	94.7	98.6
CO (+CO2) SELECTIVITY TO ETHANOL (Z) :	—	0.4

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

<u>MEOH SOURCE</u>	<u>saol/hr-kg cat</u>	<u>kg/1000 Me3 fresh feed</u>	<u>kg/1000 Me3 reactor feed</u>
As calculated ACROSS REACTOR	29.78	424.1	99.2
As Net MeOH produced, OVERALL balance	29.21	416.0	97.3

REACTOR FEED (H2/(CO+1.5CO2)) :	0.51
REACTOR FEED ((H2-CO2)/(CO+CO2)) :	0.37
APPROACH TO METHANOL EQUILIBRIUM (des.C) :	17.71
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) :	0.29
METHANOL COLLECTED AS % OF CALCULATED :	97.5
CALCULATED METHANOL PRODUCTION RATE (Ksaol/hr) :	11.91

LAPORTE LPHETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1455)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-22.31617	-2.33107	-1.18004
CO	-6.29683	0.91527	-1.80481
CO2	n.a.	0.58729	-0.53141
N2	-160.64278	6.32917	-3.05767
CH4	n.a.	-1.66816	-3.31788
H2O	-----	n.a.	n.a.
CH3OH	-----	6.19762	1.17917

OVERALL ELEMENTAL BALANCE (Kg-atoms/hr) :

	INPUTS		OUTPUTS				(IN-OUT)/IN
STREAM # STREAM NAME	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	87.1388	73.4829	2.4269	0.1465	-----	76.0563	12.7181
CO2	21.0683	20.1837	0.6666	0.3837	-----	21.2340	-0.7866
CH3OH	0.7847	0.8366	0.0276	0.0376	11.6182	12.5200	-1495.4739
OTHERS	0.4290	0.4219	0.0139	0.0024	0.1187	0.5570	-29.8476
TOTAL C	109.4206	94.9251	3.1351	0.5702	11.7369	110.3673	-0.8652
HYDROGEN:							
H2	121.5706	70.6423	2.3331	0.0654	-----	73.0408	39.9190
H2O	0.0000	0.0000	0.0000	0.0000	0.2551	0.2551	n.a.
OTHERS	4.8548	5.0341	0.1663	0.1591	47.0665	52.4259	-979.8735
TOTAL H	126.4254	75.6764	2.4994	0.2245	47.3216	125.7218	0.5565
OXYGEN:							
TOTAL O	130.0599	114.6868	3.7878	0.4519	11.8729	131.2994	-0.9531
NITROGEN:							
TOTAL N	3.1333	3.2599	0.1077	0.0100	-----	3.3775	-7.7943
TOTAL MASS FLOW (kg/hr)	3560.9094	3085.5889	101.9079	22.4299	382.3196	3592.2463	-0.8800

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS
	GC#1	[15-(50+62+68)]
MASS BALANCE (Z) :	-0.18	-0.08
ELEMENTAL BALANCE (Z) :		
CARBON	0.77	0.18
HYDROGEN	2.34	-3.92
OXYGEN	0.59	-0.81
NITROGEN	-1.40	-38.19

LAPORTE LPHETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY
=====

DATE :	06-DEC-89
TIME :	08:25:49
TIME INTERVAL :	FROM: 0600 19-Sep
	TO: 0600 20-Sep
NUMBER OF AVERAGED HOURS :	24
RUN ID NUMBER :	E7.17
FEED GAS TYPE:	CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) :	163.7
OIL/SLURRY REACTOR INLET TEMP. (des.C) :	28.3
AVG. REACTOR SLURRY TEMPERATURE (des.C) :	249.7
REACTOR FREEBOARD TEMPERATURE (des.C) :	245.0
OIL/SLURRY OUTLET TEMP. (des.C) :	242.5
REACTOR FEED GAS PRESSURE (kPa) :	5520
REACTOR EFFLUENT GAS PRESSURE (kPa) :	5282
GAS SUPERFICIAL VELOCITY (cm/sec) :	15.5
LIQUID SUPERFICIAL VELOCITY (cm/sec) :	0.0
SLURRY CONCENTRATION (wt%) :	39.0
CATALYST OXIDE IN REACTOR (kg oxide) :	399
GAS HOLD-UP (%) :	34.2
SPACE VELOCITY (1/kg-hr) :	9605
RECYCLE/FRESH FEED RATIO :	3.354
OIL/SLURRY CIRCULATION RATE (m3/hr) :	0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) :	136.14
PURGE GAS FLOW RATE <50> (ksmol/hr) :	4.17
HEAT TRANSFER COEFFICIENT (Watt/m2-des.C) :	610

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<WTX>
H2	50.53	26.73	35.67	35.18	24.23	24.67	5.39	-----
CO	35.74	56.36	51.00	51.27	51.65	51.03	24.14	-----
CO2	2.76	14.92	12.53	11.84	13.96	14.61	63.22	-----
N2	0.12	1.26	0.77	1.00	1.16	0.90	0.82	-----
CH4	0.03	0.41	0.27	0.32	0.38	0.31	0.23	-----
H2O	0.00	0.00	0.02	0.00	0.00	0.01	0.00	0.59
CH3OH	0.00	0.58	0.50	0.41	8.50	8.47	6.20	97.30
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.50
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.19
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.15
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.09
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	1.02
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.14
TOTAL :	99.18	100.26	100.77	100.03	99.89	100.00	100.08	100.00
DENS, g/cc	0.005	0.049	0.031	0.031	0.037	0.037	0.004	0.788
AV.MOL.WT	12.59	23.42	20.78	20.73	24.24	24.24	36.96	32.22
Mm3/hr	882.1	2958.1	3836.2	3840.1	3284.4	3284.3	12.1	-----
ksmol/hr	39.35	131.97	171.15	171.32	146.53	146.46	0.54	11.66
l/hr,prod	-----	-----	-----	-----	-----	-----	-----	476.91

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
		----	----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(Z) :	40.8	41.1
CARBON MONOXIDE CONVERSION	(Z) :	14.3	13.9
CARBON DIOXIDE CONVERSION	(Z) :	0.2	-0.8
RATIO H2 CONSUMED/CO CONSUMED	:	1.99	2.04
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(Z) :	37.8	39.0
CARBON MONOXIDE CONVERSION	(Z) :	13.2	13.4
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(Z) :	38.2	39.7
CARBON MONOXIDE CONVERSION	(Z) :	13.3	13.2
RATIO H2 CONSUMED/CO CONSUMED	:	2.01	2.01

SELECTIVITIES :

		ACROSS REACTOR GC Average	OVERALL *
		-----	-----
CO (+CO2) SELECTIVITY TO METHANOL	(Z) :	94.9	98.4
CO (+CO2) SELECTIVITY TO ETHANOL	(Z) :	-----	0.4

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	kmol/hr-kg cat	kg/1000 Na3 fresh feed	kg/1000 Na3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	29.13	423.0	97.2
As Net MeOH produced, OVERALL balance	28.70	416.8	95.7

REACTOR FEED (H2/(CO+1.5CO2)) :	0.51
REACTOR FEED ((H2-CO2)/(CO+CO2)) :	0.37
APPROACH TO METHANOL EQUILIBRIUM (des.C) :	17.75
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) :	2.07
METHANOL COLLECTED AS % OF CALCULATED :	98.0
CALCULATED METHANOL PRODUCTION RATE (Kmol/hr) :	11.65

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-20.10875	-1.97786	-2.57841
CO	-4.56139	0.67696	-1.56843
CO2	-14.18569	2.34724	-1.13383
N2	-155.81509	-0.14539	-1.36946
CH4	n.a.	0.31675	-0.70061
H2O	-----	n.a.	n.a.
CH3OH	-----	6.61276	1.78654

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

	INPUTS		OUTPUTS				(IN-OUT)/IN
STREAM # STREAM NAME	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	87.8400	74.3734	2.3500	0.1448	-----	76.8683	12.4906
CO2	20.2859	19.6857	0.6220	0.3794	-----	20.6871	-1.9784
CH3OH	0.7109	0.7612	0.0241	0.0372	11.4125	12.2350	-1621.1149
OTHERS	0.5551	0.5477	0.0173	0.0024	0.1167	0.6840	-23.2305
TOTAL C	109.3917	95.3680	3.0134	0.5638	11.5292	110.4744	-0.9897
HYDROGEN:							
H2	120.5258	70.5529	2.2293	0.0647	-----	72.8469	39.5591
H2O	0.0000	0.0000	0.0000	0.0000	0.2470	0.2470	n.a.
OTHERS	5.0638	5.2329	0.1653	0.1573	46.2333	51.7889	-972.7310
TOTAL H	125.5896	75.7858	2.3946	0.2220	46.4803	124.8828	0.5629
OXYGEN:							
TOTAL O	129.1225	114.5074	3.6181	0.9413	11.6655	130.7323	-1.2467
NITROGEN:							
TOTAL N	3.4264	3.3309	0.1052	0.0099	-----	3.4460	-0.5726
TOTAL MASS FLOW (kg/hr)	3551.5981	3091.0959	97.6705	22.1785	375.8258	3586.7710	-0.9903

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS [15-(50+62+68)]
MASS BALANCE (Z) :	GC#1	GC#2
ELEMENTAL BALANCE (Z) :	-----	-----
CARBON	0.93	0.22
HYDROGEN	2.88	1.99
OXYGEN	0.82	0.06
NITROGEN	0.58	0.79
		-27.17

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

```

DATE :                                06-DEC-89
TIME :                                08:30:24
TIME INTERVAL :                       FROM: 0600 20-Sep
                                         TO:  0600 21-Sep

NUMBER OF AVERAGED HOURS :            24
RUN ID NUMBER :                       E7.18
FEED GAS TYPE:                        CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 165.1
OIL/SLURRY REACTOR INLET TEMP. (deg.C) : 28.5
AVG. REACTOR SLURRY TEMPERATURE (deg.C) : 249.7
REACTOR FREEBOARD TEMPERATURE (deg.C) : 245.6
OIL/SLURRY OUTLET TEMP. (deg.C) :     242.9
REACTOR FEED GAS PRESSURE (kPa) :      5521
REACTOR EFFLUENT GAS PRESSURE (kPa) :   5282
GAS SUPERFICIAL VELOCITY (cm/sec) :    15.5
LIQUID SUPERFICIAL VELOCITY (cm/sec) :   0.0
SLURRY CONCENTRATION (wt%) :            38.0
CATALYST OXIDE IN REACTOR (kg oxide) :   399
GAS HOLD-UP (%) :                      34.2
SPACE VELOCITY (1/kg-hr) :              9607
RECYCLE/FRESH FEED RATIO :              3.150
OIL/SLURRY CIRCULATION RATE (m3/hr) :    0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (kmol/hr) : 134.84
PURGE GAS FLOW RATE <50> (kmol/hr) :     4.87
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) : 603
  
```

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDN PRODUC
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT	-----	-----	-----	-----	-----	-----	-----	-----
-----	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	59.62	26.96	35.84	35.29	24.68	25.07	5.39	-----
CO	37.05	55.39	50.88	50.48	50.60	51.00	24.14	-----
CO2	1.51	15.03	10.58	11.98	14.09	14.05	63.22	-----
N2	0.20	1.65	1.14	1.28	1.52	1.35	0.82	-----
CH4	0.02	0.46	0.32	0.36	0.43	0.38	0.23	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.58
CH3OH	0.00	0.60	0.45	0.41	8.61	8.67	6.20	97.30
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.50
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.19
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.15
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.09
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	1.03
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.14
TOTAL :	98.40	100.09	99.20	99.82	99.94	100.53	100.08	100.00
DENS, g/cc	0.005	0.049	0.031	0.031	0.037	0.036	0.004	0.788
AV. MOL. WT	12.50	23.37	20.26	20.70	24.14	24.07	36.96	32.22
Mm3/hr	924.8	2913.4	3876.4	3838.3	3291.4	3296.5	11.7	-----
kmol/hr	41.26	129.98	172.94	171.24	146.84	147.00	0.52	11.82
1/hr:prod	-----	-----	-----	-----	-----	-----	-----	493.27

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

0600 20-Sep 88 - 0600 21-Sep 88

CONVERSIONS ACROSS REACTOR :

	GC#1	GC#2

CALCULATED BY GAS COMPOSITION		
HYDROGEN CONVERSION (Z) :	40.5	40.0
CARBON MONOXIDE CONVERSION (Z) :	14.8	14.1
CARBON DIOXIDE CONVERSION (Z) :	-13.0	-0.8
RATIO H2 CONSUMED/CO CONSUMED :	1.93	1.99
CALCULATED BY METHANOL IN EXIT GAS		
HYDROGEN CONVERSION (Z) :	38.7	39.5
CARBON MONOXIDE CONVERSION (Z) :	13.6	13.8
CALCULATED BY OVERALL BALANCE		
HYDROGEN CONVERSION (Z) :	38.1	39.1
CARBON MONOXIDE CONVERSION (Z) :	13.4	13.6
RATIO H2 CONSUMED/CO CONSUMED :	2.01	2.01

SELECTIVITIES :

	ACROSS REACTOR GC #2	OVERALL %

CO (+CO2) SELECTIVITY TO METHANOL (Z) :	99.7	97.1
CO (+CO2) SELECTIVITY TO ETHANOL (Z) :	-----	0.3

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	smol/hr-ks cat	ks/1000 Na3 fresh feed	ks/1000 Na3 reactor feed
-----			
As calculated ACROSS REACTOR, GC#2	29.89	413.7	99.7
As Net MeOH produced, OVERALL balance	29.11	402.9	97.1

REACTOR FEED $\langle \text{H}_2 / (\text{CO} + 1.5\text{CO}_2) \rangle$: 0.52
 REACTOR FEED $\langle (\text{H}_2 - \text{CO}_2) / (\text{CO} + \text{CO}_2) \rangle$: 0.37

APPROACH TO METHANOL EQUILIBRIUM (des.C) : 17.82
 APPROACH TO WATER-GAS EQUILIBRIUM (des.C) : -0.25

METHANOL COLLECTED AS % OF CALCULATED, GC#2 : 95.8

CALCULATED METHANOL PRODUCTION RATE, GC#2 (Ksmol/hr) : 11.94

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-22.69839	-1.33836	-0.41051
CO	-9.91726	0.96106	-0.71936
CO2	42.30317	-1.82327	0.30833
N2	-287.06985	1.31463	0.17706
CH4	n.a.	-0.63005	1.78968
H2O	-----	n.a.	n.a.
CH3OH	-----	9.25113	1.89400

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	86.4424	71.9934	2.6971	0.1396	-----	74.8301	13.4335
CO2	20.5228	19.5327	0.7318	0.3656	-----	20.6301	-0.5227
CH3OH	0.7063	0.7783	0.0292	0.0358	11.5638	12.4071	-1656.7369
OTHERS	0.6096	0.5992	0.0224	0.0023	0.1182	0.7421	-21.7396
TOTAL C	108.2811	92.9036	3.4805	0.5433	11.6820	108.6094	-0.3032
HYDROGEN:							
H2	120.8765	70.0802	2.6254	0.0623	-----	72.7680	39.7998
H2O	0.0000	0.0000	0.0000	0.0000	0.2473	0.2473	n.a.
OTHERS	5.2635	5.5098	0.2064	0.1516	46.8463	52.7141	-901.5123
TOTAL H	126.1400	75.5900	2.8318	0.2140	47.0936	125.7294	0.3255
OXYGEN:							
TOTAL O	128.1943	111.8371	4.1898	0.9071	11.8195	128.7535	-0.4363
NITROGEN:							
TOTAL N	4.4008	4.2944	0.1609	0.0095	-----	4.4648	-1.4535
TOTAL MASS FLOW (kg/hr)	3545.1294	3037.3982	113.7904	21.3738	380.8368	3553.3994	-0.2333

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS
	GC#1	[15-(50+62+68)]
MASS BALANCE (%) :	-1.04	-0.05
ELEMENTAL BALANCE (%) :		
CARBON	-1.29	1.33
HYDROGEN	1.71	-1.85
OXYGEN	-2.99	-2.32
NITROGEN	-1.03	-3.24

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES : ANALYTICAL SUMMARY

```

DATE : 06-DEC-89
TIME : 08:31:53
TIME INTERVAL : FROM: 0600 21-Sep
                TO: 2400 21-Sep

NUMBER OF AVERAGED HOURS : 18
RUN ID NUMBER : E7.19A
FEED GAS TYPE: CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) : 164.3
OIL/SLURRY REACTOR INLET TEMP. (des.C) : 29.0
AVG. REACTOR SLURRY TEMPERATURE (des.C) : 249.7
REACTOR FREEBOARD TEMPERATURE (des.C) : 245.7
OIL/SLURRY OUTLET TEMP. (des.C) : 243.0
REACTOR FEED GAS PRESSURE (kPa) : 5521
REACTOR EFFLUENT GAS PRESSURE (kPa) : 5282
GAS SUPERFICIAL VELOCITY (cm/sec) : 15.5
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 0.0
SLURRY CONCENTRATION (wt%) : 37.7
CATALYST OXIDE IN REACTOR (kg oxide) : 399
GAS HOLD-UP (%) : 33.6
SPACE VELOCITY (1/kg-hr) : 9638
RECYCLE/FRESH FEED RATIO : 3.243
OIL/SLURRY CIRCULATION RATE (m3/hr) : 0.0
PROD. SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 136.36
PURGE GAS FLOW RATE <50> (ksmol/hr) : 5.13
HEAT TRANSFER COEFFICIENT (Watt/m2-des.C) : 606
  
```

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEOH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<WTZ>
H2	58.49	26.76	34.74	35.07	24.34	24.12	5.39	-----
CO	36.45	55.73	51.33	50.78	50.92	51.53	24.14	-----
CO2	2.47	15.14	12.13	12.10	14.16	14.22	63.22	-----
N2	0.19	1.50	1.15	1.17	1.37	1.35	0.82	-----
CH4	0.03	0.44	0.34	0.34	0.40	0.41	0.23	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.60
CH3OH	0.00	0.49	0.43	0.32	8.44	8.42	6.20	97.36
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.50
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.18
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.15
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.09
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.97
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.13
TOTAL :	97.61	100.05	100.12	99.78	99.64	100.06	100.08	100.09
DENS,g/cc	0.005	0.050	0.032	0.031	0.037	0.037	0.004	0.791
AV.MOL.WT	12.83	23.44	20.90	20.78	24.23	24.31	36.96	32.21
Mm3/hr	906.9	2941.5	3837.5	3848.5	3299.8	3294.7	11.8	-----
ksmol/hr	40.46	131.23	171.20	171.69	147.22	146.92	0.53	11.73
1/hr,prod	-----	-----	-----	-----	-----	-----	-----	477.59

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
		----	----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	40.4	40.5
CARBON MONOXIDE CONVERSION	(%) :	13.8	14.0
CARBON DIOXIDE CONVERSION	(%) :	-0.6	-0.4
RATIO H2 CONSUMED/CO CONSUMED	:	1.98	1.99
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	39.1	39.5
CARBON MONOXIDE CONVERSION	(%) :	13.2	13.6
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	39.4	39.9
CARBON MONOXIDE CONVERSION	(%) :	13.3	13.4
RATIO H2 CONSUMED/CO CONSUMED	:	2.01	2.01

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL %
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (%) :	97.4	99.5
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.4

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	kmol/hr-kg cat	kg/1000 Me3 fresh feed	kg/1000 Me3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	29.45	415.5	97.9
As Net MeOH produced, OVERALL balance	28.90	407.8	96.1

REACTOR FEED $\{H_2/(CO+1.5CO_2)\}$: 0.51
 REACTOR FEED $\{(H_2-CO_2)/(CO+CO_2)\}$: 0.37

APPROACH TO METHANOL EQUILIBRIUM (des.C) : 17.97
 APPROACH TO WATER-GAS EQUILIBRIUM (des.C) : 0.59

METHANOL COLLECTED AS % OF CALCULATED : 97.6

CALCULATED METHANOL PRODUCTION RATE (Kmol/hr) : 11.76

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT MATERIAL BALANCE SUMMARY

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-17.35961	-2.44806	-1.91800
CO	-5.13253	0.79041	-1.55427
CO2	12.81234	0.44566	-0.80375
N2	-309.02438	1.78912	-1.51626
CH4	n.a.	0.64068	-2.86494
H2O	-----	n.a.	n.a.
CH3OH	-----	14.91658	2.00247

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	87.1940	73.1321	2.8571	0.1414	-----	76.1307	12.6881
CO2	20.7748	19.8696	0.7763	0.3705	-----	21.0164	-1.1628
CH3OH	0.5438	0.6392	0.0250	0.0363	11.4794	12.1798	-2139.6047
OTHERS	0.5855	0.5787	0.0226	0.0023	0.1173	0.7210	-23.1450
TOTAL C	109.0981	94.2197	3.6810	0.5506	11.5967	110.0479	-0.8706
HYDROGEN:							
H2	120.4319	70.2267	2.7436	0.0632	-----	73.0335	39.3571
H2O	0.0000	0.0000	0.0000	0.0000	0.2500	0.2500	n.a.
OTHERS	4.5172	4.8716	0.1903	0.1537	46.5040	51.7196	-1044.9382
TOTAL H	124.9492	75.0983	2.9340	0.2168	46.7540	125.0030	-0.0431
OXYGEN:							
TOTAL O	129.2874	113.5105	4.4346	0.9192	11.7310	130.5953	-1.0116
NITROGEN:							
TOTAL N	4.0107	3.9317	0.1536	0.0096	-----	4.0949	-2.0983
TOTAL MASS FLOW (ks/hr)	3567.4255	3075.7800	120.1649	21.6588	377.7955	3595.3994	-0.7841

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]		FRESH FEED GAS
	GC#1	GC#2	[15-(50+62+68)]
MASS BALANCE (Z) :	0.15	0.00	-0.08
ELEMENTAL BALANCE (Z) :			
CARBON	0.32	0.25	-0.45
HYDROGEN	1.11	0.99	-5.35
OXYGEN	0.16	0.15	-2.03
NITROGEN	-1.06	-0.57	-7.29

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

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DATE :                                06-DEC-89
TIME :                                08:33:10
TIME INTERVAL :                       FROM: 0000 22-Sep
                                         TO: 0600 22-Sep
                                         6
NUMBER OF AVERAGED HOURS :
RUN ID NUMBER :                       E7.19R
FEED GAS TYPE:                        CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 152.5
OIL/SLURRY REACTOR INLET TEMP. (deg.C) : 29.3
AVG. REACTOR SLURRY TEMPERATURE (deg.C) : 248.5
REACTOR FREEBOARD TEMPERATURE (deg.C) : 238.1
OIL/SLURRY OUTLET TEMP. (deg.C) : 235.0
REACTOR FEED GAS PRESSURE (kPa) : 5430
REACTOR EFFLUENT GAS PRESSURE (kPa) : 5282
GAS SUPERFICIAL VELOCITY (cm/sec) : 9.6
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 0.0
SLURRY CONCENTRATION (wt%) : 37.7
CATALYST OXIDE IN REACTOR (kg oxide) : 399
GAS HOLD-UP (%) : 24.7
SPACE VELOCITY (1/kg-hr) : 5978
RECYCLE/FRESH FEED RATIO : 2.143
OIL/SLURRY CIRCULATION RATE (m3/hr) : 0.0
PROD.SEPARATOR GAS FLOWRATE <30> + <35> (ksmol/hr) : 79.47
PURGE GAS FLOW RATE <30> (ksmol/hr) : 6.89
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) : 529
  
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STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDH PRODUC
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MMZ>	<WTZ>
H2	58.01	25.57	34.73	35.46	22.27	24.19	5.39	-----
CO	36.36	56.97	51.37	51.12	51.36	51.47	24.14	-----
CO2	3.27	15.41	12.18	11.69	14.57	14.21	63.22	-----
N2	0.19	1.13	1.10	0.85	1.02	1.28	0.82	-----
CH4	0.06	0.32	0.35	0.24	0.29	0.42	0.23	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.59
CH3OH	0.00	0.49	0.40	0.29	9.81	8.40	6.20	97.40
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.50
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.18
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.15
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.09
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.94
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.13
TOTAL :	97.88	99.90	100.13	99.65	99.33	100.03	100.08	100.00
DENS,g/cc	0.005	0.050	0.032	0.031	0.038	0.037	0.004	0.790
AV.MOL.WT	13.13	23.80	20.91	20.61	24.89	24.28	36.96	32.20
M3/hr	759.2	1626.9	2345.6	2386.1	1975.7	2000.5	9.0	-----
ksmol/hr	33.87	72.58	104.64	106.45	88.14	89.21	0.40	8.22
l/hr,prod	-----	-----	-----	-----	-----	-----	-----	334.97

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

0000 22-Sep 89 - 0600 22-Sep 89

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2

CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	40.6	48.0
CARBON MONOXIDE CONVERSION	(%) :	14.5	16.8
CARBON DIOXIDE CONVERSION	(%) :	0.5	-3.2
RATIO H2 CONSUMED/CO CONSUMED	:	1.89	1.98
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	38.9	44.2
CARBON MONOXIDE CONVERSION	(%) :	13.2	15.3
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	45.1	43.4
CARBON MONOXIDE CONVERSION	(%) :	15.2	15.0
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL *

CO (+CO2) SELECTIVITY TO METHANOL (%) :	92.7	100.7
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.4

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	kmol/hr-kg cat	kg/1000 Me3 fresh feed	kg/1000 Me3 reactor feed
-----			
As calculated ACROSS REACTOR	19.31	325.2	103.5
As Net MeOH produced, OVERALL balance	20.31	342.1	108.9

REACTOR FEED (H2/(CO+1.5CO2)) :	0.52
REACTOR FEED ((H2-CO2)/(CO+CO2)) :	0.38
APPROACH TO METHANOL EQUILIBRIUM (des.C) :	11.78
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) :	15.32
METHANOL COLLECTED AS % OF CALCULATED :	104.4
CALCULATED METHANOL PRODUCTION RATE (Kmol/hr) :	7.71

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<Z diff.>	<Z diff.>	<Z diff.>
H2	-40.84790	1.19335	-3.64521
CO	-8.69287	-1.39438	-0.24846
CO2	-0.29898	-1.26074	2.48549
N2	-431.31851	-2.76677	-0.08828
CH4	n.a.	0.72465	-0.41479
H2O	-----	n.a.	n.a.
CH3OH	-----	14.29400	2.09631

OVERALL ELEMENTAL BALANCE (Kg-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	Z
CARBON:							
CO	54.4159	41.3509	3.9253	0.1071	-----	45.3833	16.5991
CO2	12.4461	11.1842	1.0617	0.2804	-----	12.5264	-0.6451
CH3OH	0.3061	0.3571	0.0339	0.0275	8.0442	8.4627	-2664.9375
OTHERS	0.2533	0.2359	0.0224	0.0018	0.0822	0.3422	-35.0854
TOTAL C	67.4214	53.1282	5.0433	0.4168	8.1263	66.7146	1.0483
HYDROGEN:							
H2	75.4982	37.1143	3.5231	0.0478	-----	40.6852	46.1110
H2O	0.0000	0.0000	0.0000	0.0000	0.1742	0.1742	n.a.
OTHERS	2.2377	2.3720	0.2252	0.1163	32.5053	35.2189	-1473.9005
TOTAL H	77.7359	39.4863	3.7483	0.1641	32.6796	76.0783	2.1323
OXYGEN:							
TOTAL O	79.6141	64.0765	6.0826	0.6958	8.2187	79.0736	0.6789
NITROGEN:							
TOTAL N	1.8160	1.6418	0.1539	0.0073	-----	1.8050	0.6099
TOTAL MASS FLOW (kg/hr)	2194.2419	1727.3162	163.9690	16.3950	264.6429	2172.3232	0.9989

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]		FRESH FEED GAS
	GC#1	GC#2	[15-(50+62+68)]
MASS BALANCE (%) :	0.96	0.00	-0.04
ELEMENTAL BALANCE (%) :			
CARBON	1.19	0.60	-1.07
HYDROGEN	1.40	3.70	7.06
OXYGEN	1.01	0.01	-3.21
NITROGEN	1.08	0.70	-30.18

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

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=====
DATE :                                06-DEC-99
TIME :                                08:34:49
TIME INTERVAL :                       FROM: 0600 22-Sep
                                         TO:  0600 23-Sep

NUMBER OF AVERAGED HOURS :            24
RUN ID NUMBER :                       E7.20
FEED GAS TYPE:                        CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) : 163.9
OIL/SLURRY REACTOR INLET TEMP. (des.C) : 28.6
AVG. REACTOR SLURRY TEMPERATURE (des.C) : 249.5
REACTOR FREEBOARD TEMPERATURE (des.C) : 245.0
OIL/SLURRY OUTLET TEMP. (des.C) :     242.4
REACTOR FEED GAS PRESSURE (kPa) :      5512
REACTOR EFFLUENT GAS PRESSURE (kPa) :    5280
GAS SUPERFICIAL VELOCITY (cm/sec) :     15.1
LIQUID SUPERFICIAL VELOCITY (cm/sec) :    0.0
SLURRY CONCENTRATION (wt%) :            37.8
CATALYST OXIDE IN REACTOR (kg oxide) :    399
GAS HOLD-UP (%) :                      33.9
SPACE VELOCITY (1/kg-hr) :              9427
RECYCLE/FRESH FEED RATIO :              3.275
OIL/SLURRY CIRCULATION RATE (m3/hr) :     0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 133.60
PURGE GAS FLOW RATE <50> (ksmol/hr) :      5.01
HEAT TRANSFER COEFFICIENT (Watt/m2-des.C) : 602
  
```

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEOH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT	=====	=====	=====	=====	=====	=====	=====	=====
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	59.30	26.50	35.11	35.03	24.15	24.03	5.39	-----
CO	36.36	56.21	50.95	51.17	51.16	51.32	24.14	-----
CO2	3.14	15.70	12.49	12.50	14.65	14.64	63.22	-----
N2	0.11	0.85	0.72	0.66	0.77	0.82	0.82	-----
CH4	0.01	0.32	0.27	0.25	0.29	0.32	0.23	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.51
CH3OH	0.00	0.58	0.45	0.39	8.50	8.41	6.20	96.79
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.03
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.65
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.25
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.19
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.11
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	1.20
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.26
TOTAL :	98.92	100.16	99.99	100.00	99.53	99.56	100.08	100.00
DENS,g/cc	0.005	0.050	0.032	0.032	0.037	0.037	0.004	0.798
AV.MOL.WT	12.94	23.62	20.86	20.88	24.37	24.40	36.96	32.34
M3/hr	880.0	2882.4	3770.4	3762.3	3224.1	3222.1	12.0	-----
ksmol/hr	39.26	128.59	168.21	167.85	143.84	143.69	0.53	11.39
1/hr:prod	-----	-----	-----	-----	-----	-----	-----	467.37

LAPORTE LPETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(Z) :	41.5	40.9
CARBON MONOXIDE CONVERSION	(Z) :	13.9	14.3
CARBON DIOXIDE CONVERSION	(Z) :	-0.2	-0.5
RATIO H2 CONSUMED/CO CONSUMED	:	2.05	1.96
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(Z) :	38.3	39.4
CARBON MONOXIDE CONVERSION	(Z) :	13.2	13.5
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(Z) :	38.5	38.7
CARBON MONOXIDE CONVERSION	(Z) :	13.3	13.3
RATIO H2 CONSUMED/CO CONSUMED	:	1.99	1.99

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL %
CO (+CO2) SELECTIVITY TO METHANOL (Z) :	95.0	99.3
CO (+CO2) SELECTIVITY TO ETHANOL (Z) :	-----	0.5

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	kmol/hr-kg cat	kg/1000 kg3 fresh feed	kg/1000 kg3 reactor feed
As calculated ACROSS REACTOR	28.68	416.7	97.5
As Net MeOH produced, OVERALL balance	28.04	407.5	95.3

REACTOR FEED (H2/(CO+1.5CO2)) : 0.50
 REACTOR FEED ((H2-CO2)/(CO+CO2)) : 0.35

APPROACH TO METHANOL EQUILIBRIUM (deg.C) : 17.73
 APPROACH TO WATER-GAS EQUILIBRIUM (deg.C) : -9.39

METHANOL COLLECTED AS % OF CALCULATED : 97.2

CALCULATED METHANOL PRODUCTION RATE (Kmol/hr) : 11.45

LAPORTE LPHETHANOL PROCESS AVERAGE REPORT MATERIAL BALANCE SUMMARY

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-21.21373	-2.52597	-1.97637
CO	-4.57978	0.76822	-2.23712
CO2	-12.30489	2.06326	-1.31044
N2	-396.56052	2.43123	-2.87717
CH4	n.a.	0.43873	-2.37218
H2O	-----	n.a.	n.a.
CH3OH	-----	13.43610	2.29004

OVERALL ELEMENTAL BALANCE (Kg-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	85.8937	72.2817	2.8148	0.1431	-----	75.2396	12.4038
CO2	20.9795	20.1903	0.7862	0.3748	-----	21.3513	-1.7721
CH3OH	0.6502	0.7512	0.0293	0.0367	11.1247	11.9419	-1736.5570
OTHERS	0.4163	0.4154	0.0162	0.0024	0.2278	0.6616	-59.9476
TOTAL C	107.9397	93.6385	3.6465	0.5570	11.3525	109.1944	-1.1624
HYDROGEN:							
H2	117.6022	68.1411	2.6535	0.0639	-----	70.8585	39.7473
H2O	0.0000	0.0000	0.0000	0.0000	0.2102	0.2102	n.a.
OTHERS	4.2660	4.6660	0.1817	0.1554	45.1822	50.1854	-1076.4049
TOTAL H	121.8682	72.8071	2.8353	0.2193	45.3924	121.2541	0.5039
OXYGEN:							
TOTAL O	128.5030	113.4134	4.4165	0.9299	11.3880	130.1478	-1.2800
NITROGEN:							
TOTAL N	2.2089	2.1784	0.0848	0.0097	-----	2.2729	-2.8981
TOTAL MASS FLOW (kg/hr)	3504.7000	3036.9644	118.2653	21.9103	368.3093	3545.4492	-1.1627

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS [15-(50+62+68)]
	GC#1	GC#2
MASS BALANCE (%) :	0.06	0.00
ELEMENTAL BALANCE (%) :		
CARBON	0.53	0.58
HYDROGEN	2.98	1.48
OXYGEN	0.38	0.42
NITROGEN	2.16	-0.02

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

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DATE :                                06-DEC-89
TIME :                                08:36:27
TIME INTERVAL :                       FROM: 0600 23-Sep
                                         TO: 0600 24-Sep

NUMBER OF AVERAGED HOURS :            24
RUN ID NUMBER :                       E7.21
FEED GAS TYPE:                        CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) : 164.6
OIL/SLURRY REACTOR INLET TEMP. (des.C) : 28.2
AVG. REACTOR SLURRY TEMPERATURE (des.C) : 249.6
REACTOR FREEBOARD TEMPERATURE (des.C) : 245.3
OIL/SLURRY OUTLET TEMP. (des.C) :    243.0
REACTOR FEED GAS PRESSURE (kPa) :     5517
REACTOR EFFLUENT GAS PRESSURE (kPa) :  5280
GAS SUPERFICIAL VELOCITY (cm/sec) :   15.4
LIQUID SUPERFICIAL VELOCITY (cm/sec) :  0.0
SLURRY CONCENTRATION (wt%) :          37.9
CATALYST OXIDE IN REACTOR (kg oxide) :  398
GAS HOLD-UP (%) :                     34.0
SPACE VELOCITY (1/kg-hr) :            9617
RECYCLE/FRESH FEED RATIO :            3.357
OIL/SLURRY CIRCULATION RATE (m3/hr) :  0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 136.50
PURGE GAS FLOW RATE <50> (ksmol/hr) :  4.65
HEAT TRANSFER COEFFICIENT (Watt/m2-des.C) : 605
  
```

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEOH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT	=====	=====	=====	=====	=====	=====	=====	=====
	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<WT%>
H2	58.21	27.17	35.23	35.59	24.74	23.83	5.39	-----
CO	35.98	55.32	50.72	50.42	50.45	50.90	24.14	-----
CO2	3.07	15.90	12.73	12.72	14.84	14.90	63.22	-----
N2	0.10	0.85	0.65	0.66	0.77	0.77	0.82	-----
CH4	0.00	0.42	0.28	0.32	0.38	0.33	0.23	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.55
CH3OH	0.00	0.61	0.50	0.41	8.56	8.46	6.20	97.05
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.03
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.57
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.21
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.17
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.10
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	1.12
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.22
TOTAL :	97.36	100.27	100.10	100.12	99.75	99.19	100.08	100.00
DENS, g/cc	0.005	0.049	0.032	0.031	0.037	0.037	0.004	0.788
AV.MOL.WT	12.97	23.47	20.88	20.77	24.24	24.47	35.96	32.28
Mm3/hr	880.3	2953.3	3826.6	3835.6	3286.0	3270.4	12.3	-----
ksmol/hr	39.27	131.85	170.72	171.12	146.60	145.84	0.55	11.71
l/hr,prod	-----	-----	-----	-----	-----	-----	-----	479.86

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2

CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(Z) :	42.2	40.4
CARBON MONOXIDE CONVERSION	(Z) :	14.2	14.3
CARBON DIOXIDE CONVERSION	(Z) :	0.0	0.0
RATIO H2 CONSUMED/CO CONSUMED	:	2.06	2.00
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(Z) :	39.2	39.9
CARBON MONOXIDE CONVERSION	(Z) :	13.3	13.7
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(Z) :	39.9	39.4
CARBON MONOXIDE CONVERSION	(Z) :	13.4	13.5
RATIO H2 CONSUMED/CO CONSUMED	:	2.01	2.01

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL *

CO (+CO2) SELECTIVITY TO METHANOL (Z) :	94.7	100.2
CO (+CO2) SELECTIVITY TO ETHANOL (Z) :	-----	0.4

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	smol/hr-ks cat	ks/1000 Na3 fresh feed	ks/1000 Na3 reactor feed
-----			
As calculated ACROSS REACTOR	29.25	124.6	97.4
As Net MeOH produced, OVERALL balance	28.89	419.3	96.2

REACTOR FEED (H2/(CO+1.5CO2)) :	0.51
REACTOR FEED ((H2-CO2)/(CO+CO2)) :	0.36
APPROACH TO METHANOL EQUILIBRIUM (des.C) :	18.20
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) :	-8.58
METHANOL COLLECTED AS % OF CALCULATED :	98.2
CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) :	11.66

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<Z diff.>	<Z diff.>	<Z diff.>
H ₂	-13.98968	-3.76711	-2.35136
CO	-3.32134	0.90033	-2.28758
CO ₂	-10.91427	1.86976	-1.53945
N ₂	-385.83237	1.96459	-2.62074
CH ₄	n.a.	-0.05078	-2.38185
H ₂ O	-----	n.a.	n.a.
CH ₃ OH	-----	11.94551	1.86508

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	Z
CARBON:							
CO	86.2849	72.9369	2.5725	0.1468	-----	75.6562	12.3181
CO ₂	21.7577	20.9674	0.7395	0.3845	-----	22.0914	-1.5337
CH ₃ OH	0.7036	0.7991	0.0282	0.0377	11.4530	12.3179	-1650.6342
OTHERS	0.5527	0.5524	0.0195	0.0024	0.1171	0.6915	-25.1048
TOTAL C	109.2990	95.2558	3.3597	0.5715	11.5701	110.7571	-1.3341
HYDROGEN:							
H ₂	121.8022	71.6580	2.5274	0.0656	-----	74.2510	39.0397
H ₂ O	0.0000	0.0000	0.0000	0.0000	0.2288	0.2288	n.a.
OTHERS	5.0254	5.4061	0.1907	0.1595	46.3976	52.1538	-937.8115
TOTAL H	126.8276	77.0641	2.7181	0.2250	46.6264	126.6336	0.1530
OXYGEN:							
TOTAL O	130.5040	115.6708	4.0797	0.9541	11.7133	132.4179	-1.4666
NITROGEN:							
TOTAL N	2.2622	2.2282	0.0786	0.0100	-----	2.3168	-2.4126
TOTAL MASS FLOW (ks/hr)	3554.1343	3094.0186	109.1263	22.4802	379.1523	3603.7773	-1.3968

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]		FRESH FEED GAS
	GC#1	GC#2	[15-(50+62+68)]
MASS BALANCE (Z) :	-0.19	0.00	-0.06
ELEMENTAL BALANCE (Z) :			
CARBON	0.74	0.43	-1.07
HYDROGEN	3.77	1.45	-9.41
OXYGEN	0.62	0.36	-1.74
NITROGEN	-0.39	0.20	-11.65

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY
=====

DATE :	04-DEC-89
TIME :	08:37:51
TIME INTERVAL :	FROM: 0600 24-Sep
	TO: 0600 25-Sep
NUMBER OF AVERAGED HOURS :	24
RUN ID NUMBER :	E7.22
FEED GAS TYPE:	CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) :	164.8
OIL/SLURRY REACTOR INLET TEMP. (des.C) :	26.9
AVG. REACTOR SLURRY TEMPERATURE (des.C) :	249.6
REACTOR FREEBOARD TEMPERATURE (des.C) :	245.5
OIL/SLURRY OUTLET TEMP. (des.C) :	243.0
REACTOR FEED GAS PRESSURE (kPa) :	5517
REACTOR EFFLUENT GAS PRESSURE (kPa) :	5280
GAS SUPERFICIAL VELOCITY (cm/sec) :	15.5
LIQUID SUPERFICIAL VELOCITY (cm/sec) :	0.0
SLURRY CONCENTRATION (wt%) :	37.9
CATALYST OXIDE IN REACTOR (ks oxide) :	398
GAS HOLD-UP (%) :	34.1
SPACE VELOCITY (1/ks-hr) :	9622
RECYCLE/FRESH FEED RATIO :	3.143
OIL/SLURRY CIRCULATION RATE (m3/hr) :	0.0
PROD. SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) :	134.47
PURGE GAS FLOW RATE <50> (ksmol/hr) :	4.65
HEAT TRANSFER COEFFICIENT (Watt/m2-des.C) :	602

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEOH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT	=====	=====	=====	=====	=====	=====	=====	=====
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	51.21	27.46	39.20	35.83	24.99	27.10	5.39	-----
CO	35.78	55.04	49.77	50.22	50.23	49.85	24.14	-----
CO2	2.17	15.89	12.73	12.69	14.86	14.94	53.22	-----
N2	0.10	0.84	0.66	0.66	0.77	0.78	0.82	-----
CH4	0.00	0.43	0.31	0.33	0.39	0.38	0.23	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.58
CH3OH	0.00	0.60	0.52	0.42	8.60	8.52	6.20	97.37
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.48
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.17
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.14
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.08
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	1.00
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.15
TOTAL :	99.26	100.26	103.20	100.14	99.85	101.58	100.08	100.00
DENS,g/cc	0.005	0.049	0.030	0.031	0.037	0.036	0.004	0.788
AV.MOL.WT	12.33	23.39	20.11	20.70	24.19	23.74	36.96	32.21
Mm3/hr	925.7	2909.9	3889.1	3835.7	3283.6	3314.2	12.3	-----
ksmol/hr	41.30	129.82	173.50	171.12	146.49	147.79	0.55	11.74
l/hr,prod	-----	-----	-----	-----	-----	-----	-----	479.86

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

=====

CONVERSIONS ACROSS REACTOR :

	GC#1	GC#2
	-----	-----
CALCULATED BY GAS COMPOSITION		
HYDROGEN CONVERSION (Z) :	41.1	40.3
CARBON MONOXIDE CONVERSION (Z) :	14.6	14.4
CARBON DIOXIDE CONVERSION (Z) :	0.1	-0.3
RATIO H2 CONSUMED/CO CONSUMED :	2.21	2.00
CALCULATED BY METHANOL IN EXIT GAS		
HYDROGEN CONVERSION (Z) :	34.4	38.8
CARBON MONOXIDE CONVERSION (Z) :	13.5	13.8
CALCULATED BY OVERALL BALANCE		
HYDROGEN CONVERSION (Z) :	34.5	38.3
CARBON MONOXIDE CONVERSION (Z) :	13.5	13.6
RATIO H2 CONSUMED/CO CONSUMED :	2.01	2.01

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL *
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (Z) :	94.5	97.6
CO (+CO2) SELECTIVITY TO ETHANOL (Z) :		0.3

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	smol/hr-ks cat	kg/1000 Nm3 fresh feed	kg/1000 Nm3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	29.58	408.1	98.5
As Net MeOH produced, OVERALL balance	28.99	400.0	96.5

REACTOR FEED (H2/(CO+1.5CO2)) : 0.52

REACTOR FEED ((H2-CO2)/(CO+CO2)) : 0.37

APPROACH TO METHANOL EQUILIBRIUM (des.C) : 18.36

APPROACH TO WATER-GAS EQUILIBRIUM (des.C) : -5.38

METHANOL COLLECTED AS % OF CALCULATED : 97.5

CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) : 11.79

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT MATERIAL BALANCE SUMMARY

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-25.38824	-0.63561	-0.93964
CO	-7.79394	0.33152	-0.77848
CO2	18.09101	-0.84081	0.07034
N2	-463.38406	0.89216	-0.96265
CH4	n.a.	-1.66045	-0.28033
H2O	-----	n.a.	n.a.
CH3OH	-----	8.28881	2.14023

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	85.9455	71.4545	2.5598	0.1470	-----	74.1614	13.7111
CO2	21.7084	20.6320	0.7391	0.3851	-----	21.7562	-0.2204
CH3OH	0.7143	0.7789	0.0279	0.0378	11.4911	12.3356	-1626.8723
OTHERS	0.5630	0.5517	0.0198	0.0024	0.1174	0.6913	-22.7941
TOTAL C	108.9312	93.4172	3.3466	0.5723	11.6085	108.9445	-0.0122
HYDROGEN:							
H2	122.6287	71.2935	2.5540	0.0657	-----	73.9133	39.7260
H2O	0.0000	0.0000	0.0000	0.0000	0.2456	0.2456	n.a.
OTHERS	5.1093	5.3225	0.1907	0.1597	46.5512	52.2241	-922.1419
TOTAL H	127.7380	76.6160	2.7447	0.2254	46.7968	126.3830	1.0608
OXYGEN:							
TOTAL O	130.0766	113.4974	4.0660	0.9535	11.7399	130.2587	-0.1400
NITROGEN:							
TOTAL N	2.2451	2.1835	0.0782	0.0100	-----	2.2718	-1.1876
TOTAL MASS FLOW (kg/hr)	3542.8875	3036.4473	108.7789	22.5138	378.1523	3545.8926	-0.0848

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]		FRESH FEED GAS
	GC#1	GC#2	[15-(50+62+68)]
MASS BALANCE (Z) :	-0.60	0.00	-0.06
ELEMENTAL BALANCE (Z) :			
CARBON	0.86	0.36	0.94
HYDROGEN	6.35	1.41	1.59
OXYGEN	0.71	0.26	-1.17
NITROGEN	-0.33	-0.22	-7.89

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

```

DATE : 06-DEC-89
TIME : 08:39:23
TIME INTERVAL : FROM: 0600 25-Sep
                TO: 0600 26-Sep

NUMBER OF AVERAGED HOURS : 24
RUN ID NUMBER : E7.23
FEED GAS TYPE: CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) : 144.1
OIL/SLURRY REACTOR INLET TEMP. (des.C) : 24.6
AVG. REACTOR SLURRY TEMPERATURE (des.C) : 249.6
REACTOR FREEBOARD TEMPERATURE (des.C) : 245.9
OIL/SLURRY OUTLET TEMP. (des.C) : 243.0
REACTOR FEED GAS PRESSURE (kPa) : 5516
REACTOR EFFLUENT GAS PRESSURE (kPa) : 5281
GAS SUPERFICIAL VELOCITY (cm/sec) : 15.5
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 0.0
SLURRY CONCENTRATION (wt%) : 37.9
CATALYST OXIDE IN REACTOR (ks oxide) : 399
GAS HOLD-UP (%) : 34.1
SPACE VELOCITY (1/ks-hr) : 9659
RECYCLE/FRESH FEED RATIO : 3.106
OIL/SLURRY CIRCULATION RATE (m3/hr) : 0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 134.63
PURGE GAS FLOW RATE <50> (ksmol/hr) : 4.76
HEAT TRANSFER COEFFICIENT (Watt/m2-des.C) : 601
  
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STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDM PRODUC
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT	=====	=====	=====	=====	=====	=====	=====	=====
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	64.45	27.33	43.12	35.63	24.93	30.42	5.39	-----
CO	35.76	55.49	49.17	50.60	50.58	49.19	24.14	-----
CO2	3.07	15.64	12.68	12.49	14.61	14.92	63.22	-----
H2	0.10	0.91	0.66	0.71	0.83	0.77	0.82	-----
CH4	0.00	0.44	0.35	0.34	0.40	0.41	0.23	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.58
CH3OH	0.00	0.56	0.54	0.36	8.51	8.52	6.20	97.37
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.48
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.17
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.14
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.08
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	1.00
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.15
TOTAL :	103.37	100.37	106.50	100.14	99.87	104.30	100.08	100.09
DENS, g/cc	0.005	0.049	0.029	0.031	0.037	0.035	0.004	0.790
AV.MOL.WT	12.28	23.38	19.36	20.72	24.16	22.99	36.96	32.21
Mm3/hr	937.3	2911.0	3981.3	3848.3	3301.1	3383.6	12.8	-----
ksmol/hr	41.81	129.87	177.62	171.69	147.27	150.89	0.57	11.76
l/hr:prod	-----	-----	-----	-----	-----	-----	-----	479.64

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

CONVERSIONS ACROSS REACTOR :

		<u>GC#1</u>	<u>GC#2</u>
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(Z) :	40.0	40.0
CARBON MONOXIDE CONVERSION	(Z) :	15.0	14.2
CARBON DIOXIDE CONVERSION	(Z) :	0.0	-0.3
RATIO H2 CONSUMED/CO CONSUMED	:	2.35	1.99
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(Z) :	31.1	30.9
CARBON MONOXIDE CONVERSION	(Z) :	13.6	13.7
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(Z) :	30.7	30.4
CARBON MONOXIDE CONVERSION	(Z) :	13.4	13.5
RATIO H2 CONSUMED/CO CONSUMED	:	2.01	2.01

SELECTIVITIES :

		<u>ACROSS REACTOR</u> <u>GC Average</u>	<u>OVERALL</u> <u>%</u>
CO (+CO2) SELECTIVITY TO METHANOL	(Z) :	93.9	94.2
CO (+CO2) SELECTIVITY TO ETHANOL	(Z) :	-----	0.3

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	<u>smol/hr-kg cat</u>	<u>kg/1000 Me3 fresh feed</u>	<u>kg/1000 Me3 reactor feed</u>
As calculated ACROSS REACTOR	29.89	407.1	99.2
As Net MeOH produced, OVERALL balance	29.07	395.9	96.4

REACTOR FEED $\{H_2/(CO+1.5CO_2)\}$: 0.51
 REACTOR FEED $\{(H_2-CO_2)/(CO+CO_2)\}$: 0.37

APPROACH TO METHANOL EQUILIBRIUM (des.C) : 18.75
 APPROACH TO WATER-GAS EQUILIBRIUM (des.C) : -3.95

METHANOL COLLECTED AS % OF CALCULATED : 96.7

CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) : 11.91

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-33.52429	2.04209	-0.32530
CO	-8.73919	0.16648	-0.48080
CO2	-17.10039	0.65093	0.32709
N2	-325.80505	0.13589	-0.64957
CH4	n.a.	-1.99254	-1.01075
H2O	-----	n.a.	n.a.
CH3OH	-----	14.40266	1.73353

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	
CARBON:							
CO	86.8680	72.0606	2.6412	0.1528	-----	74.8546	13.8295
CO2	21.4487	20.3060	0.7443	0.4003	-----	21.4506	-0.0085
CH3OH	0.6262	0.7316	0.0268	0.0392	11.5148	12.3125	-1866.0662
OTHERS	0.5854	0.5740	0.0210	0.0025	0.1176	0.7152	-22.1646
TOTAL C	109.5285	93.6722	3.4333	0.5949	11.6324	109.3329	0.1786
HYDROGEN:							
H2	122.3435	70.9957	2.6022	0.0682	-----	73.6661	39.7875
H2O	0.0000	0.0000	0.0000	0.0000	0.2461	0.2461	n.a.
OTHERS	4.8468	5.2225	0.1914	0.1660	46.6473	52.2773	-977.5640
TOTAL H	127.1903	76.2182	2.7936	0.2343	46.8934	126.1395	0.8262
OXYGEN:							
TOTAL O	130.3917	113.4042	4.1566	0.9932	11.7641	130.3181	0.0565
NITROGEN:							
TOTAL N	2.4414	2.3636	0.0866	0.0104	-----	2.4606	-0.7878
TOTAL MASS FLOW (ks/hr)	3557.8508	3036.8098	111.3072	23.4022	378.9327	3550.4521	0.2080

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS
	GC#1	GC#2
	-----	-----
MASS BALANCE (%) :	-0.92	0.00
ELEMENTAL BALANCE (%) :		[15-(50+62+68)]
CARBON	1.03	0.36
HYDROGEN	8.43	1.01
OXYGEN	0.80	0.25
NITROGEN	-0.41	-0.14
		-19.61

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

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DATE :                                06-DEC-99
TIME :                                09:40:55
TIME INTERVAL :                       FROM: 0600 26-Sep
                                         TO:  0600 27-Sep

NUMBER OF AVERAGED HOURS :            24
PUN ID NUMBER :                      E7.24
FEED GAS TYPE:                       CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) : 164.7
OIL/SLURRY REACTOR INLET TEMP. (des.C) : 26.9
AVG. REACTOR SLURRY TEMPERATURE (des.C) : 249.6
REACTOR FREEBOARD TEMPERATURE (des.C) : 245.3
OIL/SLURRY OUTLET TEMP. (des.C) :     242.9
REACTOR FEED GAS PRESSURE (kPa) :     5520
REACTOR EFFLUENT GAS PRESSURE (kPa) :  5290
GAS SUPERFICIAL VELOCITY (cm/sec) :   15.6
LIQUID SUPERFICIAL VELOCITY (cm/sec) :    0.0
SLURRY CONCENTRATION (wtZ) :          37.9
CATALYST OXIDE IN REACTOR (ks oxide) :   398
GAS HOLD-UP (Z) :                    34.1
SPACE VELOCITY (1/ks-hr) :           9712
RECYCLE/FRESH FEED RATIO :           3.329
OIL/SLURRY CIRCULATION RATE (m3/hr) :    0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 137.64
PURGE GAS FLOW RATE <50> (ksmol/hr) :    4.95
HEAT TRANSFER COEFFICIENT (Watt/m2-des.C) : 601
  
```

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEOH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
=====	=====	=====	=====	=====	=====	=====	=====	=====
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	58.92	27.37	36.74	35.65	25.00	25.70	5.39	-----
CO	36.21	55.76	50.53	50.85	50.87	50.71	24.14	-----
CO2	3.07	15.35	12.33	12.27	14.32	14.42	63.22	-----
N2	0.10	0.80	0.65	0.63	0.73	0.75	0.82	-----
CH4	0.00	0.40	0.32	0.31	0.36	0.39	0.23	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.63
CH3OH	0.00	0.57	0.47	0.38	8.48	8.46	6.20	97.25
ME	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.44
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.16
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.13
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.07
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	1.17
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.14
TOTAL :	98.31	100.25	101.03	100.09	99.77	100.45	100.08	100.00
DENS,g/cc	0.005	0.049	0.031	0.031	0.037	0.036	0.004	0.789
AV.MOL.WT	12.94	23.33	20.50	20.68	24.09	23.96	36.96	32.21
Mm3/hr	893.4	2974.2	3887.3	3867.6	3320.2	3329.4	12.2	-----
ksmol/hr	39.86	132.69	173.42	172.55	148.13	148.47	0.54	11.74
1/hr:prod	-----	-----	-----	-----	-----	-----	-----	479.18

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
		----	----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	40.1	39.8
CARBON MONOXIDE CONVERSION	(%) :	14.0	14.1
CARBON DIOXIDE CONVERSION	(%) :	-0.2	-0.2
RATIO H2 CONSUMED/CO CONSUMED	:	2.09	1.99
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	36.9	39.7
CARBON MONOXIDE CONVERSION	(%) :	13.4	13.4
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	36.7	39.0
CARBON MONOXIDE CONVERSION	(%) :	13.3	13.3
RATIO H2 CONSUMED/CO CONSUMED	:	2.01	2.01

SELECTIVITIES :

		ACROSS REACTOR GC Average	OVERALL *
		-----	-----
CO (+CO2) SELECTIVITY TO METHANOL	(%) :	96.1	99.4
CO (+CO2) SELECTIVITY TO ETHANOL	(%) :		0.3

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEDH SOURCE	smol/hr-ks cat	kg/1000 Nm3 fresh feed	kg/1000 Nm3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	29.72	424.4	99.0
As Net MeOH produced, OVERALL balance	29.98	413.9	95.6

REACTOR FEED (H2/(CO+1.5CO2)) :	0.51
REACTOR FEED ((H2-CO2)/(CO+CO2)) :	0.37
APPROACH TO METHANOL EQUILIBRIUM (des.C) :	19.12
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) :	1.27
METHANOL COLLECTED AS % OF CALCULATED :	97.0
CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) :	11.97

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 13 FRESH FEED GAS	[14+55]-153 REACTOR FEED	[32 - (50+35+62+69)] REACTOR EFFLUENT
	(% diff.)	(% diff.)	(% diff.)
H2	-15.71757	-2.86357	-1.97957
CO	-3.93120	0.75779	-2.04292
CO2	-11.64339	1.94751	-1.42102
N2	-339.33911	2.00772	-2.12567
CH4	n.a.	0.94133	-2.88532
H2O	-----	n.a.	n.a.
CH3OH	-----	14.02079	2.13165

OVERALL ELEMENTAL BALANCE (kg-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	32 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	97.7483	73.9853	2.7618	0.1453	-----	76.8924	12.3717
CO2	21.1749	20.3706	0.7604	0.3805	-----	21.5115	-1.5999
CH3OH	0.6511	0.7573	0.0293	0.0373	11.4749	12.2977	-1798.7971
OTHERS	0.5297	0.5334	0.0199	0.0024	0.1174	0.6731	-27.0693
TOTAL C	110.1040	95.6465	3.5704	0.5655	11.5923	111.3747	-1.1541
HYDROGEN:							
H2	123.0254	72.6319	2.7113	0.0649	-----	75.4080	39.7053
H2O	0.0000	0.0000	0.0000	0.0000	0.2640	0.2640	n.a.
OTHERS	4.7232	5.1627	0.1927	0.1578	46.3690	51.8823	-998.4494
TOTAL H	127.7486	77.7946	2.9040	0.2227	46.6330	127.5543	0.1521
OXYGEN:							
TOTAL O	130.7491	115.4837	4.3109	0.9441	11.7381	132.4768	-1.3214
NITROGEN:							
TOTAL N	2.1637	2.1283	0.0794	0.0099	-----	2.2177	-2.4935
TOTAL MASS FLOW (kg/hr)	3568.7708	3095.5254	115.5533	22.2455	379.0946	3611.4192	-1.1950

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]		FRESH FEED GAS
	GC#1	GC#2	[15-(50+62+69)]
MASS BALANCE (%) :	-0.11	0.00	-0.05
ELEMENTAL BALANCE (%) :			
CARBON	0.45	0.40	-0.45
HYDROGEN	3.00	1.00	-5.93
OXYGEN	0.34	0.31	-0.66
NITROGEN	0.17	-0.36	-12.07

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY
=====

DATE :	06-DEC-99
TIME :	08:59:48
TIME INTERVAL :	FROM: 0600 27-Sep
	TO: 0600 29-Sep
NUMBER OF AVERAGED HOURS :	24
RUN ID NUMBER :	E7.25
FEED GAS TYPE:	CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) :	165.2
OIL/SLURRY REACTOR INLET TEMP. (des.C) :	27.6
AVG. REACTOR SLURRY TEMPERATURE (des.C) :	249.6
REACTOR FREEBOARD TEMPERATURE (des.C) :	245.7
OIL/SLURRY OUTLET TEMP. (des.C) :	243.1
REACTOR FEED GAS PPESSURE (kPa) :	5521
REACTOR EFFLUENT GAS PRESSURE (kPa) :	5283
GAS SUPERFICIAL VELOCITY (cm/sec) :	15.5
LIQUID SUPERFICIAL VELOCITY (cm/sec) :	0.0
SLURRY CONCENTRATION (wt%) :	37.7
CATALYST OXIDE IN REACTOR (kg oxide) :	397
GAS HOLD-UP (%) :	33.8
SPACE VELOCITY (1/kg-hr) :	9496
RECYCLE/FRESH FEED RATIO :	3.365
OIL/SLURRY CIRCULATION RATE (m3/hr) :	0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) :	137.37
PURGE GAS FLOW RATE <50> (ksmol/hr) :	4.68
HEAT TRANSFER COEFFICIENT (Watt/m2-des.C) :	599

STREAM #	1	55	15	15	32	32	62	49
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEOH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	58.05	27.61	35.59	35.99	35.19	25.13	5.79	-----
CO	35.90	55.18	50.31	50.26	50.32	50.29	24.14	-----
CO2	3.07	15.48	12.41	12.37	14.48	14.52	63.22	-----
N2	0.11	0.93	0.71	0.72	0.84	0.84	0.82	-----
CH4	0.09	0.39	0.31	0.30	0.35	0.36	0.23	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.57
CH3OH	0.00	0.55	0.44	0.37	8.56	8.54	6.20	97.93
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.07
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.44
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.16
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.13
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.08
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.09
ESTERS	-----	-----	-----	-----	-----	-----	-----	1.11
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	-----
EA+	-----	-----	-----	-----	-----	-----	-----	0.14
TOTAL :	97.14	100.13	99.77	100.01	99.74	99.71	100.08	100.00
DENS,g/cc	0.005	0.049	0.031	0.031	0.037	0.037	0.004	0.790
AV.MOL.WT	12.98	23.28	20.70	20.61	24.07	24.09	36.96	32.29
m3/hr	983.9	2974.2	3847.8	3958.1	3305.6	3304.0	12.2	-----
ksmol/hr	39.43	132.69	171.66	172.12	147.47	147.34	0.55	11.79
1/hr,prod	-----	-----	-----	-----	-----	-----	-----	492.59

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		GC#1 ----	GC#2 ----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	39.4	40.0
CARBON MONOXIDE CONVERSION	(%) :	14.2	14.2
CARBON DIOXIDE CONVERSION	(%) :	-0.5	-0.3
RATIO H2 CONSUMED/CO CONSUMED	:	1.97	2.02
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	39.7	39.7
CARBON MONOXIDE CONVERSION	(%) :	13.7	13.8
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	39.5	39.0
CARBON MONOXIDE CONVERSION	(%) :	13.6	13.6
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC Average -----	OVERALL *
CO (+CO2) SELECTIVITY TO METHANOL (%) :	97.7	101.4
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.3

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	smol/hr-ks cat -----	kg/1000 Nm3 fresh feed -----	kg/1000 Nm3 reactor feed -----
As calculated ACROSS REACTOR	29.92	431.6	98.9
As Net MeOH produced, OVERALL balance	29.39	423.8	97.1

REACTOR FEED $\{H_2/(CO+1.5CO_2)\}$: 0.52
 REACTOR FEED $\{(H_2-CO)/(CO+CO_2)\}$: 0.38

APPROACH TO METHANOL EQUILIBRIUM (des.C) : 19.00
 APPROACH TO WATER-GAS EQUILIBRIUM (des.C) : -5.29

METHANOL COLLECTED AS % OF CALCULATED : 97.7

CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) : 11.91

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1455)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-12.94732	-4.04449	-2.18476
CO	-2.69726	0.98606	-2.33711
CO2	-10.58072	2.11651	-1.40761
N2	-407.90582	2.50685	-3.54589
CH4	n.a.	0.84764	-3.15908
H2O	-----	n.a.	n.a.
CH3OH	-----	11.47844	2.24230

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

	INPUTS		OUTPUTS				(IN-OUT)/IN
STREAM # STREAM NAME	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	86.5120	73.2157	2.5842	0.1464	-----	75.9463	12.2130
CO2	21.2915	20.5400	0.7250	0.3834	-----	21.6484	-1.6763
CH3OH	0.6430	0.7264	0.0256	0.0376	11.5456	12.3352	-1919.3800
OTHERS	0.5164	0.5188	0.0193	0.0024	0.1170	0.6575	-27.3265
TOTAL C	108.9628	95.0009	3.3531	0.5698	11.6635	110.5873	-1.4909
HYDROGEN:							
H2	123.8624	73.2648	2.5859	0.0654	-----	75.9161	38.7093
H2O	0.0000	0.0000	0.0000	0.0000	0.2410	0.2410	n.a.
OTHERS	4.6375	4.9807	0.1758	0.1590	46.6540	51.9695	-1020.6468
TOTAL H	128.4999	78.2455	2.7617	0.2244	46.8950	128.1266	0.2905
OXYGEN:							
TOTAL O	129.7379	115.0222	4.0598	0.9512	11.7937	131.8269	-1.6101
NITROGEN:							
TOTAL N	2.4889	2.4653	0.0870	0.0100	-----	2.5623	-2.9502
TOTAL MASS FLOW (ks/hr)	3547.0898	3089.3660	109.0417	22.4132	380.7825	3601.6035	-1.5369

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS
	GC#1	[15-(50+62+68)]
	-----	-----
MASS BALANCE (Z) :	0.08	-0.09
ELEMENTAL BALANCE (Z) :		
CARBON	0.25	-1.40
HYDROGEN	0.57	-9.93
OXYGEN	0.12	-1.35
NITROGEN	-1.52	-10.77

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY
=====

DATE :	06-DEC-89
TIME :	00:50:24
TIME INTERVAL :	FROM: 0600 29-Sep
	TO: 0600 29-Sep
NUMBER OF AVERAGED HOURS :	24
RUN ID NUMBER :	E7.26
FEED GAS TYPE:	CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) :	145.8
OIL/SLURRY REACTOR INLET TEMP. (des.C) :	27.0
AUG. REACTOR SLURRY TEMPERATURE (des.C) :	249.8
REACTOR FREEBOARD TEMPERATURE (des.C) :	246.1
OIL/SLURRY OUTLET TEMP. (des.C) :	242.9
REACTOR FEED GAS PRESSURE (kPa) :	5522
REACTOR EFFLUENT GAS PRESSURE (kPa) :	5284
GAS SUPERFICIAL VELOCITY (cm/sec) :	15.4
LIQUID SUPERFICIAL VELOCITY (cm/sec) :	0.0
SLURRY CONCENTRATION (wt%) :	37.7
CATALYST OXIDE IN REACTOR (kg oxide) :	397
GAS HOLD-UP (%) :	33.7
SPACE VELOCITY (1/kg-hr) :	9634
RECYCLE/FRESH FEED RATIO :	3.366
OIL/SLURRY CIRCULATION RATE (m3/hr) :	0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (kscmol/hr) :	137.47
PURGE GAS FLOW RATE <50> (kscmol/hr) :	5.67
HEAT TRANSFER COEFFICIENT (Watt/m2-des.C) :	599

STREAM #	1	55	15	15	32	32	62	69
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASK GAS	MEDH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT	=====	=====	=====	=====	=====	=====	=====	=====
	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<WT%>
H2	57.52	26.63	35.10	34.96	24.33	24.26	5.79	-----
CO	36.78	56.60	51.65	51.49	51.84	51.89	24.14	-----
CO2	3.35	15.33	12.33	12.39	14.38	14.38	43.22	-----
N2	0.10	0.73	0.57	0.57	0.66	0.67	0.82	-----
CH4	0.00	0.34	0.27	0.26	0.31	0.32	0.23	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.65
CH3OH	0.00	0.56	0.46	0.39	8.26	8.26	6.27	97.56
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.43
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.15
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.12
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.07
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	1.10
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.17
TOTAL :	97.76	100.18	100.37	100.06	99.78	99.77	100.15	100.00
DENS,g/cc	0.005	0.050	0.031	0.031	0.037	0.037	0.004	0.789
AV.MOL.WT	13.26	23.52	20.87	20.89	24.27	24.29	36.96	32.24
Mm3/hr	977.5	2954.2	3834.3	3831.8	3296.8	3295.5	11.6	-----
kscmol/hr	39.15	131.79	171.06	170.95	147.08	146.96	0.52	11.32
l/hr:prod	-----	-----	-----	-----	-----	-----	-----	462.39

LAPORTE LPHETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

CONVERSIONS ACROSS REACTOR :

	GC#1	GC#2
CALCULATED BY GAS COMPOSITION		
HYDROGEN CONVERSION (%) :	49.6	40.1
CARBON MONOXIDE CONVERSION (%) :	13.7	13.4
CARBON DIOXIDE CONVERSION (%) :	-0.2	0.1
RATIO H2 CONSUMED/CO CONSUMED :	2.02	2.03
CALCULATED BY METHANOL IN EXIT GAS		
HYDROGEN CONVERSION (%) :	37.8	39.4
CARBON MONOXIDE CONVERSION (%) :	12.9	13.0
CALCULATED BY OVERALL BALANCE		
HYDROGEN CONVERSION (%) :	37.5	37.6
CARBON MONOXIDE CONVERSION (%) :	12.7	12.9
RATIO H2 CONSUMED/CO CONSUMED :	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL *
CO (+CO2) SELECTIVITY TO METHANOL (%) :	95.9	100.4
CO (+CO2) SELECTIVITY TO ETHANOL (%) :		0.3

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	smol/hr-kg cat	kg/1000 Na3 fresh feed	kg/1000 Na3 reactor feed
As calculated ACROSS REACTOR	29.70	416.8	95.5
As Net MeOH produced, OVERALL balance	28.10	408.1	93.5
REACTOR FEED (H2/(CO+1.5CO2)) :		0.50	
REACTOR FEED ((H2-CO2)/(CO+CO2)) :		0.35	
APPROACH TO METHANOL EQUILIBRIUM (des.C) :		18.77	
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) :		4.10	
METHANOL COLLECTED AS % OF CALCULATED :		97.3	
CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) :		11.42	

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT MATERIAL BALANCE SUMMARY

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[1455]-15] REACTOR FEED	[12 - (50+55+62+68)] REACTOR EFFLUENT
	% diff. >	% diff. >	% diff. >
H2	-12.57554	-3.71810	-2.36243
CO	-2.77894	1.08796	-2.27035
CO2	-10.72976	1.66008	-1.36665
N2	-379.50220	1.43757	-7.28059
CH4	n.a.	-1.69492	-2.19586
H2O	-----	n.a.	n.a.
CH3OH	-----	8.85935	2.29538

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	69 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	88.0272	74.5946	3.2104	0.1394	-----	77.9434	11.4554
CO2	21.1602	20.2055	0.8696	0.3625	-----	21.4375	-1.3109
CH3OH	0.6708	0.7360	0.0317	0.0360	11.0642	11.8678	-1669.1526
OTHERS	0.4530	0.4455	0.0192	0.0022	0.1132	0.5900	-29.0394
TOTAL C	110.3113	95.9816	4.1308	0.5391	11.1773	111.8288	-1.3757
HYDROGEN:							
H2	119.5111	70.1861	3.0206	0.0618	-----	73.2685	38.6931
H2O	0.0000	0.0000	0.0000	0.0000	0.2635	0.2635	n.a.
OTHERS	4.4954	4.7260	0.2034	0.1519	44.5942	49.6774	-1005.0848
TOTAL H	124.0064	74.9121	3.2240	0.2137	44.8594	123.2094	0.6427
OXYGEN:							
TOTAL O	131.0184	115.7416	4.9812	0.8998	11.3166	132.9392	-1.4660
NITROGEN:							
TOTAL N	1.9659	1.9163	0.0825	0.0094	-----	2.0082	-2.1491
TOTAL MASS FLOW (ks/hr)	3569.9468	3100.0806	133.4202	21.1906	364.8344	3619.5259	-1.3888

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS [15-(50+62+68)]
MASS BALANCE (%) :	GC81	GC82
ELEMENTAL BALANCE (%) :	-----	-----
CARBON	-0.05	0.00
HYDROGEN	0.59	-0.86
OXYGEN	2.63	-7.23
NITROGEN	0.46	-1.02
	-0.27	-17.34

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

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DATE : 04-DEC-90
TIME : 08:56:55
TIME INTERVAL : FROM: 0600 29-Sep TO: 0600 30-Sep

NUMBER OF AVERAGED HOURS : 24
RUN ID NUMBER : E7.27
FEED GAS TYPE: CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 165.5
OIL/SLURRY REACTOR INLET TEMP. (deg.C) : 35.6
AUG. REACTOR SLURRY TEMPERATURE (deg.C) : 249.6
REACTOR FREEBOARD TEMPERATURE (deg.C) : 246.1
OIL/SLURRY OUTLET TEMP. (deg.C) : 242.4
REACTOR FEED GAS PRESSURE (kPa) : 5524
REACTOR EFFLUENT GAS PRESSURE (kPa) : 5293
GAS SUPERFICIAL VELOCITY (cm/sec) : 15.4
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 0.0
SLURRY CONCENTRATION (wt%) : 37.7
CATALYST OXIDE IN REACTOR (kg oxide) : 396
GAS HOLD-UP (%): 33.8
SPACE VELOCITY (1/kg-hr) : 9445
RECYCLE/FRESH FEED RATIO : 3.422
OIL/SLURRY CIRCULATION RATE (m3/hr) : 0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 137.33
PURGE GAS FLOW RATE <50> (ksmol/hr) : 5.16
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) : 500
  
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STREAM #	1	55	15	15	32	32	62	69
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	57.47	27.03	35.17	35.36	24.67	24.74	5.21	-----
CO	36.75	55.87	51.05	50.95	51.12	50.93	24.48	-----
CO2	3.48	15.76	12.66	12.57	14.75	14.74	65.36	-----
N2	0.12	0.73	0.58	0.57	0.67	0.67	0.24	-----
CH4	0.00	0.36	0.30	0.29	0.34	0.35	0.34	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.68
CH3OH	0.00	0.55	0.45	0.36	9.28	9.39	4.50	97.42
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.07
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.45
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.17
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.13
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.08
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.90
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.15
TOTAL :	97.82	100.30	100.21	100.10	99.92	99.94	100.19	100.00
DENS,g/cc	0.005	0.050	0.031	0.031	0.037	0.037	0.004	0.790
AV.MOL.WT	13.31	23.49	20.88	20.91	24.25	24.23	37.26	32.16
Mm3/hr	865.8	2962.5	3820.7	3828.4	3285.8	3287.1	12.0	-----
ksmol/hr	38.62	132.17	170.45	170.80	146.59	146.59	0.54	11.53
l/hr,prod	-----	-----	-----	-----	-----	-----	-----	469.42

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
		----	----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	39.5	40.1
CARBON MONOXIDE CONVERSION	(%) :	14.2	13.0
CARBON DIOXIDE CONVERSION	(%) :	-0.2	-0.7
RATIO H2 CONSUMED/CO CONSUMED	:	1.92	2.01
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	38.4	38.2
CARBON MONOXIDE CONVERSION	(%) :	13.2	13.2
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	38.2	38.0
CARBON MONOXIDE CONVERSION	(%) :	13.2	13.2
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR	OVERALL
	GC Average	%
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (%) :	95.1	100.2
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.3

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEDH SOURCE	smol/hr-ks cat	kg/1000 Na3 fresh feed	kg/1000 Na3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	29.02	426.4	94.4
As Net MeOH produced, OVERALL balance	29.55	419.4	94.9

REACTOR FEED {H2/(CO+1.5CO2)} :	0.51
REACTOR FEED {(H2-CO2)/(CO+CO2)} :	0.36
APPROACH TO METHANOL EQUILIBRIUM (deg.C) :	19.11
APPROACH TO WATER-GAS EQUILIBRIUM (deg.C) :	5.02
METHANOL COLLECTED AS % OF CALCULATED :	97.9
CALCULATED METHANOL PRODUCTION RATE (kgmol/hr) :	11.52

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1455)-15] REACTOR FEED	[32 - (50455+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-11.55072	-4.26219	-2.74887
CO	-3.06514	1.15502	-2.57877
CO2	-17.28844	3.17110	-1.87878
N2	-496.07587	3.09710	-2.70056
CH4	n.s.	-2.43676	-1.28222
H2O	-----	n.s.	n.s.
CH3OH	-----	14.76338	0.69815

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	87.0143	73.8380	2.8825	0.1466	-----	76.8670	11.6616
CO2	21.4675	20.8256	0.8130	0.3914	-----	22.0300	-2.6202
CH3OH	0.6209	0.7284	0.0284	0.0269	11.2757	12.0594	-1842.3879
OTHERS	0.4936	0.4811	0.0189	0.0028	0.1153	0.6180	-25.1942
TOTAL C	109.5962	95.8730	3.7427	0.5676	11.3910	111.5744	-1.8050
HYDROGEN:							
H2	120.7843	71.4497	2.7893	0.0624	-----	74.3014	38.4842
H2O	0.0000	0.0000	0.0000	0.0000	0.2816	0.2816	n.s.
OTHERS	4.4578	4.8379	0.1889	0.1180	45.4486	50.5974	-1034.9327
TOTAL H	125.2421	76.2876	2.9781	0.1805	45.7302	125.1764	0.0524
OXYGEN:							
TOTAL O	130.5701	116.2176	4.5369	0.9566	11.5302	133.2413	-2.0458
NITROGEN:							
TOTAL N	1.9539	1.9244	0.0751	0.0028	-----	2.0023	-2.4771
TOTAL MASS FLOW (ks/hr)	3553.9453	3104.2151	121.1832	22.3094	370.8588	3618.5654	-1.8183

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]		FRESH FEED GAS
	GC#1	GC#2	[15-(50+62+68)]
MASS BALANCE (%) :	0.20	0.00	-0.06
ELEMENTAL BALANCE (%) :			
CARBON	0.71	0.36	-1.04
HYDROGEN	0.96	1.89	-10.11
OXYGEN	0.53	0.19	-0.83
NITROGEN	-0.67	0.22	15.10

LAPORTE LDMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

```

DATE : 06-DEC-00
TIME : 09:37:46
TIME INTERVAL : FROM: 0600 30-Sep TO: 0600 01-Oct

NUMBER OF AVERAGED HOURS : 24
RUN ID NUMBER : E7.29
FEED GAS TYPE: CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 167.5
OIL/SLURRY REACTOR INLET TEMP. (deg.C) : 22.9
AVG. REACTOR SLURRY TEMPERATURE (deg.C) : 249.6
REACTOR FREEBOARD TEMPERATURE (deg.C) : 246.2
OIL/SLURRY OUTLET TEMP. (deg.C) : 242.7
REACTOR FEED GAS PRESSURE (kPa) : 5524
REACTOR EFFLUENT GAS PRESSURE (kPa) : 5293
GAS SUPERFICIAL VELOCITY (cm/sec) : 15.3
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 0.0
SLURRY CONCENTRATION (wt%) : 37.6
CATALYST OXIDE IN REACTOR (kg oxide) : 396
GAS HOLD-UP (%) : 33.7
SPACE VELOCITY (1/kg-hr) : 9402
RECYCLE/FRESH FEED RATIO : 3.433
OIL/SLURRY CIRCULATION RATE (m3/hr) : 0.0
PROD. SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 136.67
PURGE GAS FLOW RATE <50> (ksmol/hr) : 5.26
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) : 600
  
```

STREAM #	1	55	15	15	32	32	62	69
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	U/L SEP	U/L SEP	FLASH GAS	MEOH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	57.21	27.05	34.74	35.36	24.69	24.49	5.22	-----
CO	36.50	56.01	51.05	51.03	51.19	51.24	24.60	-----
CO2	3.34	15.62	12.54	12.52	14.60	14.64	55.51	-----
N2	0.10	0.74	0.57	0.58	0.68	0.67	0.24	-----
CH4	0.00	0.34	0.27	0.26	0.31	0.32	0.34	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.80
CH3OH	0.00	0.49	0.42	0.35	9.31	9.75	4.25	97.41
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.46
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.17
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.14
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.07
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.81
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.12
TOTAL :	97.14	100.26	99.63	100.10	99.77	99.69	100.21	100.00
DENS,g/cc	0.005	0.050	0.031	0.031	0.037	0.037	0.005	0.790
AV.MOL.WT	13.25	23.46	20.93	20.80	24.22	24.29	37.27	32.11
Na3/hr	858.1	2945.4	3791.1	3803.4	3270.2	3266.0	12.3	-----
ksmol/hr	38.29	131.40	159.13	169.69	145.89	145.64	0.55	11.25
1/hr,prod	-----	-----	-----	-----	-----	-----	-----	457.15

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

CONVERSIONS ACROSS REACTOR :

	GC#1	GC#2
CALCULATED BY GAS COMPOSITION		
HYDROGEN CONVERSION (%) :	39.3	40.0
CARBON MONOXIDE CONVERSION (%) :	13.5	13.9
CARBON DIOXIDE CONVERSION (%) :	-0.5	-0.2
RATIO H2 CONSUMED/CO CONSUMED :	1.99	2.01
CALCULATED BY METHANOL IN EXIT GAS		
HYDROGEN CONVERSION (%) :	38.9	38.5
CARBON MONOXIDE CONVERSION (%) :	13.3	13.3
CALCULATED BY OVERALL BALANCE		
HYDROGEN CONVERSION (%) :	39.0	37.2
CARBON MONOXIDE CONVERSION (%) :	12.9	12.9
RATIO H2 CONSUMED/CO CONSUMED :	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL *
CO (+CO2) SELECTIVITY TO METHANOL (%) :	99.1	100.0
CO (+CO2) SELECTIVITY TO ETHANOL (%) :		0.3

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	smol/hr-ks cat	kg/1000 Na3 fresh feed	kg/1000 Na3 reactor feed
As calculated ACROSS REACTOR	29.01	429.1	94.8
As Net MeOH produced, OVERALL balance	27.95	412.0	92.0
REACTOR FEED (H2/(CO+1.5CO2)) :		0.51	
REACTOR FEED ((H2-CO2)/(CO+CO2)) :		0.76	
APPROACH TO METHANOL EQUILIBRIUM (deg.C) :		19.13	
APPROACH TO WATER-GAS EQUILIBRIUM (deg.C) :		14.06	
METHANOL COLLECTED AS % OF CALCULATED :		95.6	
CALCULATED METHANOL PRODUCTION RATE (smol/hr) :		11.49	

LAPORTE LPHETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

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COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[1455]-153 REACTOR FEED	[32 - (50+55+42+68)] REACTOR EFFLUENT
	(% diff.)	(% diff.)	(% diff.)
H2	-10.85844	-4.47099	-2.74873
CO	-1.47829	1.11042	-2.70070
CO2	-9.71973	2.55937	-2.17640
N2	-368.85962	2.93412	-2.70682
CH4	n.a.	1.34437	-2.56618
H2O	-----	n.a.	n.a.
CH3OH	-----	9.35615	3.65036

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	42 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	86.5964	73.6035	2.9490	0.1503	-----	74.7020	11.4249
CO2	21.2457	20.5267	0.8224	0.4002	-----	21.7493	-2.3706
CH3OH	0.5890	0.6498	0.0260	0.0260	10.9794	11.6811	-1093.2477
OTHERS	0.4395	0.4455	0.0178	0.0029	0.1125	0.5786	-31.5613
TOTAL C	108.8705	95.2254	3.8153	0.5793	11.0918	110.7119	-1.6913
HYDROGEN:							
H2	119.9877	71.1003	2.8487	0.0638	-----	74.0127	39.3164
H2O	0.0000	0.0000	0.0000	0.0000	0.3208	0.3208	n.a.
OTHERS	4.1130	4.3810	0.1755	0.1144	44.2549	49.9257	-1099.3004
TOTAL H	124.1016	75.4812	3.0242	0.1782	44.5756	123.2592	0.6789
OXYGEN:							
TOTAL O	129.6767	115.3066	4.6199	0.9771	11.2465	132.1501	-1.9074
NITROGEN:							
TOTAL N	1.9615	1.9422	0.0778	0.0029	-----	2.0229	-3.1277
TOTAL MASS FLOW (kg/hr)	3530.0295	3082.7454	123.5127	22.7714	361.1703	3590.2000	-1.7045

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]		FRESH FEED GAS
	GC#1	GC#2	[15-(50+62+68)]
MASS BALANCE (%) :	0.08	-0.09	-0.02
ELEMENTAL BALANCE (%) :			
CARBON	0.11	0.29	-1.55
HYDROGEN	0.38	1.42	-0.00
OXYGEN	0.00	0.22	-1.01
NITROGEN	-0.71	-0.41	-5.40

LAPORTE LPHETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

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DATE :                                04-DEC-80
TIME :                                10:01:48
TIME INTERVAL :                       FROM: 0600 01-Oct
                                         TO:  0600 02-Oct

NUMBER OF AVERAGED HOURS :            24
RUN ID NUMBER :                       E7.29
FEED GAS TYPE:                        CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 169.4
OIL/SLURRY REACTOR INLET TEMP. (deg.C) : 24.6
AVG. REACTOR SLURRY TEMPERATURE (deg.C) : 249.6
REACTOR FREEBOARD TEMPERATURE (deg.C) : 246.1
OIL/SLURRY OUTLET TEMP. (deg.C) :     242.8
REACTOR FEED GAS PRESSURE (kPa) :      5528
REACTOR EFFLUENT GAS PRESSURE (kPa) :   5284
GAS SUPERFICIAL VELOCITY (cm/sec) :    15.4
LIQUID SUPERFICIAL VELOCITY (cm/sec) :   0.0
SLURRY CONCENTRATION (wt%) :           37.5
CATALYST OXIDE IN REACTOR (kg oxide) :  395
GAS HOLD-UP (%) :                     33.7
SPACE VELOCITY (1/kg-hr) :             9714
RECYCLE/FRESH FEED RATIO :             3.420
OIL/SLURRY CIRCULATION RATE (m3/hr) :   0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 137.84
PURGE GAS FLOW RATE <50> (ksmol/hr) :   5.28
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) : 599
  
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STREAM #	1	55	15	15	32	32	62	62
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDM PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	57.54	26.98	35.20	35.20	24.68	24.49	5.22	-----
CO	36.45	56.07	51.15	51.15	51.31	51.26	24.60	-----
CO2	3.30	15.59	12.56	12.56	14.60	14.64	65.51	-----
N2	0.10	0.77	0.61	0.61	0.71	0.73	0.24	-----
CH4	0.00	0.36	0.28	0.28	0.33	0.32	0.34	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.73
CH3OH	0.00	0.52	0.34	0.38	9.24	8.32	4.25	97.46
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.46
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.17
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.15
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.07
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.85
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.10
TOTAL :	97.40	100.29	100.14	100.18	99.87	99.77	100.21	100.00
DENS,g/cc	0.005	0.050	0.031	0.031	0.037	0.037	0.004	0.790
AV.MOL.WT	13.20	23.47	20.86	20.86	24.22	24.28	37.27	32.13
Nm3/hr	868.9	2971.3	3805.7	3840.0	3306.9	3303.0	11.8	-----
ksmol/hr	38.76	132.56	169.78	171.32	147.53	147.29	0.53	11.39
1/hr,prod	-----	-----	-----	-----	-----	-----	-----	463.29

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		<u>GC#1</u>	<u>GC#2</u>
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	39.6	39.6
CARBON MONOXIDE CONVERSION	(%) :	13.0	13.6
CARBON DIOXIDE CONVERSION	(%) :	-1.1	-0.1
RATIO H2 CONSUMED/CO CONSUMED	:	2.09	2.00
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	39.1	39.2
CARBON MONOXIDE CONVERSION	(%) :	13.4	13.1
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	37.9	37.5
CARBON MONOXIDE CONVERSION	(%) :	13.0	12.9
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.00

SELECTIVITIES :

	<u>ACROSS REACTOR</u>	<u>OVERALL</u>
	<u>GC #2</u>	<u>*</u>
CO (+CO2) SELECTIVITY TO METHANOL (%) :	96.6	100.8
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.3

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	<u>smol/hr-kg cat</u>	<u>kg/1000 Na3 fresh feed</u>	<u>kg/1000 Na3 reactor feed</u>
As calculated ACROSS REACTOR, GC#2	29.11	424.3	96.0
As Net MeOH Produced, OVERALL balance	28.30	412.5	93.3

REACTOR FEED (H2/(CO+1.5CO2)) : 0.50
 REACTOR FEED ((H2-CO2)/(CO+CO2)) : 0.36

APPROACH TO METHANOL EQUILIBRIUM (des.C) : 19.38
 APPROACH TO WATER-GAS EQUILIBRIUM (des.C) : 9.93

METHANOL COLLECTED AS % OF CALCULATED, GC#2 : 96.8

CALCULATED METHANOL PRODUCTION RATE, GC#2 (Ksmol/hr) : 11.51

LAPORTE LPNETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	(% diff.)	(% diff.)	(% diff.)
H2	-13.09945	-3.84536	-2.20826
CO	-2.53901	0.93240	-2.28317
CO2	-9.99598	1.90674	-1.52943
N2	-422.81384	2.15366	-2.41957
CH4	n.a.	-0.35864	-2.07613
H2O	-----	n.a.	n.a.
CH3OH	-----	5.48680	2.32891

OVERALL ELEMENTAL BALANCE (Kg-atoms/hr) :

	INPUTS		OUTPUTS				(IN-OUT)/IN
STREAM #	15	55	50	62	68	TOTAL	
STREAM NAME	REACTOR FEED	RECYCLE	PURGE GAS	FLASH GAS	MeOH PRODUCT		%
CARBON:							
CO	87.6277	74.3234	2.9631	0.1446	-----	77.4311	11.6363
CO2	21.5240	20.6617	0.8237	0.3851	-----	21.8705	-1.6096
CH3OH	0.6551	0.6931	0.0276	0.0250	11.1320	11.8777	-1713.2366
OTHERS	0.4763	0.4746	0.0189	0.0027	0.1139	0.6101	-29.1040
TOTAL C	110.2830	96.1527	3.8334	0.5574	11.2459	111.7894	-1.3659
HYDROGEN:							
H2	120.5955	71.5198	2.8513	0.0613	-----	74.4325	38.2792
H2O	0.0000	0.0000	0.0000	0.0000	0.2979	0.2979	n.a.
OTHERS	4.5252	4.6705	0.1862	0.1101	44.8697	49.8365	-1001.3015
TOTAL H	125.1208	76.1903	3.0376	0.1714	45.1675	124.5669	0.4427
OXYGEN:							
TOTAL O	131.3307	116.3398	4.6382	0.9401	11.3910	133.3091	-1.5064
NITROGEN:							
TOTAL N	2.0866	2.0520	0.0818	0.0029	-----	2.1366	-2.3937
TOTAL MASS FLOW (kg/hr)	3573.1182	3111.6423	124.0549	21.9093	366.0146	3623.6208	-1.4134

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS [15-(50+62+68)]
MASS BALANCE (%) :	GC#1	GC#2
ELEMENTAL BALANCE (%) :	-----	-----
CARBON	-1.02	0.00
HYDROGEN	-0.56	-0.09
OXYGEN	0.36	
NITROGEN	0.49	
	-0.66	-1.47
	-4.18	-9.44
	0.03	-1.67
		-4.90

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

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DATE : 06-DEC-80
TIME : 10:03:04
TIME INTERVAL : FROM: 0600 02-Oct
                TO: 0600 03-Oct

NUMBER OF AVERAGED HOURS : 24
RUN ID NUMBER : E7.30
FEED GAS TYPE: CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) : 163.5
OIL/SLURRY REACTOR INLET TEMP. (des.C) : 22.0
AVG. REACTOR SLURRY TEMPERATURE (des.C) : 249.5
REACTOR FREEBOARD TEMPERATURE (des.C) : 245.9
OIL/SLURRY OUTLET TEMP. (des.C) : 241.9
REACTOR FEED GAS PRESSURE (kPa) : 5526
REACTOR EFFLUENT GAS PRESSURE (kPa) : 5293
GAS SUPERFICIAL VELOCITY (cm/sec) : 15.5
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 0.0
SLURRY CONCENTRATION (wt%) : 37.4
CATALYST OXIDE IN REACTOR (kg oxide) : 394
GAS HOLD-UP (%) : 33.5
SPACE VELOCITY (1/kg-hr) : 9754
RECYCLE/FRESH FEED RATIO : 3.439
OIL/SLURRY CIRCULATION RATE (m3/hr) : 0.0
PROD. SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 138.15
PURGE GAS FLOW RATE <50> (ksmol/hr) : 5.14
HEAT TRANSFER COEFFICIENT (Watt/m2-des.C) : 597
  
```

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDM PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<WTX>
H2	57.76	27.08	35.26	35.26	24.74	24.57	5.22	-----
CO	36.40	55.92	51.03	51.03	51.18	51.21	24.60	-----
CO2	3.36	15.64	12.60	12.60	14.67	14.72	45.51	-----
N2	0.11	0.80	0.63	0.63	0.74	0.75	0.24	-----
CH4	0.01	0.40	0.31	0.31	0.37	0.36	0.34	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.69
CH3OH	0.00	0.46	0.29	0.33	8.17	8.23	4.25	97.50
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.45
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.16
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.15
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.08
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.86
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.10
TOTAL :	97.63	100.31	100.12	100.15	99.86	99.85	100.21	100.00
DENS,g/cc	0.005	0.050	0.032	0.032	0.037	0.037	0.004	0.793
AV.MOL.WT	13.18	23.45	20.84	20.84	24.21	24.26	37.27	32.15
Mm3/hr	867.1	2981.3	3819.7	3848.3	3312.7	3309.0	12.3	-----
ksmol/hr	38.69	133.00	170.41	171.69	147.79	147.56	0.55	11.41
l/hr,prod	-----	-----	-----	-----	-----	-----	-----	462.60

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
		----	----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	39.6	39.6
CARBON MONOXIDE CONVERSION	(%) :	13.1	13.7
CARBON DIOXIDE CONVERSION	(%) :	-1.2	-0.3
RATIO H2 CONSUMED/CO CONSUMED	:	2.10	2.00
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	39.9	39.0
CARBON MONOXIDE CONVERSION	(%) :	13.4	13.1
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	37.8	37.5
CARBON MONOXIDE CONVERSION	(%) :	13.0	12.9
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR	OVERALL
	GC Average	%
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (%) :	100.6	100.6
CO (+CO2) SELECTIVITY TO ETHANOL (%) :		0.3

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEDH SOURCE	saol/hr-ks cat	kg/1000 Na3 fresh feed	kg/1000 Na3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	29.34	427.8	96.4
As Net MeOH produced, OVERALL balance	29.42	414.3	93.4

REACTOR FEED (H2/(CO+1.5CO2)) : 0.50
 REACTOR FEED ((H2-CO2)/(CO+CO2)) : 0.36

APPROACH TO METHANOL EQUILIBRIUM (des.C) : 19.75
 APPROACH TO WATER-GAS EQUILIBRIUM (des.C) : 4.40

METHANOL COLLECTED AS % OF CALCULATED : 96.4

CALCULATED METHANOL PRODUCTION RATE (Ksaol/hr) : 11.58

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<u><% diff.></u>	<u><% diff.></u>	<u><% diff.></u>
H2	-13.29734	-3.71992	-2.44319
CO	-2.78593	0.96276	-2.34091
CO2	-10.69206	2.12564	-1.46547
N2	-406.98581	2.54283	-1.99015
CH4	n.a.	0.53350	-1.63995
H2O	-----	n.a.	n.a.
CH3OH	-----	9.21018	1.97339

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

	INPUTS		OUTPUTS				(IN-OUT)/IN
STREAM #	15	55	50	62	68	TOTAL	
STREAM NAME	REACTOR FEED	RECYCLE	PURGE GAS	FLASH GAS	MeOH PRODUCT		%
CARBON:							
CO	87.6058	74.3778	2.8765	0.1506	-----	77.4049	11.6441
CO2	21.6272	20.7990	0.8044	0.4011	-----	22.0045	-1.7446
CH3OH	0.5612	0.6181	0.0239	0.0260	11.1623	11.8304	-2007.9929
OTHERS	0.5374	0.5360	0.0207	0.0028	0.1141	0.6737	-25.3699
TOTAL C	110.3316	96.3310	3.7255	0.5806	11.2765	111.9135	-1.4338
HYDROGEN:							
H2	121.0793	72.0476	2.7863	0.0639	-----	74.8979	39.1414
H2O	0.0000	0.0000	0.0000	0.0000	0.2794	0.2794	n.a.
OTHERS	4.3944	4.6166	0.1785	0.1147	44.9917	49.9016	-1035.5807
TOTAL H	125.4736	76.6642	2.9649	0.1786	45.2711	125.0789	0.3146
OXYGEN:							
TOTAL O	131.4214	116.5940	4.5091	0.9793	11.4128	133.4952	-1.5780
NITROGEN:							
TOTAL N	2.1598	2.1334	0.0825	0.0029	-----	2.2189	-2.7300
TOTAL MASS FLOW							
(kg/hr)	3577.7473	3118.6506	120.6097	22.8222	366.8641	3628.9465	-1.4310

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS [15-(50+62+68)]
	GC#1	GC#2
MASS BALANCE (%) :	-0.86	0.00
ELEMENTAL BALANCE (%) :		
CARBON	-0.50	0.36
HYDROGEN	0.82	1.51
OXYGEN	0.64	0.26
NITROGEN	-3.29	-0.73

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

```

DATE :                                04-DEC-80
TIME :                                10:04:42
TIME INTERVAL :                       FROM: 0600 03-Oct
                                         TO: 0600 04-Oct

NUMBER OF AVERAGED HOURS :            24
RUN ID NUMBER :                       E7.31
FEED GAS TYPE:                        CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 155.7
OIL/SLURRY REACTOR INLET TEMP. (deg.C) : 22.2
AVG. REACTOR SLURRY TEMPERATURE (deg.C) : 249.6
REACTOR FREEBOARD TEMPERATURE (deg.C) : 246.3
OIL/SLURRY OUTLET TEMP. (deg.C) :     242.6
REACTOR FEED GAS PRESSURE (kPa) :      5524
REACTOR EFFLUENT GAS PRESSURE (kPa) :   5284
GAS SUPERFICIAL VELOCITY (cm/sec) :    15.5
LIQUID SUPERFICIAL VELOCITY (cm/sec) :  0.0
SLURRY CONCENTRATION (wt%) :           37.4
CATALYST OXIDE IN REACTOR (kg oxide) :  393
GAS HOLD-UP (%) :                     33.5
SPACE VELOCITY (1/kg-hr) :             9810
RECYCLE/FRESH FEED RATIO :             3.456
OIL/SLURRY CIRCULATION RATE (m3/hr) :  0.0
PROD. SEPARATOR GAS FLOWRATE <50> + <55> (kscmol/hr) : 139.70
PURGE GAS FLOW RATE <50> (kscmol/hr) :  5.13
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) : 595
  
```

STREAM #	1	55	15	15	32	32	62	69
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDH PRODUC
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT	=====	=====	=====	=====	=====	=====	=====	=====
	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<WTX>
H2	57.52	27.00	34.60	35.15	24.69	24.48	5.22	-----
CO	36.47	55.99	51.28	51.09	51.23	51.53	24.60	-----
CO2	3.37	15.59	12.60	12.60	14.63	14.63	65.51	-----
N2	0.11	0.87	0.68	0.68	0.80	0.80	0.24	-----
CH4	0.01	0.41	0.33	0.32	0.38	0.39	0.34	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.69
CH3OH	0.00	0.45	0.39	0.29	8.14	9.04	4.25	97.51
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.43
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.16
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.13
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.08
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.88
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.09
TOTAL :	97.49	100.31	99.88	100.14	99.87	99.99	100.21	100.00
DENS,g/cc	0.005	0.050	0.032	0.032	0.037	0.037	0.005	0.794
AV.MOL.WT	13.23	23.46	20.99	20.86	24.21	24.26	37.27	32.14
Nm3/hr	866.3	2994.0	3849.4	3860.3	3326.9	3323.3	12.4	-----
kscmol/hr	38.65	133.57	171.73	172.22	148.42	148.20	0.55	11.45
l/hr:prod	-----	-----	-----	-----	-----	-----	-----	463.51

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

	GC#1	GC#2
	----	----
CALCULATED BY GAS COMPOSITION		
HYDROGEN CONVERSION (%) :	38.9	39.5
CARBON MONOXIDE CONVERSION (%) :	13.2	13.6
CARBON DIOXIDE CONVERSION (%) :	-0.3	-0.1
RATIO H2 CONSUMED/CO CONSUMED :	1.99	2.00
CALCULATED BY METHANOL IN EXIT GAS		
HYDROGEN CONVERSION (%) :	37.9	38.2
CARBON MONOXIDE CONVERSION (%) :	12.8	13.1
CALCULATED BY OVERALL BALANCE		
HYDROGEN CONVERSION (%) :	38.3	37.6
CARBON MONOXIDE CONVERSION (%) :	12.9	12.9
RATIO H2 CONSUMED/CO CONSUMED :	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL %
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (%) :	97.0	100.7
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.3

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	kmol/hr-kg cat	kg/1000 Na3 fresh feed	kg/1000 Na3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	29.01	422.2	94.7
As Net MeOH produced, OVERALL balance	29.59	416.1	93.4

REACTOR FEED (H2/(CO+1.5CO2)) : 0.50
REACTOR FEED ((H2-CO2)/(CO+CO2)) : 0.35

APPROACH TO METHANOL EQUILIBRIUM (deg.C) : 19.72
APPROACH TO WATER-GAS EQUILIBRIUM (deg.C) : 5.41

METHANOL COLLECTED AS % OF CALCULATED : 98.1

CALCULATED METHANOL PRODUCTION RATE (Kmol/hr) : 11.41

LAPORTE LPNETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-12.09224	-3.84722	-2.26300
CO	-2.91264	1.00777	-2.32367
CO2	-11.02262	1.97494	-1.44576
N2	-402.24261	2.88043	-2.22657
CH4	n.a.	-0.16627	-2.20144
H2O	-----	n.a.	n.a.
CH3OH	-----	15.06314	1.90300

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	87.9837	74.7834	2.8704	0.1515	-----	77.8054	11.5685
CO2	21.6911	20.8253	0.7993	0.4035	-----	22.0282	-1.5540
CH3OH	0.5061	0.5959	0.0229	0.0262	11.2002	11.8452	-2240.2993
OTHERS	0.5580	0.5517	0.0212	0.0029	0.1145	0.6902	-23.6955
TOTAL C	110.7390	96.7563	3.7138	0.5841	11.3147	112.3689	-1.4719
HYDROGEN:							
H2	121.0775	72.1320	2.7686	0.0643	-----	74.9649	39.0952
H2O	0.0000	0.0000	0.0000	0.0000	0.2840	0.2840	n.a.
OTHERS	4.2565	4.5902	0.1762	0.1154	45.1444	50.0262	-1075.2819
TOTAL H	125.3341	76.7222	2.9448	0.1793	45.4284	125.2751	0.0471
OXYGEN:							
TOTAL O	131.8721	117.0300	4.4920	0.9851	11.4518	133.9588	-1.5824
NITROGEN:							
TOTAL N	2.3491	2.3322	0.0895	0.0029	-----	2.4246	-3.2151
TOTAL MASS FLOW (ks/hr)	3593.0254	3133.7527	120.2829	22.9574	368.0481	3645.0410	-1.4477

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]		FRESH FEED GAS
	GC#1	GC#2	[15-(50+62+68)]
MASS BALANCE (Z) :	0.22	0.00	-0.04
ELEMENTAL BALANCE (Z) :			
CARBON	0.30	0.31	-1.35
HYDROGEN	0.95	1.18	-9.15
OXYGEN	0.20	0.25	-1.36
NITROGEN	-1.29	-0.97	-6.76

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

```

DATE : 04-DEC-89
TIME : 10:05:59
TIME INTERVAL : FROM: 0600 04-Oct
                TO: 2400 04-Oct

NUMBER OF AVERAGED HOURS : 19
RUN ID NUMBER : E7.32
FEED GAS TYPE: CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 153.8
OIL/SLURRY REACTOR INLET TEMP. (deg.C) : 20.7
AVG. REACTOR SLURRY TEMPERATURE (deg.C) : 249.7
REACTOR FREEBOARD TEMPERATURE (deg.C) : 246.5
OIL/SLURRY OUTLET TEMP. (deg.C) : 243.0
REACTOR FEED GAS PRESSURE (kPa) : 5522
REACTOR EFFLUENT GAS PRESSURE (kPa) : 5284
GAS SUPERFICIAL VELOCITY (cm/sec) : 15.4
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 0.0
SLURRY CONCENTRATION (wt%) : 37.3
CATALYST OXIDE IN REACTOR (kg oxide) : 393
GAS HOLD-UP (%) : 33.5
SPACE VELOCITY (1/kg-hr) : 9761
RECYCLE/FRESH FEED RATIO : 3.651
OIL/SLURRY CIRCULATION RATE (m3/hr) : 0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 139.59
PURGE GAS FLOW RATE <50> (ksmol/hr) : 5.07
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) : 595
  
```

STREAM #	1	55	15	15	32	32	62	69
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEOH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	56.29	26.68	34.57	34.90	24.35	24.53	5.22	-----
CO	37.38	56.30	51.66	51.43	51.67	51.61	24.60	-----
CO2	3.93	15.66	12.68	12.67	14.74	14.62	65.51	-----
N2	0.13	0.80	0.62	0.63	0.73	0.75	0.24	-----
CH4	0.03	0.39	0.32	0.31	0.36	0.39	0.34	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.71
CH3OH	0.01	0.41	0.35	0.28	8.04	7.83	4.25	97.49
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.41
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.15
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.12
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.08
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.80
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.12
TOTAL :	97.78	100.24	100.20	100.21	99.89	99.75	100.21	100.00
DENS,g/cc	0.005	0.050	0.033	0.032	0.037	0.037	0.005	0.795
AV.MOL.WT	13.68	23.55	21.04	20.95	24.22	24.24	37.27	32.14
M3/hr	826.0	3015.3	3832.3	3841.2	3309.8	3314.4	12.5	-----
ksmol/hr	36.85	134.52	170.97	171.37	147.62	147.80	0.56	11.25
1/hr,prod	-----	-----	-----	-----	-----	-----	-----	454.88

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

=====

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
		----	----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	38.6	39.9
CARBON MONOXIDE CONVERSION	(%) :	13.6	13.5
CARBON DIOXIDE CONVERSION	(%) :	0.3	-0.2
RATIO H2 CONSUMED/CO CONSUMED	:	1.90	2.01
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	37.1	38.1
CARBON MONOXIDE CONVERSION	(%) :	12.4	12.9
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	37.8	37.4
CARBON MONOXIDE CONVERSION	(%) :	12.6	12.7
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR	OVERALL
	GC Average	*
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (%) :	93.7	100.3
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.3

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	smol/hr-kg cat	kg/1000 Nm3 fresh feed	kg/1000 Nm3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	28.43	434.0	93.3
As Net MeOH produced, OVERALL balance	28.08	428.7	92.2

REACTOR FEED (H2/(CO+1.5CO2)) : 0.50

REACTOR FEED ((H2-CO2)/(CO+CO2)) : 0.35

APPROACH TO METHANOL EQUILIBRIUM (deg.C) : 19.38

APPROACH TO WATER-GAS EQUILIBRIUM (deg.C) : 7.22

METHANOL COLLECTED AS % OF CALCULATED : 98.3

CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) : 11.19

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-9.06062	-5.60559	-3.72137
CO	-1.46011	1.54385	-3.24287
CO2	-23.58466	3.56417	-2.31474
N2	-473.17242	4.35737	-3.63592
CH4	n.a.	2.90925	-2.76746
H2O	-----	n.a.	n.a.
CH3OH	-----	14.28209	2.31435

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	88.1320	75.7411	2.8535	0.1527	-----	79.7473	10.6484
CO2	21.7070	21.0607	0.7934	0.4068	-----	22.2609	-2.5521
CH3OH	0.4774	0.5515	0.0208	0.0264	11.0023	11.6009	-2329.8232
OTHERS	0.5244	0.5287	0.0199	0.0029	0.1125	0.6640	-26.6253
TOTAL C	110.8408	97.8820	3.6876	0.5888	11.1148	113.2732	-2.1946
HYDROGEN:							
H2	119.6205	71.7935	2.7044	0.0648	-----	74.5527	37.6757
H2O	0.0000	0.0000	0.0000	0.0000	0.2871	0.2871	n.a.
OTHERS	4.0073	4.3205	0.1628	0.1163	44.3468	49.9464	-1121.4363
TOTAL H	123.6278	76.1040	2.8671	0.1811	44.6339	123.7861	-0.1290
OXYGEN:							
TOTAL O	132.0234	118.4141	4.4611	0.9931	11.2524	135.1206	-2.3460
NITROGEN:							
TOTAL N	2.1455	2.1497	0.0810	0.0029	-----	2.2336	-4.1048
TOTAL MASS FLOW (kg/hr)	3589.6099	3168.3916	119.3657	23.1434	361.6506	3672.5510	-2.3106

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS
	GC#1	[15-(50+62+68)]
MASS BALANCE (%) :	0.37	0.00
ELEMENTAL BALANCE (%) :		
CARBON	0.95	-1.00
HYDROGEN	1.28	-14.74
OXYGEN	0.86	-0.19
NITROGEN	-5.47	10.34

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

```

DATE : 04-DEC-89
TIME : 10:07:37
TIME INTERVAL : FROM: 0400 05-Oct
                TO: 0400 04-Oct

NUMBER OF AVERAGED HOURS : 24
RUN ID NUMBER : E7.33
FEED GAS TYPE: CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 155.0
OIL/SLURRY REACTOR INLET TEMP. (deg.C) : 21.2
AVG. REACTOR SLURRY TEMPERATURE (deg.C) : 249.6
REACTOR FREEBOARD TEMPERATURE (deg.C) : 246.8
OIL/SLURRY OUTLET TEMP. (deg.C) : 243.3
REACTOR FEED GAS PRESSURE (kPa) : 5523
REACTOR EFFLUENT GAS PRESSURE (kPa) : 5294
GAS SUPERFICIAL VELOCITY (cm/sec) : 15.5
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 0.0
SLURRY CONCENTRATION (wt%) : 37.3
CATALYST OXIDE IN REACTOR (kg oxide) : 293
GAS HOLD-UP (%) : 33.4
SPACE VELOCITY (1/kg-hr) : 0.008
RECYCLE/FRESH FEED RATIO : 4.093
OIL/SLURRY CIRCULATION RATE (m3/hr) : 0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 143.44
PURGE GAS FLOW RATE <50> (ksmol/hr) : 5.20
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) : 597
  
```

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDH PRODUC
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	53.44	26.80	46.97	35.07	24.61	32.33	5.22	-----
CO	40.34	56.28	45.27	51.32	51.54	49.07	24.60	-----
CO2	5.87	15.58	9.13	12.55	14.62	13.27	65.51	-----
N2	0.41	0.76	0.43	0.60	0.70	1.22	0.24	-----
CH4	0.22	0.36	0.21	0.29	0.32	0.79	0.34	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.73
CH3OH	0.17	0.42	0.22	0.28	9.07	6.50	4.25	97.46
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.41
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.15
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.12
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.08
ALKANES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.89
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.14
TOTAL :	100.45	100.19	102.21	100.11	99.86	103.18	100.21	100.00
DENS,g/cc	0.006	0.050	0.027	0.032	0.037	0.034	0.004	0.795
AV.MOL.WT	14.99	23.51	17.61	20.89	24.23	22.19	37.27	32.14
Mm3/hr	757.0	3098.6	3849.0	3855.6	3322.6	3472.3	8.5	-----
ksmol/hr	33.77	138.24	171.72	172.01	148.23	154.84	0.38	11.47
l/hr,prod	-----	-----	-----	-----	-----	-----	-----	463.74

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		GC#1 ----	GC#2 ----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	37.9	39.5
CARBON MONOXIDE CONVERSION	(%) :	2.2	13.5
CARBON DIOXIDE CONVERSION	(%) :	-31.1	-0.3
RATIO H2 CONSUMED/CO CONSUMED	:	17.71	2.01
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	24.1	38.0
CARBON MONOXIDE CONVERSION	(%) :	12.5	13.0
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	29.3	37.8
CARBON MONOXIDE CONVERSION	(%) :	14.6	12.9
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC #2 -----	OVERALL *
CO (+CO2) SELECTIVITY TO METHANOL (%) :	97.2	97.9
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.3

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	smol/hr-ks cat -----	ks/1000 Na3 fresh feed -----	ks/1000 Na3 reactor feed -----
As calculated ACROSS REACTOR, GC#2	29.15	485.6	95.3
As Net MeOH produced, OVERALL balance	28.60	476.4	93.5

REACTOR FEED {H2/(CO+1.5CO2)} : 0.50
REACTOR FEED {(H2-CO2)/(CO+CO2)} : 0.35

APPROACH TO METHANOL EQUILIBRIUM (des.C) : 19.83
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) : 9.91

METHANOL COLLECTED AS % OF CALCULATED, GC#2 : 97.8

CALCULATED METHANOL PRODUCTION RATE, GC#2 (Ksmol/hr) : 11.47

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	8.36921	-9.49249	-5.41728
CO	0.51460	3.43734	-5.79263
CO2	-66.98794	8.21270	-4.43493
N2	n.a.	13.02426	-5.72269
CH4	n.a.	16.14618	-8.14898
H2O	-----	n.a.	n.a.
CH3OH	-----	23.63900	1.04006

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	88.2767	77.7943	2.9260	0.1041	-----	80.8244	8.4420
CO2	21.5910	21.5391	0.8101	0.2772	-----	22.6265	-4.7959
CH3OH	0.4858	0.5788	0.0218	0.0180	11.2144	11.8329	-2335.6833
OTHERS	0.4782	0.4977	0.0187	0.0020	0.1147	0.6331	-32.3854
TOTAL C	110.8317	100.4098	3.7766	0.4013	11.3291	115.9169	-4.5882
HYDROGEN:							
H2	120.6459	74.0908	2.7867	0.0442	-----	75.9217	36.2418
H2O	0.0000	0.0000	0.0000	0.0000	0.2976	0.2976	n.a.
OTHERS	3.8560	4.3058	0.1620	0.0793	45.2017	49.7488	-1190.1517
TOTAL H	124.5020	78.3967	2.9487	0.1234	45.4993	124.9681	-1.9809
OXYGEN:							
TOTAL O	131.9444	121.4513	4.5681	0.6768	11.4711	138.1672	-4.7162
NITROGEN:							
TOTAL N	2.0745	2.1095	0.0793	0.0020	-----	2.1909	-5.6115
TOTAL MASS FLOW (kg/hr)	3591.7874	3250.2869	122.2507	15.7726	368.6922	3757.0022	-4.5998

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]		FRESH FEED GAS
	GC#1	GC#2	[15-(50+62+68)]
MASS BALANCE (%) :	-13.63	0.00	-0.07
ELEMENTAL BALANCE (%) :			
CARBON	-14.58	0.30	1.47
HYDROGEN	11.47	1.44	-32.65
OXYGEN	-16.21	0.19	5.29
NITROGEN	-156.69	0.11	70.48

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

```

DATE : 06-DEC-99
TIME : 10:09:07
TIME INTERVAL : FROM: 0600 06-Oct
                TO: 0600 07-Oct

NUMBER OF AVERAGED HOURS : 24
RUN ID NUMBER : E7.34
FEED GAS TYPE: CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 155.0
OIL/SLURRY REACTOR INLET TEMP. (deg.C) : 20.4
AVG. REACTOR SLURRY TEMPERATURE (deg.C) : 250.1
REACTOR FREEBOARD TEMPERATURE (deg.C) : 247.2
OIL/SLURRY OUTLET TEMP. (deg.C) : 243.8
REACTOR FEED GAS PPESSURE (kPa) : 5519
REACTOR EFFLUENT GAS PRESSURE (kPa) : 5285
GAS SUPERFICIAL VELOCITY (cm/sec) : 15.4
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 0.0
SLURRY CONCENTRATION (wt%) : 37.3
CATALYST OXIDE IN REACTOR (kg oxide) : 393
GAS HOLD-UP (%) : 33.4
SPACE VELOCITY (1/kg-hr) : 9725
RECYCLE/FRESH FEED RATIO : 3.516
OIL/SLURRY CIRCULATION RATE (m3/hr) : 0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 139.07
PURGE GAS FLOW RATE <50> (ksmol/hr) : 5.14
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) : 598
  
```

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDM PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	57.33	27.27	35.22	35.46	24.91	24.82	5.22	-----
CO	36.26	55.51	50.68	50.70	50.82	50.87	24.60	-----
CO2	3.45	15.79	12.75	12.73	14.82	14.84	65.51	-----
N2	0.10	0.81	0.64	0.64	0.75	0.75	0.24	-----
CH4	0.01	0.38	0.30	0.29	0.34	0.35	0.34	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.73
CH3OH	0.02	0.39	0.34	0.26	8.20	8.21	4.25	97.45
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.41
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.15
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.12
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.08
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.89
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.14
TOTAL :	97.19	100.16	99.93	100.08	99.83	99.85	100.21	100.00
DENS,g/cc	0.005	0.050	0.032	0.032	0.037	0.037	0.005	0.796
AV.MOL.WT	13.24	23.42	20.86	20.81	24.19	24.22	37.27	32.14
Mm3/hr	847.5	2979.6	3820.5	3827.1	3292.5	3290.4	8.0	-----
ksmol/hr	37.81	132.93	170.45	170.74	146.89	146.73	0.36	11.39
1/hr,prod	-----	-----	-----	-----	-----	-----	-----	459.65

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

	GC#1	GC#2
	----	----
CALCULATED BY GAS COMPOSITION		
HYDROGEN CONVERSION (Z) :	39.3	39.6
CARBON MONOXIDE CONVERSION (Z) :	13.6	13.8
CARBON DIOXIDE CONVERSION (Z) :	-0.2	-0.2
RATIO H2 CONSUMED/CO CONSUMED :	2.01	2.01
CALCULATED BY METHANOL IN EXIT GAS		
HYDROGEN CONVERSION (Z) :	38.2	38.3
CARBON MONOXIDE CONVERSION (Z) :	13.3	13.4
CALCULATED BY OVERALL BALANCE		
HYDROGEN CONVERSION (Z) :	37.7	37.4
CARBON MONOXIDE CONVERSION (Z) :	13.1	13.0
RATIO H2 CONSUMED/CO CONSUMED :	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL %
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (Z) :	99.0	101.6
CO (+CO2) SELECTIVITY TO ETHANOL (Z) :	-----	0.3

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEDH SOURCE	smol/hr-kg cat	kg/1000 Nm3 fresh feed	kg/1000 Nm3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	29.31	436.0	96.6
As Net MeOH produced, OVERALL balance	28.38	422.2	93.5

REACTOR FEED (H2/(CO+1.5CO2)) : 0.51
 REACTOR FEED ((H2-CO2)/(CO+CO2)) : 0.36

APPROACH TO METHANOL EQUILIBRIUM (des.C) : 19.24
 APPROACH TO WATER-GAS EQUILIBRIUM (des.C) : 6.09

METHANOL COLLECTED AS % OF CALCULATED : 96.5

CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) : 11.53

LAPORTE LPHETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-9.26457	-4.51029	-2.96898
CO	-0.44207	1.07236	-2.80147
CO2	-8.98755	2.54741	-1.36038
N2	-316.79138	1.97675	-2.64851
CH4	n.a.	3.05828	-4.52257
H2O	-----	n.a.	n.a.
CH3OH	-----	14.36825	2.93468

OVERALL ELEMENTAL BALANCE (kg-atoms/hr) :

	INPUTS		OUTPUTS				(IN-OUT)/IN
STREAM # STREAM NAME	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	86.5678	73.7946	2.8533	0.0975	-----	76.7454	11.3465
CO2	21.7282	20.9906	0.8116	0.2597	-----	22.0619	-1.5757
CH3OH	0.4517	0.5200	0.0201	0.0168	11.1295	11.6864	-2487.1060
OTHERS	0.4900	0.4998	0.0193	0.0018	0.1139	0.6348	-29.5495
TOTAL C	109.2378	95.8050	3.7043	0.3759	11.2434	111.1285	-1.7309
HYDROGEN:							
H2	121.0809	72.5013	2.8033	0.0414	-----	75.3459	37.7723
H2O	0.0000	0.0000	0.0000	0.0000	0.2953	0.2953	n.a.
OTHERS	3.7670	4.0790	0.1577	0.0743	44.8596	49.1706	-1205.3164
TOTAL H	124.8479	76.5803	2.9610	0.1156	45.1549	124.8119	0.0289
OXYGEN:							
TOTAL O	130.4759	116.2957	4.4966	0.6340	11.3843	132.8105	-1.7893
NITROGEN:							
TOTAL N	2.1991	2.1641	0.0837	0.0019	-----	2.2496	-2.2959
TOTAL MASS FLOW (kg/hr)	3552.2151	3113.0266	120.3650	14.7752	365.9019	3614.0688	-1.7413

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS
	GC#1	GC#2
	-----	-----
MASS BALANCE (%) :	0.03	-0.02
ELEMENTAL BALANCE (%) :		
CARBON	0.17	0.26
HYDROGEN	0.99	1.22
OXYGEN	0.09	0.19
NITROGEN	-0.73	0.34

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

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DATE : 06-DEC-99
TIME : 10:10:44
TIME INTERVAL : FROM: 0600 07-Oct
                TO: 0600 08-Oct

NUMBER OF AVERAGED HOURS : 13
RUN ID NUMBER : E7.35
FEED GAS TYPE: CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) : 153.4
OIL/SLURRY REACTOR INLET TEMP. (des.C) : 21.4
AVG. REACTOR SLURRY TEMPERATURE (des.C) : 249.5
REACTOR FREEBOARD TEMPERATURE (des.C) : 246.6
OIL/SLURRY OUTLET TEMP. (des.C) : 243.0
REACTOR FEED GAS PRESSURE (kPa) : 5517
REACTOR EFFLUENT GAS PRESSURE (kPa) : 5284
GAS SUPERFICIAL VELOCITY (cm/sec) : 15.4
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 0.0
SLURRY CONCENTRATION (wt%) : 37.3
CATALYST OXIDE IN REACTOR (ks oxide) : 393
GAS HOLD-UP (%) : 33.3
SPACE VELOCITY (1/ks-hr) : 9746
RECYCLE/FRESH FEED RATIO : 3.289
OIL/SLURRY CIRCULATION RATE (m3/hr) : 0.0
PROD. SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 136.75
PURGE GAS FLOW RATE <50> (ksmol/hr) : 5.52
HEAT TRANSFER COEFFICIENT (Watt/m2-des.C) : 600
  
```

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
=====	<MOL%	<MOL%	<MOL%	<MOL%	<MOL%	<MOL%	<MOL%	<WT%
H2	57.63	27.79	35.76	35.93	25.28	24.91	5.22	-----
CO	36.34	55.68	50.96	50.85	51.03	51.05	24.60	-----
CO2	3.34	15.20	12.21	12.15	14.21	14.25	45.51	-----
N2	0.10	0.75	0.59	0.58	0.69	0.68	0.24	-----
CH4	0.02	0.36	0.29	0.29	0.33	0.34	0.34	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.73
CH3OH	0.00	0.37	0.33	0.28	8.26	8.27	4.25	97.49
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.41
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.15
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.12
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.08
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.86
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.15
TOTAL :	97.43	100.15	100.14	100.07	99.80	99.51	100.21	100.00
DENS,g/cc	0.006	0.050	0.032	0.032	0.036	0.037	0.005	0.795
AV.MOL.WT	13.18	23.19	20.65	20.59	24.00	24.09	37.27	35.51
Mm3/hr	894.2	2941.4	3829.6	3835.4	3290.2	3283.9	11.9	-----
ksmol/hr	39.89	131.22	170.85	171.11	146.79	146.44	0.53	10.58
l/hr,prod	-----	-----	-----	-----	-----	-----	-----	472.60

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
		----	----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	40.3	39.6
CARBON MONOXIDE CONVERSION	(%) :	14.1	13.9
CARBON DIOXIDE CONVERSION	(%) :	-0.1	-0.4
RATIO H2 CONSUMED/CO CONSUMED	:	2.01	2.01
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	37.8	37.9
CARBON MONOXIDE CONVERSION	(%) :	13.3	13.4
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	34.4	34.2
CARBON MONOXIDE CONVERSION	(%) :	12.1	12.1
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR	OVERALL
	GC Average	*
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (%) :	95.5	100.9
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.3

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEDM SOURCE	kmol/hr-kg cat	kg/1000 Nm3 fresh feed	kg/1000 Nm3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	29.47	415.6	96.9
As Net MeOH produced, OVERALL balance	29.17	411.3	95.9

REACTOR FEED (H2/(CO+1.5CO2)) :	0.52
REACTOR FEED ((H2-CO2)/(CO+CO2)) :	0.38
APPROACH TO METHANOL EQUILIBRIUM (deg.C) :	20.42
APPROACH TO WATER-GAS EQUILIBRIUM (deg.C) :	10.06
METHANOL COLLECTED AS % OF CALCULATED :	98.6
CALCULATED METHANOL PRODUCTION RATE (Kmol/hr) :	11.60

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-12.30717	-3.39837	-2.49138
CO	-4.25890	0.62171	-1.84359
CO2	-13.29367	2.32618	-1.49380
N2	-112.36137	3.17016	-1.63389
CH4	n.a.	-2.56856	-1.42874
H2O	-----	n.a.	n.a.
CH3OH	-----	1.65466	10.30608

OVERALL ELEMENTAL BALANCE (Kg-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	87.0182	73.0642	3.0759	0.1459	-----	76.2860	12.3333
CO2	20.7831	19.9460	0.8397	0.3887	-----	21.1744	-1.8928
CH3OH	0.4724	0.4803	0.0202	0.0252	10.3476	10.8733	-2201.8994
OTHERS	0.4911	0.4724	0.0199	0.0028	0.1058	0.6009	-22.3567
TOTAL C	108.7648	93.9630	3.9557	0.5625	10.4534	108.9345	-0.1561
HYDROGEN:							
H2	122.9497	72.9290	3.0702	0.0619	-----	76.0611	39.1364
H2O	0.0000	0.0000	0.0000	0.0000	0.2737	0.2737	n.a.
OTHERS	3.8538	3.8109	0.1604	0.1111	41.7077	45.7901	-1988.1823
TOTAL H	126.8035	76.7399	3.2306	0.1730	41.9815	122.1250	3.6896
OXYGEN:							
TOTAL O	129.0567	113.4366	4.7755	0.9488	10.5826	129.7434	-0.5321
NITROGEN:							
TOTAL N	1.9951	1.9815	0.0834	0.0028	-----	2.0677	-3.6363
TOTAL MASS FLOW (kg/hr)	3523.1648	3043.2151	128.1134	22.1121	375.7339	3569.1746	-1.3059

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS
	GC#1	[15-(50+62+68)]
MASS BALANCE (%) :	-0.02	-0.03
ELEMENTAL BALANCE (%) :		
CARBON	0.66	5.46
HYDROGEN	2.35	1.35
OXYGEN	0.53	4.99
NITROGEN	1.02	-9.15

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES : ANALYTICAL SUMMARY
=====

DATE :	06-DEC-89
TIME :	10:12:04
TIME INTERVAL :	FROM: 0600 09-Oct
	TO: 0600 09-Oct
NUMBER OF AVERAGED HOURS :	24
RUN ID NUMBER :	E7.36
FEED GAS TYPE:	CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) :	157.6
OIL/SLURRY REACTOR INLET TEMP. (deg.C) :	21.7
AVG. REACTOR SLURRY TEMPERATURE (deg.C) :	249.9
REACTOR FREEBOARD TEMPERATURE (deg.C) :	247.0
OIL/SLURRY OUTLET TEMP. (deg.C) :	243.9
REACTOR FEED GAS PRESSURE (kPa) :	5521
REACTOR EFFLUENT GAS PRESSURE (kPa) :	5284
GAS SUPERFICIAL VELOCITY (cm/sec) :	15.5
LIQUID SUPERFICIAL VELOCITY (cm/sec) :	0.0
SLURRY CONCENTRATION (wt%) :	37.5
CATALYST OXIDE IN REACTOR (kg oxide) :	393
GAS HOLD-UP (Z) :	33.9
SPACE VELOCITY (1/kg-hr) :	9796
RECYCLE/FRESH FEED RATIO :	3.297
OIL/SLURRY CIRCULATION RATE (m3/hr) :	0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (kscmol/hr) :	138.07
PURGE GAS FLOW RATE <50> (kscmol/hr) :	6.11
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) :	599

STREAM #	1	55	15	15	32	32	62	69
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDM PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT	=====	=====	=====	=====	=====	=====	=====	=====
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	57.08	27.53	35.33	35.60	25.16	25.19	5.22	-----
CO	36.78	55.76	50.95	50.96	51.04	51.16	24.60	-----
CO2	3.59	15.34	12.38	12.37	14.40	14.43	65.51	-----
N2	0.10	0.70	0.55	0.55	0.64	0.64	0.24	-----
CH4	0.01	0.35	0.28	0.27	0.32	0.33	0.34	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.72
CH3OH	0.00	0.43	0.46	0.29	8.21	8.20	4.25	97.48
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.42
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.15
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.12
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.08
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.85
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.17
TOTAL :	97.57	100.11	99.95	100.04	99.76	99.95	100.21	100.00
DENS,g/cc	0.006	0.050	0.032	0.032	0.036	0.036	0.005	0.793
AV.MOL.WT	13.39	23.28	20.78	20.71	24.06	24.06	37.27	33.76
Mm3/hr	897.0	2957.8	3848.2	3854.8	3321.2	3320.9	12.4	-----
kscmol/hr	40.02	131.96	171.69	171.98	148.17	148.09	0.55	10.98
1/hr:prod	-----	-----	-----	-----	-----	-----	-----	467.37

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

CONVERSIONS ACROSS REACTOR :

	GC#1	GC#2
	----	----
CALCULATED BY GAS COMPOSITION		
HYDROGEN CONVERSION (%) :	38.5	39.1
CARBON MONOXIDE CONVERSION (%) :	13.3	13.7
CARBON DIOXIDE CONVERSION (%) :	-0.6	-0.3
RATIO H2 CONSUMED/CO CONSUMED :	2.00	1.99
CALCULATED BY METHANOL IN EXIT GAS		
HYDROGEN CONVERSION (%) :	37.5	38.1
CARBON MONOXIDE CONVERSION (%) :	13.0	13.3
CALCULATED BY OVERALL BALANCE		
HYDROGEN CONVERSION (%) :	36.0	35.7
CARBON MONOXIDE CONVERSION (%) :	12.5	12.4
RATIO H2 CONSUMED/CO CONSUMED :	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL *
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (%) :	97.9	100.7
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.3

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	smol/hr-ks cat	ks/1000 Nm3 fresh feed	ks/1000 Nm3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	29.25	411.1	95.7
As Net MeOH produced, OVERALL balance	28.79	404.7	94.2

REACTOR FEED (H2/(CO+1.5CO2)) :	0.51
REACTOR FEED ((H2-CO2)/(CO+CO2)) :	0.37
APPROACH TO METHANOL EQUILIBRIUM (des.C) :	19.98
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) :	7.43
METHANOL COLLECTED AS % OF CALCULATED :	98.0
CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) :	11.51

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES ~ 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-12.73840	-3.46601	-2.04868
CO	-3.52763	0.75539	-2.00638
CO2	-12.73141	1.87238	-1.19914
N2	-230.85239	1.88013	-2.17744
CH4	n.a.	-0.26853	-2.15245
H2O	-----	n.a.	n.a.
CH3OH	-----	10.12874	6.69788

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	87.6338	73.5810	3.4087	0.1521	-----	77.1417	11.9726
CO2	21.2769	20.2450	0.9379	0.4050	-----	21.5878	-1.4615
CH3OH	0.5054	0.5624	0.0261	0.0263	10.7344	11.3491	-2145.4829
OTHERS	0.4626	0.4566	0.0212	0.0029	0.1098	0.5904	-27.6170
TOTAL C	109.8787	94.8449	4.3938	0.5862	10.8442	110.6691	-0.7193
HYDROGEN:							
H2	122.4366	72.6533	3.3657	0.0645	-----	76.0835	27.8588
H2O	0.0000	0.0000	0.0000	0.0000	0.2824	0.2824	n.a.
OTHERS	3.8721	4.0758	0.1888	0.1158	43.2671	47.6475	-1130.5198
TOTAL H	126.3087	76.7292	3.5545	0.1803	43.5495	124.0135	1.8171
OXYGEN:							
TOTAL O	130.6929	114.6333	5.3105	0.9887	10.9776	131.9100	-0.9313
NITROGEN:							
TOTAL N	1.9055	1.8580	0.0861	0.0029	-----	1.9470	-2.1759
TOTAL MASS FLOW (ks/hr)	3561.9656	3072.3735	142.3297	23.0419	370.6463	3608.3916	-1.3034

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]		FRESH FEED GAS
	GC#1	GC#2	[15-(50+62+68)]
MASS BALANCE (%) :	0.08	-0.08	-0.01
ELEMENTAL BALANCE (%) :			
CARBON	0.17	0.26	2.09
HYDROGEN	0.94	0.96	-3.46
OXYGEN	0.05	0.18	1.81
NITROGEN	-0.76	0.00	-5.99

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

```

DATE :                                06-DEC-89
TIME :                                10:13:30
TIME INTERVAL :                       FROM: 0600 09-Oct
                                         TO: 0600 10-Oct

NUMBER OF AVERAGED HOURS :            24
RUN ID NUMBER :                       E7.37
FEED GAS TYPE:                        CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 157.3
OIL/SLURRY REACTOR INLET TEMP. (deg.C) : 22.0
AVG. REACTOR SLURRY TEMPERATURE (deg.C) : 249.9
REACTOR FREEBOARD TEMPERATURE (deg.C) : 246.5
OIL/SLURRY OUTLET TEMP. (deg.C) :     243.3
REACTOR FEED GAS PRESSURE (kPa) :      5516
REACTOR EFFLUENT GAS PRESSURE (kPa) :   5293
GAS SUPERFICIAL VELOCITY (cm/sec) :    15.3
LIQUID SUPERFICIAL VELOCITY (cm/sec) :  0.0
SLURRY CONCENTRATION (wt%) :           37.5
CATALYST OXIDE IN REACTOR (kg oxide) :  393
GAS HOLD-UP (%) :                     33.8
SPACE VELOCITY (1/kg-hr) :             9701
RECYCLE/FRESH FEED RATIO :             3.259
OIL/SLURRY CIRCULATION RATE (m3/hr) :  0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 136.84
PURGE GAS FLOW RATE <50> (ksmol/hr) :   6.52
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) : 592
  
```

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEOH PRODUC
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT	=====	=====	=====	=====	=====	=====	=====	=====
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	57.19	27.46	35.49	35.69	25.04	24.92	5.22	-----
CO	37.00	55.67	50.85	50.78	50.99	51.07	24.60	-----
CO2	3.76	15.55	12.60	12.48	14.67	14.61	65.51	-----
N2	0.11	0.69	0.54	0.54	0.63	0.62	0.24	-----
CH4	0.01	0.31	0.25	0.24	0.28	0.29	0.34	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.72
CH3OH	0.00	0.47	0.42	0.33	8.18	8.19	4.25	97.47
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.42
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.15
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.13
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.09
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.85
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.17
TOTAL :	98.06	100.14	100.15	100.06	99.78	99.71	100.21	100.00
DENS,g/cc	0.005	0.050	0.032	0.032	0.037	0.037	0.005	0.792
AV.MOL.WT	13.47	23.34	20.80	20.71	24.14	24.16	37.27	32.15
Mm3/hr	896.4	2920.9	3807.4	3817.4	3277.2	3275.7	12.1	-----
ksmol/hr	39.99	130.31	169.86	170.31	146.21	146.00	0.54	11.32
l/hr,prod	-----	-----	-----	-----	-----	-----	-----	459.65

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		GC#1 ----	GC#2 ----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	39.6	39.8
CARBON MONOXIDE CONVERSION	(%) :	13.6	13.9
CARBON DIOXIDE CONVERSION	(%) :	0.2	-0.9
RATIO H2 CONSUMED/CO CONSUMED	:	2.03	2.03
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	37.4	37.5
CARBON MONOXIDE CONVERSION	(%) :	13.0	13.2
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	37.4	37.0
CARBON MONOXIDE CONVERSION	(%) :	13.0	13.0
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC Average -----	OVERALL *
CO (+CO2) SELECTIVITY TO METHANOL (%) :	96.3	100.2
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.3

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	kgol/hr-kg cat -----	kg/1000 Nm3 fresh feed -----	kg/1000 Nm3 reactor feed -----
As calculated ACROSS REACTOR	28.79	404.9	95.1
As Net MeOH produced, OVERALL balance	28.29	397.9	93.4

REACTOR FEED {H2/(CO+1.5CO2)} : 0.51
 REACTOR FEED {(H2-CO2)/(CO+CO2)} : 0.37

APPROACH TO METHANOL EQUILIBRIUM (deg.C) : 19.80
 APPROACH TO WATER-GAS EQUILIBRIUM (deg.C) : 6.14

METHANOL COLLECTED AS % OF CALCULATED : 97.8

CALCULATED METHANOL PRODUCTION RATE (Kkgol/hr) : 11.33

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-15.02445	-3.64174	-2.72185
CO	-3.54752	0.98965	-2.37257
CO2	-21.49482	2.35891	-1.07614
N2	-353.42566	2.63892	-2.56760
CH4	n.a.	0.23169	-3.44713
H2O	-----	n.a.	n.a.
CH3OH	-----	7.64302	1.78966

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

	INPUTS		OUTPUTS				(IN-OUT)/IN
STREAM # STREAM NAME	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	86.4743	72.5422	3.6323	0.1485	-----	76.3230	11.7391
CO2	21.2558	20.2649	1.0147	0.3955	-----	21.6750	-1.9722
CH3OH	0.5653	0.6121	0.0306	0.0257	11.0743	11.7427	-1977.1427
OTHERS	0.4036	0.4014	0.0201	0.0028	0.1133	0.5375	-33.1732
TOTAL C	108.6990	93.8206	4.6977	0.5724	11.1875	110.2782	-1.4528
HYDROGEN:							
H2	121.5810	71.5701	3.5836	0.0630	-----	75.2167	38.1345
H2O	0.0000	0.0000	0.0000	0.0000	0.2910	0.2910	n.a.
OTHERS	3.8758	4.0539	0.2030	0.1131	44.6368	49.0067	-1164.4265
TOTAL H	125.4568	75.6240	3.7866	0.1761	44.9278	124.5144	0.7511
OXYGEN:							
TOTAL O	129.5512	113.6840	5.6923	0.9655	11.3253	131.6671	-1.6333
NITROGEN:							
TOTAL N	1.8223	1.7853	0.0894	0.0028	-----	1.8775	-3.0320
TOTAL MASS FLOW (kg/hr)	3526.8538	3041.4880	152.2910	22.5010	364.0632	3580.3433	-1.5166

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS
	GC#1	GC#2
	-----	-----
MASS BALANCE (%):	0.06	-0.05
ELEMENTAL BALANCE (%):		
CARBON	0.49	0.31
HYDROGEN	2.12	2.21
OXYGEN	0.44	0.12
NITROGEN	1.24	-0.45
		[15-(50+62+68)]

		-0.05
		-0.94
		-6.86
		-1.00
		-6.78

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

```

DATE : 06-DEC-99
TIME : 10:14:57
TIME INTERVAL : FROM: 0600 10-Oct
                TO: 0600 11-Oct

NUMBER OF AVERAGED HOURS : 24
RUN ID NUMBER : E7.38
FEED GAS TYPE: CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 157.8
OIL/SLURRY REACTOR INLET TEMP. (deg.C) : 21.0
AVG. REACTOR SLURRY TEMPERATURE (deg.C) : 249.9
REACTOR FREEBOARD TEMPERATURE (deg.C) : 246.5
OIL/SLURRY OUTLET TEMP. (deg.C) : 243.4
REACTOR FEED GAS PRESSURE (kPa) : 5518
REACTOR EFFLUENT GAS PRESSURE (kPa) : 5282
GAS SUPERFICIAL VELOCITY (cm/sec) : 15.4
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 0.0
SLURRY CONCENTRATION (wt%) : 37.4
CATALYST OXIDE IN REACTOR (kg oxide) : 393
GAS HOLD-UP (%) : 33.7
SPACE VELOCITY (1/kg-hr) : 9745
RECYCLE/FRESH FEED RATIO : 3.411
OIL/SLURRY CIRCULATION RATE (m3/hr) : 0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 137.74
PURGE GAS FLOW RATE <50> (ksmol/hr) : 5.43
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) : 591
  
```

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDM PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	57.74	27.12	35.44	35.13	24.76	24.51	5.22	-----
CO	36.61	56.13	51.32	51.29	51.49	51.59	24.60	-----
CO2	3.42	15.25	12.31	12.33	14.33	14.34	65.51	-----
N2	0.11	0.83	0.65	0.65	0.76	0.76	0.24	-----
CH4	0.01	0.37	0.29	0.28	0.33	0.34	0.34	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.78
CH3OH	0.03	0.41	0.36	0.28	8.05	8.09	4.25	97.45
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.41
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.15
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.12
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.07
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.84
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.16
TOTAL :	97.92	100.11	100.38	99.96	99.72	99.64	100.21	100.00
DENS,g/cc	0.005	0.050	0.032	0.032	0.037	0.037	0.005	0.794
AV.MOL.WT	13.24	23.37	20.77	20.82	24.14	24.21	37.27	32.12
Mm3/hr	869.4	2965.7	3839.7	3835.0	3303.1	3298.5	12.1	-----
ksmol/hr	38.79	132.31	171.30	171.09	147.36	147.09	0.54	11.34
1/hr,prod	-----	-----	-----	-----	-----	-----	-----	458.97

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION (%) :		40.6	39.3
CARBON MONOXIDE CONVERSION (%) :		13.6	13.5
CARBON DIOXIDE CONVERSION (%) :		-0.1	-0.1
RATIO H2 CONSUMED/CO CONSUMED :		2.06	1.99
 CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION (%) :		37.2	37.9
CARBON MONOXIDE CONVERSION (%) :		12.8	13.0
 CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION (%) :		37.1	37.5
CARBON MONOXIDE CONVERSION (%) :		12.8	12.8
RATIO H2 CONSUMED/CO CONSUMED :		2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL %
CO (+CO2) SELECTIVITY TO METHANOL (%) :	95.1	100.2
CO (+CO2) SELECTIVITY TO ETHANOL (%) :		0.3

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	kmol/hr-kg cat	kg/1000 Na3 fresh feed	kg/1000 Na3 reactor feed
As calculated ACROSS REACTOR	28.80	417.7	94.7
As Net MeOH produced, OVERALL balance	28.29	410.3	93.0

REACTOR FEED (H2/(CO+1.5CO2)) :	0.50
REACTOR FEED ((H2-CO2)/(CO+CO2)) :	0.36
APPROACH TO METHANOL EQUILIBRIUM (deg.C) :	19.98
APPROACH TO WATER-GAS EQUILIBRIUM (deg.C) :	13.29
METHANOL COLLECTED AS % OF CALCULATED :	97.8
CALCULATED METHANOL PRODUCTION RATE (Kmol/hr) :	11.33

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-14.70267	-3.13950	-2.48305
CO	-3.45593	0.79982	-2.07967
CO2	-11.53519	1.94027	-1.38158
N2	-302.62131	2.76776	-2.34335
CH4	n.a.	1.31900	-2.86827
H2O	-----	n.a.	n.a.
CH3OH	-----	14.49396	1.57237

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

	INPUTS		OUTPUTS				(IN-OUT)/IN
STREAM # STREAM NAME	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	87.7535	74.2601	3.0489	0.1480	-----	77.4570	11.7334
CO2	21.0889	20.1812	0.8286	0.3943	-----	21.4041	-1.4944
CH3OH	0.4723	0.5407	0.0222	0.0256	11.0845	11.6730	-2371.4536
OTHERS	0.4808	0.4829	0.0198	0.0028	0.1134	0.6190	-28.7526
TOTAL C	109.7955	95.4650	3.9195	0.5707	11.1979	111.1531	-1.2365
HYDROGEN:							
H2	120.2269	71.7753	2.9469	0.0628	-----	74.7850	37.7968
H2O	0.0000	0.0000	0.0000	0.0000	0.3144	0.3144	n.a.
OTHERS	3.8123	4.0947	0.1681	0.1127	44.6783	49.0538	-1186.7128
TOTAL H	124.0392	75.8700	3.1150	0.1755	44.9926	124.1532	-0.0919
OXYGEN:							
TOTAL O	130.4036	115.1632	4.7282	0.9626	11.3448	132.1989	-1.3767
NITROGEN:							
TOTAL N	2.2208	2.1963	0.0902	0.0028	-----	2.2894	-3.0877
TOTAL MASS FLOW (ks/hr)	3561.6384	3092.0764	126.9504	22.4333	364.4416	3605.9016	-1.2428

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS
	GC#1	GC#2
	-----	-----
MASS BALANCE (Z) :	-0.12	0.13
ELEMENTAL BALANCE (Z) :		
CARBON	0.64	0.41
HYDROGEN	3.29	1.34
OXYGEN	0.51	0.34
NITROGEN	0.08	-0.73
		-0.04
		-0.94
		-7.64
		-1.03
		-6.11

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

```

DATE :                                06-DEC-89
TIME :                                10:16:28
TIME INTERVAL :                       FROM: 0600 11-Oct
                                         TO:  0600 12-Oct

NUMBER OF AVERAGED HOURS :            24
RUN ID NUMBER :                      E7.39
FEED GAS TYPE:                       CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 159.1
OIL/SLURRY REACTOR INLET TEMP. (deg.C) : 21.1
AVG. REACTOR SLURRY TEMPERATURE (deg.C) : 249.9
REACTOR FREEBOARD TEMPERATURE (deg.C) : 246.8
OIL/SLURRY OUTLET TEMP. (deg.C) :     243.9
REACTOR FEED GAS PRESSURE (kPa) :     5515
REACTOR EFFLUENT GAS PRESSURE (kPa) :  5282
GAS SUPERFICIAL VELOCITY (cm/sec) :   15.4
LIQUID SUPERFICIAL VELOCITY (cm/sec) :  0.0
SLURRY CONCENTRATION (wt%) :          37.5
CATALYST OXIDE IN REACTOR (kg oxide) :  393
GAS HOLD-UP (Z) :                    33.9
SPACE VELOCITY (1/kg-hr) :            9739
RECYCLE/FRESH FEED RATIO :            3.443
OIL/SLURRY CIRCULATION RATE (m3/hr) :  0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 137.68
PURGE GAS FLOW RATE <50> (ksmol/hr) :  5.18
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) : 596
  
```

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEOH PRODUC
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
=====	=====	=====	=====	=====	=====	=====	=====	=====
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	57.42	27.72	35.06	35.75	25.20	25.06	5.05	-----
CO	36.31	55.88	51.24	51.16	51.30	51.29	24.13	-----
CO2	3.34	15.29	12.34	12.32	14.25	14.34	65.96	-----
N2	0.09	0.70	0.54	0.54	0.63	0.63	0.22	-----
CH4	0.01	0.34	0.27	0.26	0.31	0.31	0.29	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.75
CH3OH	0.01	0.40	0.35	0.27	8.18	8.18	4.47	97.49
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.42
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.15
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.12
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.08
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.85
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.12
TOTAL :	97.18	100.32	99.80	100.30	99.87	99.83	100.19	100.00
DENS,g/cc	0.005	0.049	0.032	0.032	0.036	0.037	0.005	0.794
AV.MOL.WT	13.20	23.24	20.84	20.68	24.02	24.08	37.40	32.13
Nm3/hr	862.7	2969.9	3818.6	3832.4	3303.8	3300.2	12.1	-----
ksmol/hr	38.49	132.50	170.36	170.98	147.39	147.17	0.54	11.38
l/hr,prod	-----	-----	-----	-----	-----	-----	-----	460.33

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
		----	----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(Z) :	38.2	39.2
CARBON MONOXIDE CONVERSION	(Z) :	13.5	13.6
CARBON DIOXIDE CONVERSION	(Z) :	-0.4	0.3
RATIO H2 CONSUMED/CO CONSUMED	:	1.94	2.02
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(Z) :	38.3	38.0
CARBON MONOXIDE CONVERSION	(Z) :	13.1	13.3
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(Z) :	37.9	37.0
CARBON MONOXIDE CONVERSION	(Z) :	12.9	12.9
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR	OVERALL
	GC Average	%
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (Z) :	97.6	101.3
CO (+CO2) SELECTIVITY TO ETHANOL (Z) :	-----	0.3

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEDH SOURCE	smol/hr-kg cat	kg/1000 Na3 fresh feed	kg/1000 Na3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	29.28	428.0	96.3
As Net MeOH produced, OVERALL balance	28.38	414.9	93.4

REACTOR FEED {H2/(CO+1.5CO2)} :	0.51
REACTOR FEED {(H2-CO2)/(CO+CO2)} :	0.37
APPROACH TO METHANOL EQUILIBRIUM (deg.C) :	20.27
APPROACH TO WATER-GAS EQUILIBRIUM (deg.C) :	10.43
METHANOL COLLECTED AS % OF CALCULATED :	96.5
CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) :	11.52

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-16.14626	-3.90138	-2.81632
CO	-2.41215	0.61513	-1.94144
CO2	-10.29192	2.22514	-2.13300
N2	-218.17834	3.14839	-3.17307
CH4	n.a.	2.56976	-3.13756
H2O	-----	n.a.	n.a.
CH3OH	-----	14.20902	2.93516

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	87.4678	74.0337	2.8964	0.1454	-----	77.0755	11.8813
CO2	21.0642	20.2574	0.7925	0.3973	-----	21.4473	-1.8184
CH3OH	0.4633	0.5365	0.0210	0.0269	11.1202	11.7046	-2426.5520
OTHERS	0.4428	0.4518	0.0177	0.0025	0.1138	0.5859	-32.2892
TOTAL C	109.4381	95.2795	3.7276	0.5722	11.2340	110.8132	-1.2565
HYDROGEN:							
H2	122.2340	73.4508	2.8736	0.0609	-----	76.3652	37.5090
H2O	0.0000	0.0000	0.0000	0.0000	0.3052	0.3052	n.a.
OTHERS	3.6244	3.9534	0.1547	0.1170	44.8220	49.0471	-1253.2604
TOTAL H	125.8583	77.4041	3.0283	0.1778	45.1272	125.7374	0.0961
OXYGEN:							
TOTAL O	130.0595	115.0850	4.5024	0.9673	11.3782	131.9330	-1.4405
NITROGEN:							
TOTAL N	1.8534	1.8444	0.0722	0.0026	-----	1.9191	-3.5486
TOTAL MASS FLOW (ks/hr)	3536.6335	3078.5559	120.4416	22.5285	365.5235	3587.0496	-1.4255

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]		FRESH FEED GAS
	GC#1	GC#2	[15-(50+62+68)]
MASS BALANCE (%) :	0.13	-0.13	-0.07
ELEMENTAL BALANCE (%) :			
CARBON	0.22	0.29	-1.74
HYDROGEN	-0.14	1.19	-9.30
OXYGEN	0.11	0.30	-1.79
NITROGEN	-0.86	-0.36	-7.97

LAPORTE LPMEI/NAMOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

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DATE :                                06-DEC-99
TIME :                                10:17:56
TIME INTERVAL :                       FROM: 0600 12-Oct
                                         TO: 0600 13-Oct

NUMBER OF AVERAGED HOURS :            24
RUN ID NUMBER :                       E7.40
FEED GAS TYPE:                       CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 156.3
OIL/SLURRY REACTOR INLET TEMP. (deg.C) : 20.9
AVG. REACTOR SLURRY TEMPERATURE (deg.C) : 249.8
REACTOR FREEBOARD TEMPERATURE (deg.C) : 247.0
OIL/SLURRY OUTLET TEMP. (deg.C) :     243.6
REACTOR FEED GAS PRESSURE (kPa) :     5518
REACTOR EFFLUENT GAS PRESSURE (kPa) :  5279
GAS SUPERFICIAL VELOCITY (cm/sec) :   15.5
LIQUID SUPERFICIAL VELOCITY (cm/sec) :  0.0
SLURRY CONCENTRATION (wt%) :          37.4
CATALYST OXIDE IN REACTOR (kg oxide) : 393
GAS HOLD-UP (%) :                     33.7
SPACE VELOCITY (1/kg-hr) :            9779
RECYCLE/FRESH FEED RATIO :            3.419
OIL/SLURRY CIRCULATION RATE (m3/hr) :  0.0
PROD. SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 138.03
PURGE GAS FLOW RATE <50> (ksmol/hr) :  5.20
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) : 594
  
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STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEOH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	57.70	27.69	35.37	35.81	25.26	24.90	5.03	-----
CO	36.25	55.85	50.96	50.94	51.11	51.11	24.16	-----
CO2	3.37	15.35	12.40	12.41	14.44	14.44	55.88	-----
N2	0.09	0.69	0.54	0.55	0.66	0.63	0.22	-----
CH4	0.00	0.36	0.29	0.28	0.34	0.34	0.29	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.74
CH3OH	0.00	0.41	0.37	0.27	8.17	8.16	4.54	97.51
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.41
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.15
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.12
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.07
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.86
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.12
TOTAL :	97.41	100.35	99.93	100.26	99.97	99.59	100.19	100.00
DENS,g/cc	0.005	0.050	0.032	0.032	0.036	0.037	0.005	0.795
AV.MOL.WT	13.17	23.25	20.77	20.68	24.04	24.12	37.40	32.13
Mm3/hr	870.9	2977.4	3839.6	3948.3	3310.8	3305.5	12.2	-----
ksmol/hr	38.85	132.83	171.30	171.68	147.71	147.40	0.55	11.46
l/hr,prod	-----	-----	-----	-----	-----	-----	-----	463.06

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

=====

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
		-----	-----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	39.4	39.3
CARBON MONOXIDE CONVERSION	(%) :	13.6	13.7
CARBON DIOXIDE CONVERSION	(%) :	-0.2	-0.1
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.02
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	37.7	37.7
CARBON MONOXIDE CONVERSION	(%) :	13.1	13.3
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	37.6	37.1
CARBON MONOXIDE CONVERSION	(%) :	13.0	13.0
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL %
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (%) :	96.6	101.0
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.3

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEDH SOURCE	smol/hr-ks cat	ks/1000 Ma3 fresh feed	ks/1000 Ma3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	29.23	423.2	95.8
As Net MeOH produced, OVERALL balance	28.60	414.0	93.7

REACTOR FEED (H2/(CO+1.5CO2)) : 0.51

REACTOR FEED ((H2-CO2)/(CO+CO2)) : 0.37

APPROACH TO METHANOL EQUILIBRIUM (deg.C) : 20.26

APPROACH TO WATER-GAS EQUILIBRIUM (deg.C) : 8.56

METHANOL COLLECTED AS % OF CALCULATED : 97.4

CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) : 11.50

LAPORTE LPHETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-15.60237	-3.84763	-2.53276
CO	-2.90441	0.91678	-2.30259
CO2	-10.68433	1.79563	-1.23739
N2	-267.08389	1.53354	1.14485
CH4	n.a.	-1.75722	1.25613
H2O	-----	n.a.	n.a.
CH3OH	-----	14.16898	2.22015

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	87.4557	74.1817	2.9035	0.1471	-----	77.2323	11.6898
CO2	21.3111	20.3934	0.7982	0.4010	-----	21.5927	-1.3211
CH3OH	0.4674	0.5445	0.0213	0.0276	11.2033	11.7968	-2424.0615
OTHERS	0.4859	0.4755	0.0186	0.0025	0.1146	0.6113	-25.8132
TOTAL C	109.7201	95.5952	3.7416	0.5783	11.3179	111.2330	-1.3789
HYDROGEN:							
H2	122.9496	73.5614	2.8792	0.0613	-----	76.5019	37.7778
H2O	0.0000	0.0000	0.0000	0.0000	0.3025	0.3025	n.a.
OTHERS	3.8130	4.0802	0.1597	0.1200	45.1570	49.5169	-1198.6490
TOTAL H	126.7626	77.6416	3.0389	0.1813	45.4594	126.3213	0.3482
OXYGEN:							
TOTAL O	130.5453	115.5131	4.5212	0.9772	11.4599	132.4715	-1.4754
NITROGEN:							
TOTAL N	1.8817	1.8410	0.0721	0.0026	-----	1.9157	-1.8102
TOTAL MASS FLOW (ks/hr)	3550.0779	3088.5693	120.8883	22.7630	368.1505	3600.3713	-1.4167

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]		FRESH FEED GAS
	GC#1	GC#2	[15-(50+62+68)]
MASS BALANCE (Z) :	0.03	-0.03	-0.06
ELEMENTAL BALANCE (Z) :			
CARBON	0.42	0.30	-1.59
HYDROGEN	1.63	1.49	-8.56
OXYGEN	0.31	0.25	-1.56
NITROGEN	-0.28	-2.99	-6.80

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

```

DATE :                                06-DEC-89
TIME :                                10:19:30
TIME INTERVAL :                        FROM: 0600 13-Oct
                                         TO:  0600 14-Oct

NUMBER OF AVERAGED HOURS :             23
RUN ID NUMBER :                        E7.41
FEED GAS TYPE:                        CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 151.6
OIL/SLURRY REACTOR INLET TEMP. (deg.C) : 19.9
AVG. REACTOR SLURRY TEMPERATURE (deg.C) : 249.5
REACTOR FREEBOARD TEMPERATURE (deg.C) : 246.8
OIL/SLURRY OUTLET TEMP. (deg.C) :      243.7
REACTOR FEED GAS PRESSURE (kPa) :      5518
REACTOR EFFLUENT GAS PRESSURE (kPa) :   5283
GAS SUPERFICIAL VELOCITY (cm/sec) :    15.4
LIQUID SUPERFICIAL VELOCITY (cm/sec) :   0.0
SLURRY CONCENTRATION (wt%) :            37.5
CATALYST OXIDE IN REACTOR (kg oxide) :   393
GAS HOLD-UP (%) :                      33.9
SPACE VELOCITY (1/kg-hr) :             9762
RECYCLE/FRESH FEED RATIO :             3.366
OIL/SLURRY CIRCULATION RATE (m3/hr) :   0.0
PROD. SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 137.50
PURGE GAS FLOW RATE <50> (ksmol/hr) :   5.37
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) : 592
  
```

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	NEOH PRODUC
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	57.75	27.59	35.51	34.80	25.16	24.98	5.03	-----
CO	36.41	56.07	51.19	51.47	51.37	51.38	24.16	-----
CO2	3.41	15.18	12.26	12.54	14.29	14.27	55.88	-----
N2	0.09	0.67	0.52	0.57	0.61	0.61	0.22	-----
CH4	0.01	0.39	0.31	0.33	0.36	0.36	0.29	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.74
CH3OH	0.03	0.53	0.39	0.76	8.11	8.08	4.54	97.52
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.40
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.14
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.12
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.07
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.87
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.12
TOTAL :	97.71	100.43	100.17	100.48	99.90	99.70	100.19	100.00
DENS, g/cc	0.006	0.050	0.032	0.033	0.036	0.037	0.005	0.796
AV. MOL. WT	13.21	23.25	20.73	20.97	24.03	24.08	37.40	32.12
M3/hr	879.8	2961.6	3852.8	3841.6	3336.1	3333.3	12.3	-----
ksmol/hr	39.25	132.13	171.89	171.38	148.83	148.64	0.55	11.54
l/hr,prod	-----	-----	-----	-----	-----	-----	-----	465.78

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		GC#1 ----	GC#2 ----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	39.1	37.2
CARBON MONOXIDE CONVERSION	(%) :	13.2	13.3
CARBON DIOXIDE CONVERSION	(%) :	-0.7	1.1
RATIO H2 CONSUMED/CO CONSUMED	:	2.06	1.89
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	37.2	36.1
CARBON MONOXIDE CONVERSION	(%) :	12.9	12.2
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	37.6	38.5
CARBON MONOXIDE CONVERSION	(%) :	13.0	13.0
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC Average -----	OVERALL *
CO (+CO2) SELECTIVITY TO METHANOL (%) :	94.5	100.8
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.3

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

METH SOURCE	kmol/hr-kg cat -----	kg/1000 Nm3 fresh feed -----	kg/1000 Nm3 reactor feed -----
As calculated ACROSS REACTOR	28.10	402.7	92.2
As Net MeOH produced, OVERALL balance	28.82	413.1	94.6

REACTOR FEED (H2/(CO+1.5CO2)) :	0.50
REACTOR FEED {(H2-CO2)/(CO+CO2)} :	0.35
APPROACH TO METHANOL EQUILIBRIUM (des.C) :	20.75
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) :	10.14
METHANOL COLLECTED AS % OF CALCULATED :	102.1
CALCULATED METHANOL PRODUCTION RATE (Kmol/hr) :	11.06

LAPORTE LPNETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 13] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-14.39105	-0.88862	-1.37777
CO	-4.00992	0.18485	-1.02422
CO2	-12.01679	-0.45281	-0.03877
N2	-234.84532	-6.63479	-2.07104
CH4	n.a.	-9.61729	-0.99531
H2O	-----	n.a.	n.a.
CH3OH	-----	-81.63486	0.20779

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

	INPUTS		OUTPUTS				(IN-OUT)/IN
STREAM # STREAM NAME	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	88.2099	74.0821	3.0122	0.1476	-----	77.2419	12.4339
CO2	21.4899	20.0542	0.8154	0.4025	-----	21.2721	1.0134
CH3OH	1.3049	0.7055	0.0287	0.0278	11.2848	12.0467	-823.1962
OTHERS	0.5690	0.5219	0.0212	0.0025	0.1154	0.6611	-16.1861
TOTAL C	111.5736	95.3637	3.8775	0.5804	11.4002	111.2218	0.3153
HYDROGEN:							
H2	119.2904	72.9022	2.9642	0.0615	-----	75.9280	36.3503
H2O	0.0000	0.0000	0.0000	0.0000	0.3050	0.3050	n.a.
OTHERS	7.4935	4.9015	0.1993	0.1204	45.4853	50.7065	-576.4904
TOTAL H	126.7839	77.8037	3.1635	0.1819	45.7903	126.9395	-0.1211
OXYGEN:							
TOTAL O	132.4946	114.8999	4.6719	0.9808	11.5426	132.0952	0.3014
NITROGEN:							
TOTAL N	1.9709	1.7784	0.0723	0.0026	-----	1.8534	5.9640
TOTAL MASS FLOW (ks/hr)	3593.9319	3072.4741	124.9279	22.8478	370.7830	3591.0330	0.0807

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]		FRESH FEED GAS
	GC#1	GC#2	[15-(50+62+68)]
MASS BALANCE (%) :	-0.48	0.47	-0.04
ELEMENTAL BALANCE (%) :			
CARBON	0.07	1.12	-1.34
HYDROGEN	1.81	1.17	-8.20
OXYGEN	-0.08	1.08	-1.26
NITROGEN	-0.82	7.87	-7.28

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

```

DATE :                                06-DEC-89
TIME :                                10:20:57
TIME INTERVAL :                       FROM: 0600 14-Oct
                                         TO:  0600 15-Oct

NUMBER OF AVERAGED HOURS :            24
RUN ID NUMBER :                       E7.42
FEED GAS TYPE:                        CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) : 153.1
OIL/SLURRY REACTOR INLET TEMP. (des.C) : 20.7
AVG. REACTOR SLURRY TEMPERATURE (des.C) : 249.8
REACTOR FREEBOARD TEMPERATURE (des.C) : 247.2
OIL/SLURRY OUTLET TEMP. (des.C) :     244.1
REACTOR FEED GAS PRESSURE (kPa) :      5517
REACTOR EFFLUENT GAS PRESSURE (kPa) :   5281
GAS SUPERFICIAL VELOCITY (cm/sec) :    15.4
LIQUID SUPERFICIAL VELOCITY (cm/sec) :   0.0
SLURRY CONCENTRATION (wt%) :           37.4
CATALYST OXIDE IN REACTOR (kg oxide) :   393
GAS HOLD-UP (Z) :                     33.7
SPACE VELOCITY (1/kg-hr) :             9744
RECYCLE/FRESH FEED RATIO :             3.442
OIL/SLURRY CIRCULATION RATE (m3/hr) :   0.0
PROD. SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 138.19
PURGE GAS FLOW RATE <50> (ksmol/hr) :    5.64
HEAT TRANSFER COEFFICIENT (Watt/m2-des.C) : 591
  
```

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEOH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
=====	=====	=====	=====	=====	=====	=====	=====	=====
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	57.23	27.21	34.75	35.20	24.90	24.69	5.03	-----
CO	36.72	56.44	51.49	51.56	51.76	51.73	24.16	-----
CO2	3.46	15.17	12.27	12.27	14.26	14.24	65.88	-----
N2	0.09	0.65	0.50	0.51	0.59	0.59	0.22	-----
CH4	0.03	0.38	0.30	0.30	0.35	0.35	0.29	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.74
CH3OH	0.03	0.44	0.36	0.30	8.03	8.07	4.54	97.52
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.40
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.15
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.12
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.07
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.87
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.11
TOTAL :	97.56	100.29	99.68	100.14	99.89	99.68	100.19	100.00
DENS,g/cc	0.005	0.049	0.032	0.032	0.037	0.037	0.005	0.793
AV.MOL.WT	13.33	23.34	20.89	20.80	24.09	24.14	37.40	32.12
m3/hr	863.2	2971.3	3825.7	3834.6	3312.3	3308.9	11.8	-----
ksmol/hr	38.51	132.56	170.68	171.07	147.77	147.55	0.53	11.21
1/hr:prod	-----	-----	-----	-----	-----	-----	-----	453.97

LAPORTE LPHETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
		----	----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	38.6	38.9
CARBON MONOXIDE CONVERSION	(%) :	13.1	13.3
CARBON DIOXIDE CONVERSION	(%) :	-0.4	-0.4
RATIO H2 CONSUMED/CO CONSUMED	:	1.98	2.00
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	38.1	37.7
CARBON MONOXIDE CONVERSION	(%) :	12.9	12.9
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	37.6	37.0
CARBON MONOXIDE CONVERSION	(%) :	12.7	12.5
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR	OVERALL
	GC Average	*
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (%) :	98.0	100.9
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.3

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEDH SOURCE	kmol/hr-kg cat	kg/1000 Nm3 fresh feed	kg/1000 Nm3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	28.77	420.2	94.6
As Net MeOH produced, OVERALL balance	27.98	408.7	92.0

REACTOR FEED (H2/(CO+1.5CO2)) :	0.50
REACTOR FEED ((H2-CO2)/(CO+CO2)) :	0.36
APPROACH TO METHANOL EQUILIBRIUM (des.C) :	20.40
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) :	9.27
METHANOL COLLECTED AS % OF CALCULATED :	96.8
CALCULATED METHANOL PRODUCTION RATE (Kmol/hr) :	11.32

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-12.41839	-3.60882	-2.27197
CO	-2.80403	0.83316	-2.16847
CO2	-10.59904	2.07974	-1.33184
N2	-258.89188	2.34867	-2.17810
CH4	n.a.	0.69075	-2.15126
H2O	-----	n.a.	n.a.
CH3OH	-----	13.50218	2.21104

OVERALL ELEMENTAL BALANCE (Kg-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	88.2142	74.8154	3.1809	0.1421	-----	78.1385	11.4219
CO2	20.9942	20.1076	0.8549	0.3876	-----	21.3501	-1.6954
CH3OH	0.5180	0.5881	0.0250	0.0267	10.9572	11.5970	-2138.8345
OTHERS	0.5098	0.5037	0.0214	0.0025	0.1121	0.6397	-25.4728
TOTAL C	110.2361	96.0149	4.0822	0.5589	11.0693	111.7253	-1.3509
HYDROGEN:							
H2	120.4222	72.1484	3.0675	0.0592	-----	75.2751	37.4907
H2O	0.0000	0.0000	0.0000	0.0000	0.2942	0.2942	n.a.
OTHERS	4.1112	4.3672	0.1857	0.1159	44.1652	48.8340	-1087.8337
TOTAL H	124.5334	76.5155	3.2532	0.1752	44.4594	124.4032	0.1045
OXYGEN:							
TOTAL O	130.7205	115.6188	4.9157	0.9444	11.2072	132.6861	-1.5036
NITROGEN:							
TOTAL N	1.7450	1.7153	0.0729	0.0025	-----	1.7908	-2.6253
TOTAL MASS FLOW (kg/hr)	3559.0183	3094.0237	131.5465	21.9997	360.0204	3607.5903	-1.3648

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]		FRESH FEED GAS
	GC#1	GC#2	[15-(50+62+68)]
MASS BALANCE (%) :	0.04	-0.04	-0.07
ELEMENTAL BALANCE (%) :			
CARBON	0.13	0.28	-1.40
HYDROGEN	0.41	1.15	-8.44
OXYGEN	0.05	0.19	-1.50
NITROGEN	-1.25	-0.44	-5.36

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

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=====
DATE :                                06-DEC-89
TIME :                                10:22:31
TIME INTERVAL :                       FROM: 0600 15-Oct
                                         TO:  0600 16-Oct

NUMBER OF AVERAGED HOURS :            24
RUN ID NUMBER :                      E7.43
FEED GAS TYPE:                       CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) : 156.3
OIL/SLURRY REACTOR INLET TEMP. (des.C) : 22.8
AVG. REACTOR SLURRY TEMPERATURE (des.C) : 250.2
REACTOR FREEBOARD TEMPERATURE (des.C) : 247.6
OIL/SLURRY OUTLET TEMP. (des.C) :     244.5
REACTOR FEED GAS PRESSURE (kPa) :      5518
REACTOR EFFLUENT GAS PRESSURE (kPa) :   5283
GAS SUPERFICIAL VELOCITY (cm/sec) :    15.5
LIQUID SUPERFICIAL VELOCITY (cm/sec) :   0.0
SLURRY CONCENTRATION (wt%) :            37.4
CATALYST OXIDE IN REACTOR (kg oxide) :   393
GAS HOLD-UP (%) :                      33.7
SPACE VELOCITY (1/kg-hr) :              9766
RECYCLE/FRESH FEED RATIO :              3.407
OIL/SLURRY CIRCULATION RATE (m3/hr) :    0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 138.59
PURGE GAS FLOW RATE <50> (ksmol/hr) :    6.04
HEAT TRANSFER COEFFICIENT (Watt/m2-des.C) : 592
  
```

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEOH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	57.23	27.22	34.92	35.24	24.94	24.78	5.03	-----
CO	36.92	56.37	51.43	51.51	51.70	51.68	24.16	-----
CO2	3.54	15.19	12.27	12.25	14.25	14.25	65.88	-----
N2	0.11	0.71	0.55	0.56	0.65	0.65	0.22	-----
CH4	0.03	0.35	0.28	0.27	0.32	0.34	0.29	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.74
CH3OH	0.01	0.47	0.42	0.34	8.04	8.05	4.54	97.46
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.43
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.16
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.13
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.08
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.85
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.15
TOTAL :	97.84	100.30	99.87	100.18	99.89	99.76	100.19	100.00
DENS,g/cc	0.005	0.049	0.032	0.032	0.037	0.037	0.004	0.791
AV.MOL.WT	13.38	23.35	20.86	20.80	24.09	24.12	37.40	32.14
M3/hr	871.9	2971.0	3836.8	3842.9	3317.9	3315.3	11.3	-----
ksmol/hr	38.90	132.54	171.17	171.45	148.02	147.84	0.50	11.16
l/hr,prod	-----	-----	-----	-----	-----	-----	-----	453.52

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		GC#1 ----	GC#2 ----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	38.7	38.9
CARBON MONOXIDE CONVERSION	(%) :	13.2	13.3
CARBON DIOXIDE CONVERSION	(%) :	-0.3	-0.4
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	1.99
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	37.4	37.4
CARBON MONOXIDE CONVERSION	(%) :	12.7	12.8
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	37.1	36.7
CARBON MONOXIDE CONVERSION	(%) :	12.6	12.5
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC Average -----	OVERALL *
CO (+CO2) SELECTIVITY TO METHANOL (%) :	96.9	100.5
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.3

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	smol/hr-kg cat -----	kg/1000 Nm3 fresh feed -----	kg/1000 Nm3 reactor feed -----
As calculated ACROSS REACTOR	28.59	413.5	93.8
As Net MeOH produced, OVERALL balance	27.87	403.0	91.4

REACTOR FEED (H2/(CO+1.5CO2)) : 0.50
REACTOR FEED ((H2-CO2)/(CO+CO2)) : 0.36

APPROACH TO METHANOL EQUILIBRIUM (deg.C) : 20.02
APPROACH TO WATER-GAS EQUILIBRIUM (deg.C) : 8.44

METHANOL COLLECTED AS % OF CALCULATED : 97.0

CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) : 11.25

LAPORTE LPHETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<Z diff.>	<Z diff.>	<Z diff.>
H2	-17.44117	-3.57288	-2.24368
CO	-2.86156	0.86059	-2.26792
CO2	-11.17985	2.34541	-1.55690
N2	-363.09021	1.89814	-2.26516
CH4	n.a.	1.06013	-2.10746
H2O	---	n.a.	n.a.
CH3OH	---	6.70555	2.57779

OVERALL ELEMENTAL BALANCE (Kg-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	Z
CARBON:							
CO	88.3114	74.7147	3.4071	0.1360	-----	78.2577	11.3844
CO2	20.9986	20.1267	0.9178	0.3708	-----	21.4153	-1.9845
CH3OH	0.5865	0.6259	0.0285	0.0256	10.9113	11.5913	-1876.5225
OTHERS	0.4698	0.4639	0.0212	0.0023	0.1116	0.5990	-27.5181
TOTAL C	110.3663	95.9312	4.3745	0.5348	11.0230	111.8634	-1.3566
HYDROGEN:							
H2	120.8415	72.1486	3.2900	0.0567	-----	75.4954	37.5253
H2O	0.0000	0.0000	0.0000	0.0000	0.2931	0.2931	n.a.
OTHERS	4.2248	4.3591	0.1988	0.1109	43.9802	48.6491	-1051.5004
TOTAL H	125.0663	76.5078	3.4888	0.1676	44.2734	124.4376	0.5027
OXYGEN:							
TOTAL O	130.8951	115.5940	5.2712	0.9036	11.1625	132.9313	-1.5556
NITROGEN:							
TOTAL N	1.9236	1.8768	0.0856	0.0024	-----	1.9648	-2.1425
TOTAL MASS FLOW (kg/hr)	3565.2034	3094.6218	141.1173	21.0498	358.7531	3615.5422	-1.4119

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]		FRESH FEED GAS
	GC#1	GC#2	[15-(50+62+68)]
MASS BALANCE (Z) :	0.09	0.00	-0.08
ELEMENTAL BALANCE (Z) :			
CARBON	0.28	0.35	-1.14
HYDROGEN	1.12	1.38	-7.52
OXYGEN	0.18	0.23	-1.28
NITROGEN	-1.93	0.12	-4.75

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

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DATE :                                06-DEC-89
TIME :                                10:24:02
TIME INTERVAL :                       FROM: 0600 16-Oct
                                         TO: 0600 17-Oct

NUMBER OF AVERAGED HOURS :            24
RUN ID NUMBER :                       E7.44
FEED GAS TYPE:                        CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 157.7
OIL/SLURRY REACTOR INLET TEMP. (deg.C) : 24.3
AVG. REACTOR SLURRY TEMPERATURE (deg.C) : 249.9
REACTOR FREEBOARD TEMPERATURE (deg.C) : 247.1
OIL/SLURRY OUTLET TEMP. (deg.C) :     244.3
REACTOR FEED GAS PRESSURE (kPa) :     5515
REACTOR EFFLUENT GAS PRESSURE (kPa) :   5282
GAS SUPERFICIAL VELOCITY (cm/sec) :    15.4
LIQUID SUPERFICIAL VELOCITY (cm/sec) :   0.0
SLURRY CONCENTRATION (wt%) :           37.4
CATALYST OXIDE IN REACTOR (kg oxide) :   393
GAS HOLD-UP (Z) :                     33.6
SPACE VELOCITY (1/kg-hr) :             9734
RECYCLE/FRESH FEED RATIO :             3.385
OIL/SLURRY CIRCULATION RATE (m3/hr) :   0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 138.18
PURGE GAS FLOW RATE <50> (ksmol/hr) :   6.26
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) : 592
  
```

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEOH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
=====	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	56.72	27.28	34.87	35.30	25.02	25.01	5.03	-----
CO	37.00	56.29	51.39	51.42	51.64	51.64	24.16	-----
CO2	3.63	15.33	12.41	12.40	14.39	14.38	65.88	-----
N2	0.09	0.58	0.45	0.46	0.53	0.53	0.22	-----
CH4	0.00	0.31	0.25	0.24	0.29	0.29	0.29	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.74
CH3OH	0.00	0.53	0.44	0.37	8.06	8.08	4.54	97.43
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.44
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.16
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.13
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.08
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.84
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.17
TOTAL :	97.44	100.32	99.81	100.19	99.93	99.93	100.19	100.00
DENS,g/cc	0.005	0.049	0.032	0.032	0.037	0.037	0.004	0.790
AV.MOL.WT	13.48	23.36	20.90	20.91	24.10	24.10	37.40	32.15
Mm3/hr	873.6	2957.1	3821.4	3830.7	3311.1	3310.8	11.6	-----
ksmol/hr	38.98	131.93	170.48	170.90	147.72	147.64	0.52	11.12
1/hr,prod	-----	-----	-----	-----	-----	-----	-----	452.61

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

0600 15-Oct 88 - 0600 17-Oct 89

CONVERSIONS ACROSS REACTOR :

	GC#1	GC#2
CALCULATED BY GAS COMPOSITION		
HYDROGEN CONVERSION (Z) :	37.9	38.7
CARBON MONOXIDE CONVERSION (Z) :	12.9	13.2
CARBON DIOXIDE CONVERSION (Z) :	-0.4	-0.3
RATIO H2 CONSUMED/CO CONSUMED :	1.98	2.02
CALCULATED BY METHANOL IN EXIT GAS		
HYDROGEN CONVERSION (Z) :	37.6	37.4
CARBON MONOXIDE CONVERSION (Z) :	12.8	12.8
CALCULATED BY OVERALL BALANCE		
HYDROGEN CONVERSION (Z) :	37.2	36.7
CARBON MONOXIDE CONVERSION (Z) :	12.6	12.6
RATIO H2 CONSUMED/CO CONSUMED :	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL *
CO (+CO2) SELECTIVITY TO METHANOL (Z) :	98.6	100.9
CO (+CO2) SELECTIVITY TO ETHANOL (Z) :		0.3

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEDH SOURCE	saol/hr-ks cat	ks/1000 Ma3 fresh feed	ks/1000 Ma3 reactor feed
As calculated ACROSS REACTOR	28.53	411.8	93.9
As Net MeOH produced, OVERALL balance	27.78	401.0	91.4

REACTOR FEED (H2/(CO+1.5CO2)) : 0.50
 REACTOR FEED ((H2-CO2)/(CO+CO2)) : 0.36

APPROACH TO METHANOL EQUILIBRIUM (des.C) : 20.38
 APPROACH TO WATER-GAS EQUILIBRIUM (des.C) : 7.85

METHANOL COLLECTED AS % OF CALCULATED : 96.8

CALCULATED METHANOL PRODUCTION RATE (Ksaol/hr) : 11.23

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<Z diff.>	<Z diff.>	<Z diff.>
H2	-18.43854	-3.83100	-2.09800
CO	-2.87159	0.91461	-2.15359
CO2	-11.08857	2.10986	-1.48995
N2	-320.08292	1.77086	-2.17727
CH4	n.a.	-0.51469	-1.75979
H2O	-----	n.a.	n.a.
CH3OH	-----	8.40290	2.39382

OVERALL ELEMENTAL BALANCE (Kgs-atoms/hr) :

	INPUTS		OUTPUTS				(IN-OUT)/IN
STREAM # STREAM NAME	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	Z
CARBON:							
CO	87.8763	74.2662	3.5220	0.1397	-----	77.9279	11.3209
CO2	21.1847	20.2268	0.9592	0.3810	-----	21.5671	-1.8051
CH3OH	0.6363	0.6947	0.0329	0.0263	10.8723	11.6262	-1727.2092
OTHERS	0.4136	0.4103	0.0195	0.0024	0.1112	0.5434	-31.3893
TOTAL C	110.1108	95.5980	4.5336	0.5494	10.9836	111.6646	-1.4111
HYDROGEN:							
H2	120.6513	71.9839	3.4137	0.0582	-----	75.4559	37.4596
H2O	0.0000	0.0000	0.0000	0.0000	0.2922	0.2922	n.a.
OTHERS	4.1994	4.4198	0.2096	0.1140	43.8230	48.5663	-1056.4991
TOTAL H	124.8507	76.4037	3.6233	0.1722	44.1152	124.3144	0.4296
OXYGEN:							
TOTAL O	130.8819	115.4146	5.4734	0.9284	11.1237	132.9400	-1.5725
NITROGEN:							
TOTAL N	1.5654	1.5251	0.0723	0.0025	-----	1.5999	-2.2005
TOTAL MASS FLOW (kgs/hr)	3556.0686	3081.9158	146.1550	21.6265	357.5818	3607.2793	-1.4401

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS
	GC#1	[15-(50+62+68)]
MASS BALANCE (Z) :	0.10	-0.09
ELEMENTAL BALANCE (Z) :		
CARBON	0.06	0.22
HYDROGEN	0.19	1.29
OXYGEN	-0.02	0.14
NITROGEN	-1.02	-0.02

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

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=====
DATE :                                06-DEC-89
TIME :                                10:25:27
TIME INTERVAL :                       FROM: 0600 17-Oct
                                         TO: 0600 18-Oct

NUMBER OF AVERAGED HOURS :            24
RUN ID NUMBER :                       E7.45
FEED GAS TYPE:                        CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) : 158.2
OIL/SLURRY REACTOR INLET TEMP. (des.C) : 25.1
AVG. REACTOR SLURRY TEMPERATURE (des.C) : 250.0
REACTOR FREEBOARD TEMPERATURE (des.C) : 247.1
OIL/SLURRY OUTLET TEMP. (des.C) :     244.4
REACTOR FEED GAS PRESSURE (kPa) :     5514
REACTOR EFFLUENT GAS PRESSURE (kPa) :  5283
GAS SUPERFICIAL VELOCITY (cm/sec) :   15.4
LIQUID SUPERFICIAL VELOCITY (cm/sec) :  0.0
SLURRY CONCENTRATION (wt%) :          37.3
CATALYST OXIDE IN REACTOR (kg oxide) : 393
GAS HOLD-UP (%) :                     33.3
SPACE VELOCITY (1/kg-hr) :            9729
RECYCLE/FRESH FEED RATIO :            3.333
OIL/SLURRY CIRCULATION RATE (m3/hr) :  0.0
PROD. SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 137.94
PURGE GAS FLOW RATE <50> (ksmol/hr) :  6.57
HEAT TRANSFER COEFFICIENT (Watt/m2-des.C) : 591
  
```

STREAM #	1	55	15	15	32	32	62	69
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDM PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT	=====	=====	=====	=====	=====	=====	=====	=====
	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<WTZ>
H2	56.93	27.27	34.98	35.26	24.98	24.83	5.03	-----
CO	37.24	56.31	51.49	51.44	51.66	51.64	24.16	-----
CO2	3.74	15.28	12.40	12.38	14.39	14.35	65.89	-----
N2	0.10	0.62	0.49	0.49	0.57	0.57	0.22	-----
CH4	0.01	0.29	0.24	0.23	0.27	0.27	0.29	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.75
CH3OH	0.00	0.53	0.44	0.35	8.03	8.05	4.54	97.46
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.44
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.16
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.13
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.08
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.82
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.16
TOTAL :	98.02	100.32	100.03	100.15	99.89	99.74	100.19	100.00
DENS, g/cc	0.005	0.049	0.032	0.032	0.037	0.037	0.004	0.790
AV. MOL. WT	13.53	23.36	20.89	20.81	24.11	24.14	37.40	32.14
m3/hr	883.4	2744.6	3821.4	3828.4	3307.4	3305.5	11.7	-----
ksmol/hr	39.41	131.38	170.49	170.89	147.35	147.40	0.52	11.14
1/hr, prod	-----	-----	-----	-----	-----	-----	-----	453.29

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

	GC#1	GC#2
	----	----
CALCULATED BY GAS COMPOSITION		
HYDROGEN CONVERSION (Z) :	39.6	38.8
CARBON MONOXIDE CONVERSION (Z) :	13.2	13.2
CARBON DIOXIDE CONVERSION (Z) :	-0.1	-0.5
RATIO H2 CONSUMED/CO CONSUMED :	1.98	2.01
CALCULATED BY METHANOL IN EXIT GAS		
HYDROGEN CONVERSION (Z) :	37.3	37.3
CARBON MONOXIDE CONVERSION (Z) :	12.7	12.9
CALCULATED BY OVERALL BALANCE		
HYDROGEN CONVERSION (Z) :	37.2	36.8
CARBON MONOXIDE CONVERSION (Z) :	12.6	12.6
RATIO H2 CONSUMED/CO CONSUMED :	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL *
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (Z) :	96.7	100.3
CO (+CO2) SELECTIVITY TO ETHANOL (Z) :	-----	0.3

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	saol/hr-ks cat	ks/1000 Nm3 fresh feed	ks/1000 Nm3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	28.43	405.8	93.6
As Net MeOH produced, OVERALL balance	27.84	397.3	91.7

REACTOR FEED (H2/(CO+1.5CO2)) :	0.50
REACTOR FEED ((H2-CO2)/(CO+CO2)) :	0.36
APPROACH TO METHANOL EQUILIBRIUM (des.C) :	20.36
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) :	8.91
METHANOL COLLECTED AS Z OF CALCULATED :	97.4
CALCULATED METHANOL PRODUCTION RATE (Ksaol/hr) :	11.19

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-20.09142	-3.36273	-2.16117
CO	-3.42343	0.89493	-2.08981
CO2	-11.81606	1.92949	-1.08600
N2	-431.55222	2.37726	-3.03727
CH4	n.a.	-1.36561	-2.31697
H2O	-----	n.a.	n.a.
CH3OH	-----	14.18151	1.66353

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	87.8665	73.9827	3.6981	0.1411	-----	77.8218	11.4318
CO2	21.1396	20.0811	1.0038	0.3846	-----	21.4694	-1.5605
CH3OH	0.5950	0.6918	0.0346	0.0265	10.8917	11.6446	-1857.0197
OTHERS	0.3911	0.3823	0.0191	0.0024	0.1114	0.5153	-31.7461
TOTAL C	109.9922	95.1378	4.7556	0.5546	11.0032	111.4512	-1.3264
HYDROGEN:							
H2	120.4563	71.6665	3.5823	0.0588	-----	75.3076	37.4814
H2O	0.0000	0.0000	0.0000	0.0000	0.2970	0.2970	n.a.
OTHERS	3.9446	4.2963	0.2148	0.1150	43.9012	48.5273	-1130.2321
TOTAL H	124.4009	75.9628	3.7971	0.1738	44.1982	124.1319	0.2162
OXYGEN:							
TOTAL O	130.7407	114.8366	5.7403	0.9371	11.1439	132.6578	-1.4664
NITROGEN:							
TOTAL N	1.6806	1.6396	0.0820	0.0025	-----	1.7241	-2.5841
TOTAL MASS FLOW (kg/hr)	3554.9697	3068.7185	153.3938	21.8301	358.1201	3602.0625	-1.3247

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS
	GC#1	GC#2
	-----	-----
MASS BALANCE (%) :	0.06	-0.06
ELEMENTAL BALANCE (%) :		
CARBON	0.43	0.26
HYDROGEN	1.19	1.40
OXYGEN	0.32	0.15
NITROGEN	-0.89	0.44
		-0.05
		-0.97
		-7.30
		-1.10
		-3.05

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

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DATE :                                06-DEC-89
TIME :                                11:05:48
TIME INTERVAL :                       FROM: 0600 18-Oct
                                         TO:  0600 19-Oct

NUMBER OF AVERAGED HOURS :            24
RUN ID NUMBER :                       E7.46
FEED GAS TYPE:                        CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 157.9
OIL/SLURRY REACTOR INLET TEMP. (deg.C) : 24.9
AVG. REACTOR SLURRY TEMPERATURE (deg.C) : 249.9
REACTOR FREEBOARD TEMPERATURE (deg.C) : 247.1
OIL/SLURRY OUTLET TEMP. (deg.C) :     244.4
REACTOR FEED GAS PRESSURE (kPa) :     5514
REACTOR EFFLUENT GAS PRESSURE (kPa) :   5282
GAS SUPERFICIAL VELOCITY (cm/sec) :    15.4
LIQUID SUPERFICIAL VELOCITY (cm/sec) :    0.0
SLURRY CONCENTRATION (wt%) :           37.3
CATALYST OXIDE IN REACTOR (kg oxide) :   393
GAS HOLD-UP (%) :                     33.4
SPACE VELOCITY (1/kg-hr) :             9736
RECYCLE/FRESH FEED RATIO :             3.363
OIL/SLURRY CIRCULATION RATE (m3/hr) :    0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 138.18
PURGE GAS FLOW RATE <50> (ksmol/hr) :    6.42
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) : 591
=====

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STREAM #	1	55	15	15	32	32	62	69
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT	=====	=====	=====	=====	=====	=====	=====	=====
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	56.98	27.29	34.87	35.22	24.98	24.89	5.03	-----
CO	37.13	56.30	51.46	51.44	51.65	51.65	24.16	-----
CO2	3.73	15.39	12.47	12.45	14.47	14.46	65.98	-----
N2	0.09	0.59	0.46	0.46	0.54	0.53	0.22	-----
CH4	0.00	0.29	0.23	0.22	0.26	0.27	0.29	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.74
CH3OH	0.00	0.52	0.42	0.35	8.02	8.03	4.54	97.49
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.43
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.16
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.12
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.08
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.83
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.15
TOTAL :	97.94	100.37	99.91	100.14	99.92	99.84	100.19	100.00
DENS,g/cc	0.005	0.049	0.032	0.032	0.037	0.037	0.004	0.790
AV.MOL.WT	13.50	23.37	20.92	20.84	24.12	24.14	37.40	32.13
M3/hr	878.3	2953.3	3824.8	3831.5	3313.2	3311.8	11.7	-----
ksmol/hr	39.18	131.75	170.64	170.93	147.81	147.68	0.52	11.11
1/hr,prod	-----	-----	-----	-----	-----	-----	-----	451.93

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

=====

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
		----	----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(Z) :	38.2	38.7
CARBON MONOXIDE CONVERSION	(Z) :	13.1	13.2
CARBON DIOXIDE CONVERSION	(Z) :	-0.4	-0.5
RATIO H2 CONSUMED/CO CONSUMED	:	1.98	2.01
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(Z) :	37.5	37.4
CARBON MONOXIDE CONVERSION	(Z) :	12.7	12.9
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(Z) :	37.1	36.7
CARBON MONOXIDE CONVERSION	(Z) :	12.6	12.5
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR	OVERALL
	GC Average	*
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (Z) :	97.9	100.4
CO (+CO2) SELECTIVITY TO ETHANOL (Z) :	-----	0.3

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	saol/hr-ks cat	ks/1000 Na3 fresh feed	ks/1000 Na3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	28.47	408.7	93.7
As Net MeOH produced, OVERALL balance	27.76	398.5	91.3

REACTOR FEED (H2/(CO+1.5CO2)) : 0.50

REACTOR FEED (H2-CO2)/(CO+CO2) : 0.36

APPROACH TO METHANOL EQUILIBRIUM (des.C) : 20.38

APPROACH TO WATER-GAS EQUILIBRIUM (des.C) : 7.49

METHANOL COLLECTED AS % OF CALCULATED : 97.0

CALCULATED METHANOL PRODUCTION RATE (Ksaol/hr) : 11.20

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-19.95584	-3.30652	-2.19027
CO	-3.23711	0.90771	-2.07754
CO2	-11.49299	2.13725	-1.25390
N2	-341.50641	2.43694	-2.72641
CH4	n.a.	0.88292	-3.07999
H2O	-----	n.a.	n.a.
CH3OH	-----	12.20951	2.12474

OVERALL ELEMENTAL BALANCE (Kg-atoms/hr) :

	INPUTS		OUTPUTS				(IN-OUT)/IN
STREAM # STREAM NAME	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	87.9236	74.1788	3.6161	0.1408	-----	77.9357	11.3597
CO2	21.2779	20.2796	0.9986	0.3840	-----	21.6522	-1.7588
CH3OH	0.5977	0.6808	0.0332	0.0265	10.8628	11.6032	-1841.4703
OTHERS	0.3812	0.3834	0.0187	0.0024	0.1111	0.5156	-35.2731
TOTAL C	110.1803	95.5225	4.6566	0.5537	10.9739	111.7068	-1.3854
HYDROGEN:							
H2	120.4063	71.9008	3.5051	0.0587	-----	75.4645	37.3251
H2O	0.0000	0.0000	0.0000	0.0000	0.2921	0.2921	n.a.
OTHERS	3.9153	4.2567	0.2075	0.1149	43.7846	48.3637	-1135.2336
TOTAL H	124.3216	76.1575	3.7126	0.1736	44.0767	124.1203	0.1619
OXYGEN:							
TOTAL O	131.0771	115.4187	5.6265	0.9357	11.1114	133.0923	-1.5374
NITROGEN:							
TOTAL N	1.5794	1.5468	0.0754	0.0025	-----	1.6247	-2.8668
TOTAL MASS FLOW (kg/hr)	3561.5908	3079.6167	150.1273	21.7962	357.0436	3608.5840	-1.3194

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS
	GC#1	GC#2
MASS BALANCE (%) :	0.09	-0.10
ELEMENTAL BALANCE (%) :		
CARBON	0.24	0.18
HYDROGEN	0.65	1.20
OXYGEN	0.13	0.08
NITROGEN	-0.99	-0.14
		[15-(50+62+68)]
		-0.01
		-1.06
		-7.40
		-1.13
		-8.08

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

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DATE :                                06-DEC-89
TIME :                                10:28:31
TIME INTERVAL :                       FROM: 0600 19-Oct
                                      TO:   0600 20-Oct

NUMBER OF AVERAGED HOURS :            24
RUN ID NUMBER :                       E7.47
FEED GAS TYPE:                        CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 158.3
OIL/SLURRY REACTOR INLET TEMP. (deg.C) : 24.7
AVG. REACTOR SLURRY TEMPERATURE (deg.C) : 249.7
REACTOR FREEBOARD TEMPERATURE (deg.C) : 246.9
OIL/SLURRY OUTLET TEMP. (deg.C) :     244.2
REACTOR FEED GAS PRESSURE (kPa) :      5511
REACTOR EFFLUENT GAS PRESSURE (kPa) :    5282
GAS SUPERFICIAL VELOCITY (cm/sec) :     15.3
LIQUID SUPERFICIAL VELOCITY (cm/sec) :    0.0
SLURRY CONCENTRATION (wt%) :            37.4
CATALYST OXIDE IN REACTOR (kg oxide) :   393
GAS HOLD-UP (%) :                      33.6
SPACE VELOCITY (1/kg-hr) :              9668
RECYCLE/FRESH FEED RATIO :              3.365
OIL/SLURRY CIRCULATION RATE (m3/hr) :    0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 137.51
PURGE GAS FLOW RATE <50> (ksmol/hr) :    6.67
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) : 591
  
```

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEOH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT	=====	=====	=====	=====	=====	=====	=====	=====
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	56.89	27.16	34.97	35.13	24.85	24.63	5.15	-----
CO	37.22	56.43	51.60	51.61	51.84	51.88	23.92	-----
CO2	3.81	15.41	12.51	12.49	14.50	14.47	64.29	-----
N2	0.10	0.58	0.46	0.46	0.54	0.53	0.18	-----
CH4	0.00	0.24	0.18	0.18	0.22	0.22	0.20	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.77
CH3OH	0.00	0.50	0.43	0.37	7.97	7.99	6.28	97.46
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.42
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.16
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.13
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.08
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.83
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.15
TOTAL :	98.01	100.33	100.11	100.24	99.93	99.72	100.07	100.00
DENS,g/cc	0.005	0.049	0.032	0.032	0.037	0.037	0.004	0.790
AV.MOL.WT	13.54	23.41	20.93	20.88	24.16	24.21	37.19	32.13
M3/hr	871.6	2932.8	3800.4	3804.4	3288.0	3284.6	11.0	-----
ksmol/hr	38.88	130.84	169.55	169.73	146.69	146.47	0.49	10.91
l/hr,Prod	-----	-----	-----	-----	-----	-----	-----	443.52

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
		-----	-----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	39.1	38.9
CARBON MONOXIDE CONVERSION	(%) :	13.1	13.2
CARBON DIOXIDE CONVERSION	(%) :	0.0	-0.4
RATIO H2 CONSUMED/CO CONSUMED	:	2.02	2.01
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	37.1	37.1
CARBON MONOXIDE CONVERSION	(%) :	12.5	12.6
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	36.6	36.4
CARBON MONOXIDE CONVERSION	(%) :	12.4	12.4
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL *
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (%) :	96.1	100.5
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.3

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	smol/hr-kg cat	kg/1000 Nm3 fresh feed	kg/1000 Nm3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	28.01	405.2	92.8
As Net MeOH produced, OVERALL balance	27.26	394.3	90.3

REACTOR FEED (H2/(CO+1.5CO2)) :	0.50
REACTOR FEED {(H2-CO2)/(CO+CO2)} :	0.35
APPROACH TO METHANOL EQUILIBRIUM (des.C) :	20.64
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) :	10.09
METHANOL COLLECTED AS % OF CALCULATED :	96.7
CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) :	11.02

LAPORTE LPHETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-17.56949	-3.41248	-2.53124
CO	-2.70203	0.79984	-2.21297
CO2	-10.82796	2.09997	-1.29998
N2	-371.49933	2.67214	-1.86894
CH4	n.a.	4.17043	-0.80741
H2O	-----	n.a.	n.a.
CH3OH	-----	4.51384	2.65025

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	87.5974	73.8326	3.7651	0.1302	-----	77.7279	11.2668
CO2	21.1920	20.1666	1.0264	0.3499	-----	21.5449	-1.6653
CH3OH	0.6255	0.6551	0.0134	0.0342	10.6576	11.3803	-1719.3632
OTHERS	0.3004	0.3127	0.0139	0.0018	0.1091	0.4395	-46.2957
TOTAL C	109.7153	94.9670	4.8429	0.5160	10.7667	111.0926	-1.2554
HYDROGEN:							
H2	119.2598	71.0810	3.6248	0.0561	-----	74.7618	37.3118
H2O	0.0000	0.0000	0.0000	0.0000	0.2991	0.2991	n.a.
OTHERS	3.7037	3.8712	0.1974	0.1431	42.9576	47.1693	-1173.5747
TOTAL H	122.9634	74.9521	3.8222	0.1992	43.2568	122.2303	0.5962
OXYGEN:							
TOTAL O	130.6669	114.8209	5.8553	0.8645	10.9073	132.4480	-1.4097
NITROGEN:							
TOTAL N	1.5649	1.5308	0.0781	0.0019	-----	1.6109	-2.9386
TOTAL MASS FLOW (ks/hr)	3543.3723	3063.3938	156.2188	20.2450	350.3963	3590.2539	-1.3231

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]		FRESH FEED GAS
	GC#1	GC#2	[15-(50+62+68)]
MASS BALANCE (%) :	0.02	-0.02	-0.04
ELEMENTAL BALANCE (%) :			
CARBON	0.44	0.35	-1.09
HYDROGEN	1.86	1.61	-6.85
OXYGEN	0.36	0.26	-1.12
NITROGEN	0.33	-1.05	-3.93

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

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DATE :                                06-DEC-89
TIME :                                10:29:50
TIME INTERVAL :                       FROM: 0600 20-Oct
                                         TO: 0600 21-Oct

NUMBER OF AVERAGED HOURS :            24
RUN ID NUMBER :                       E7.48
FEED GAS TYPE:                        CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) : 159.4
OIL/SLURRY REACTOR INLET TEMP. (des.C) : 25.0
AVG. REACTOR SLURRY TEMPERATURE (des.C) : 249.8
REACTOR FREEBOARD TEMPERATURE (des.C) : 247.0
OIL/SLURRY OUTLET TEMP. (des.C) :     244.4
REACTOR FEED GAS PRESSURE (kPa) :      5516
REACTOR EFFLUENT GAS PRESSURE (kPa) :    5283
GAS SUPERFICIAL VELOCITY (cm/sec) :     15.4
LIQUID SUPERFICIAL VELOCITY (cm/sec) :    0.0
SLURRY CONCENTRATION (wt%) :            37.3
CATALYST OXIDE IN REACTOR (kg oxide) :    393
GAS HOLD-UP (%) :                      33.3
SPACE VELOCITY (1/kg-hr) :              9736
RECYCLE/FRESH FEED RATIO :              3.364
OIL/SLURRY CIRCULATION RATE (m3/hr) :    0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 138.52
PURGE GAS FLOW RATE <50> (ksmol/hr) :    6.76
HEAT TRANSFER COEFFICIENT (Watt/m2-des.C) : 592
  
```

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	56.56	27.22	34.84	35.15	24.98	24.68	5.15	-----
CO	37.35	56.40	51.58	51.54	51.78	51.83	23.75	-----
CO2	3.83	15.32	12.45	12.44	14.40	14.42	63.87	-----
N2	0.11	0.65	0.51	0.51	0.60	0.59	0.17	-----
CH4	0.00	0.21	0.17	0.16	0.19	0.20	0.18	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.80
CH3OH	0.00	0.52	0.42	0.37	7.97	7.97	6.87	97.43
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.42
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.16
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.17
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.08
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.82
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.15
TOTAL :	97.85	100.32	99.98	100.18	99.93	99.70	100.05	100.00
DENS,g/cc	0.005	0.049	0.032	0.032	0.037	0.037	0.004	0.790
AV.MOL.WT	13.61	23.39	20.94	20.86	24.11	24.19	37.15	32.12
Mm3/hr	877.9	2953.4	3824.0	3831.1	3314.5	3309.3	11.3	-----
ksmol/hr	39.17	131.76	170.60	170.92	147.87	147.57	0.50	11.03
l/hr:prod	-----	-----	-----	-----	-----	-----	-----	448.57

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

CONVERSIONS ACROSS REACTOR :

	GC#1	GC#2
CALCULATED BY GAS COMPOSITION		
HYDROGEN CONVERSION (Z) :	38.7	38.5
CARBON MONOXIDE CONVERSION (Z) :	13.0	13.1
CARBON DIOXIDE CONVERSION (Z) :	-0.2	-0.2
RATIO H2 CONSUMED/CO CONSUMED :	2.01	2.01
CALCULATED BY METHANOL IN EXIT GAS		
HYDROGEN CONVERSION (Z) :	37.2	37.1
CARBON MONOXIDE CONVERSION (Z) :	12.6	12.7
CALCULATED BY OVERALL BALANCE		
HYDROGEN CONVERSION (Z) :	36.9	36.5
CARBON MONOXIDE CONVERSION (Z) :	12.5	12.4
RATIO H2 CONSUMED/CO CONSUMED :	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL *
CO (+CO2) SELECTIVITY TO METHANOL (Z) :	96.9	100.6
CO (+CO2) SELECTIVITY TO ETHANOL (Z) :		0.3

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	mol/hr-kg cat	kg/1000 Na3 fresh feed	kg/1000 Na3 reactor feed
As calculated ACROSS REACTOR	28.22	405.3	92.9
As Net MeOH produced, OVERALL balance	27.57	396.0	90.7

REACTOR FEED (H2/(CO+1.5CO2)) : 0.50
 REACTOR FEED ((H2-CO2)/(CO+CO2)) : 0.36

APPROACH TO METHANOL EQUILIBRIUM (des.C) : 20.71
 APPROACH TO WATER-GAS EQUILIBRIUM (des.C) : 12.43

METHANOL COLLECTED AS % OF CALCULATED : 97.1

CALCULATED METHANOL PRODUCTION RATE (Kg/mol/hr) : 11.10

LAPORTE LPHETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-18.68735	-3.56976	-2.13425
CO	-2.76129	0.94401	-2.19999
CO2	-11.46975	2.01263	-1.39151
N2	-463.78937	2.32892	-2.08613
CH4	n.a.	-0.12245	-2.32287
H2O	-----	n.a.	n.a.
CH3OH	-----	7.72311	2.14304

OVERALL ELEMENTAL BALANCE (Kg-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	88.0985	74.3105	3.8120	0.1327	-----	78.2552	11.1731
CO2	21.2538	20.1907	1.0357	0.3569	-----	21.5833	-1.5505
CH3OH	0.6342	0.6873	0.0353	0.0384	10.7763	11.5372	-1719.1592
OTHERS	0.2769	0.2754	0.0141	0.0017	0.1103	0.4015	-45.0087
TOTAL C	110.2634	95.4638	4.8971	0.5297	10.8866	111.7772	-1.3729
HYDROGEN:							
H2	120.1698	71.7267	3.6794	0.0576	-----	75.4637	37.2024
H2O	0.0000	0.0000	0.0000	0.0000	0.3136	0.3136	n.a.
OTHERS	3.6444	3.8506	0.1975	0.1595	43.4362	47.6439	-1207.3254
TOTAL H	123.8141	75.5773	3.8770	0.2171	43.7498	123.4212	0.3174
OXYGEN:							
TOTAL O	131.2403	115.3791	5.9187	0.8852	11.0341	133.2171	-1.5063
NITROGEN:							
TOTAL N	1.7605	1.7155	0.0880	0.0019	-----	1.8054	-2.5522
TOTAL MASS FLOW (kg/hr)	3565.5425	3081.5681	158.0782	20.7625	354.3923	3614.9010	-1.3815

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]		FRESH FEED GAS
	GC#1	GC#2	[15-(50+62+68)]
MASS BALANCE (%) :	0.01	0.00	-0.02
ELEMENTAL BALANCE (%) :			
CARBON	0.34	0.30	-1.15
HYDROGEN	1.45	1.32	-7.98
OXYGEN	0.25	0.23	-1.20
NITROGEN	-0.40	-0.46	-3.40

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

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DATE : 06-DEC-99
TIME : 10:31:22
TIME INTERVAL : FROM: 0600 21-Oct
                TO: 0600 22-Oct

NUMBER OF AVERAGED HOURS : 24
RUN ID NUMBER : E7.49
FEED GAS TYPE: CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 159.0
OIL/SLURRY REACTOR INLET TEMP. (deg.C) : 24.2
AVG. REACTOR SLURRY TEMPERATURE (deg.C) : 249.6
REACTOR FREEBOARD TEMPERATURE (deg.C) : 247.0
OIL/SLURRY OUTLET TEMP. (deg.C) : 244.2
REACTOR FEED GAS PRESSURE (kPa) : 5516
REACTOR EFFLUENT GAS PRESSURE (kPa) : 5281
GAS SUPERFICIAL VELOCITY (cm/sec) : 15.4
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 0.0
SLURRY CONCENTRATION (wt%) : 37.3
CATALYST OXIDE IN REACTOR (ks oxide) : 393
GAS HOLD-UP (%) : 33.4
SPACE VELOCITY (1/ks-hr) : 9746
RECYCLE/FRESH FEED RATIO : 3.308
OIL/SLURRY CIRCULATION RATE (m3/hr) : 0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <35> (ksmol/hr) : 138.39
PURGE GAS FLOW RATE <50> (ksmol/hr) : 7.00
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) : 593
  
```

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEOH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	56.39	27.39	34.74	35.36	25.15	25.04	5.15	-----
CO	37.43	56.35	51.50	51.50	51.73	51.74	23.75	-----
CO2	3.81	15.07	12.25	12.21	14.14	14.19	63.87	-----
N2	0.10	0.61	0.48	0.49	0.57	0.56	0.17	-----
CH4	0.01	0.25	0.20	0.20	0.23	0.24	0.18	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.79
CH3OH	0.00	0.53	0.44	0.36	8.00	8.02	6.87	97.48
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.42
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.15
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.13
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.08
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.81
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.14
TOTAL :	97.74	100.21	99.62	100.10	99.81	99.79	100.05	100.00
DENS,g/cc	0.006	0.049	0.032	0.032	0.036	0.036	0.004	0.790
AV.MOL.WT	13.64	23.29	20.90	20.76	24.02	24.06	37.15	32.11
M3/hr	890.2	2944.9	3921.7	3835.1	3314.5	3312.0	11.4	-----
ksmol/hr	39.71	131.38	170.50	171.10	147.87	147.69	0.51	11.14
1/hr,prod	-----	-----	-----	-----	-----	-----	-----	452.89

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		GC#1 ----	GC#2 ----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(Z) :	37.5	39.5
CARBON MONOXIDE CONVERSION	(Z) :	12.9	13.2
CARBON DIOXIDE CONVERSION	(Z) :	-0.3	-0.1
RATIO H2 CONSUMED/CO CONSUMED	:	1.96	2.01
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(Z) :	37.5	37.1
CARBON MONOXIDE CONVERSION	(Z) :	12.6	12.7
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(Z) :	37.4	36.6
CARBON MONOXIDE CONVERSION	(Z) :	12.6	12.6
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.00

SELECTIVITIES :

		ACROSS REACTOR GC Average -----	OVERALL *
CO (+CO2) SELECTIVITY TO METHANOL	(Z) :	97.5	100.8
CO (+CO2) SELECTIVITY TO ETHANOL	(Z) :		0.3

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	smol/hr-kg cat -----	kg/1000 Na3 fresh feed -----	kg/1000 Na3 reactor feed -----
As calculated ACROSS REACTOR	28.36	401.7	93.2
As Net MeOH produced, OVERALL balance	27.86	394.6	91.6

REACTOR FEED (H2/(CO+1.5CO2)) :	0.51
REACTOR FEED ((H2-CO2)/(CO+CO2)) :	0.36
APPROACH TO METHANOL EQUILIBRIUM (des.C) :	21.18
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) :	12.97
METHANOL COLLECTED AS % OF CALCULATED :	97.5
CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) :	11.16

LAPORTE LPNETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 11 FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-14.32079	-3.62133	-2.02122
CO	-3.36990	0.89296	-2.13244
CO2	-12.00223	1.99481	-1.47819
N2	-440.77563	1.58407	-1.28091
CH4	n.a.	-2.04038	-2.05988
H2O	-----	n.a.	n.a.
CH3OH	-----	12.17192	1.49683

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN %
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	
CARBON:							
CO	88.1093	74.0379	3.9464	0.1344	-----	78.1187	11.3388
CO2	20.8874	19.8006	1.0554	0.3615	-----	21.2176	-1.5909
CH3OH	0.6090	0.6934	0.0370	0.0389	10.8856	11.6549	-1813.7520
OTHERS	0.3371	0.3271	0.0174	0.0017	0.1114	0.4577	-35.7901
TOTAL C	109.9428	94.8591	5.0562	0.5365	10.9971	111.4489	-1.3700
HYDROGEN:							
H2	120.9854	71.9713	3.8362	0.0584	-----	75.8659	37.2934
H2O	0.0000	0.0000	0.0000	0.0000	0.3118	0.3118	n.a.
OTHERS	3.7843	4.0822	0.2176	0.1616	43.8768	48.3382	-1177.3473
TOTAL H	124.7696	76.0535	4.0538	0.2199	44.1886	124.5159	0.2034
OXYGEN:							
TOTAL O	130.4931	114.3326	6.0942	0.8967	11.1421	132.4656	-1.5116
NITROGEN:							
TOTAL N	1.6699	1.6134	0.0860	0.0019	-----	1.7013	-1.2804
TOTAL MASS FLOW (kg/hr)	3552.4658	3060.4221	163.1273	21.0321	357.8054	3602.3870	-1.4053

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]		FRESH FEED GAS
	GC#1	GC#2	[15-(50+62+68)]
MASS BALANCE (%) :	0.25	0.00	-0.07
ELEMENTAL BALANCE (%) :			
CARBON	0.16	0.34	-1.28
HYDROGEN	0.01	1.38	-8.18
OXYGEN	0.09	0.27	-1.36
NITROGEN	-0.48	-0.59	-5.42

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY
=====

DATE :	06-DEC-89
TIME :	10:32:55
TIME INTERVAL :	FROM: 0600 22-Oct
	TO: 0600 23-Oct
NUMBER OF AVERAGED HOURS :	24
RUN ID NUMBER :	E7.50
FEED GAS TYPE:	CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) :	155.4
OIL/SLURRY REACTOR INLET TEMP. (des.C) :	23.6
AVG. REACTOR SLURRY TEMPERATURE (des.C) :	249.8
REACTOR FREEBOARD TEMPERATURE (des.C) :	247.0
OIL/SLURRY OUTLET TEMP. (des.C) :	243.9
REACTOR FEED GAS PRESSURE (kPa) :	5518
REACTOR EFFLUENT GAS PRESSURE (kPa) :	5281
GAS SUPERFICIAL VELOCITY (cm/sec) :	15.5
LIQUID SUPERFICIAL VELOCITY (cm/sec) :	0.0
SLURRY CONCENTRATION (wt%) :	37.3
CATALYST OXIDE IN REACTOR (kg oxide) :	393
GAS HOLD-UP (%) :	33.3
SPACE VELOCITY (1/kg-hr) :	9805
RECYCLE/FRESH FEED RATIO :	3.369
OIL/SLURRY CIRCULATION RATE (m3/hr) :	0.0
PROD. SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) :	139.29
PURGE GAS FLOW RATE <50> (ksmol/hr) :	6.55
HEAT TRANSFER COEFFICIENT (Watt/m2-des.C) :	590

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEOH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<WTX>
H2	57.43	27.44	35.41	35.29	25.18	25.27	5.15	-----
CO	37.03	56.01	51.22	51.27	51.44	51.38	23.75	-----
CO2	3.85	15.39	12.55	12.50	14.46	14.47	63.87	-----
N2	0.11	0.61	0.50	0.48	0.56	0.58	0.17	-----
CH4	0.00	0.20	0.17	0.15	0.18	0.20	0.18	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.77
CH3OH	0.01	0.45	0.39	0.31	7.71	7.92	6.87	97.48
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.01
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.41
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.15
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.12
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.07
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.83
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.16
TOTAL :	98.43	100.10	100.25	100.01	99.53	99.84	100.05	100.00
DENS,g/cc	0.005	0.049	0.032	0.032	0.036	0.036	0.004	0.792
AV.MOL.WT	13.47	23.33	20.82	20.82	24.05	24.05	37.15	32.12
M3/hr	883.0	2975.4	3859.8	3858.5	3340.8	3341.2	12.1	-----
ksmol/hr	39.40	132.74	172.20	172.14	149.05	149.00	0.54	11.07
l/hr,prod	-----	-----	-----	-----	-----	-----	-----	449.10

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

	GC#1	GC#2
CALCULATED BY GAS COMPOSITION		
HYDROGEN CONVERSION (%) :	38.2	38.2
CARBON MONOXIDE CONVERSION (%) :	13.2	13.1
CARBON DIOXIDE CONVERSION (%) :	0.2	-0.2
RATIO H2 CONSUMED/CO CONSUMED :	2.01	2.01
CALCULATED BY METHANOL IN EXIT GAS		
HYDROGEN CONVERSION (%) :	36.5	36.1
CARBON MONOXIDE CONVERSION (%) :	12.6	12.4
CALCULATED BY OVERALL BALANCE		
HYDROGEN CONVERSION (%) :	36.1	36.3
CARBON MONOXIDE CONVERSION (%) :	12.5	12.5
RATIO H2 CONSUMED/CO CONSUMED :	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL *
CO (+CO2) SELECTIVITY TO METHANOL (%) :	95.2	99.9
CO (+CO2) SELECTIVITY TO ETHANOL (%) :		0.3

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	smol/hr-ks cat	ks/1000 Me3 fresh feed	ks/1000 Me3 reactor feed
As calculated ACROSS REACTOR	28.05	400.5	91.7
As Net MeOH produced, OVERALL balance	27.68	395.3	90.5

REACTOR FEED (H2/(CO+1.5CO2)) :	0.50
REACTOR FEED ((H2-CO2)/(CO+CO2)) :	0.36
APPROACH TO METHANOL EQUILIBRIUM (deg.C) :	21.96
APPROACH TO WATER-GAS EQUILIBRIUM (deg.C) :	9.05
METHANOL COLLECTED AS % OF CALCULATED :	98.0
CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) :	11.04

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT MATERIAL BALANCE SUMMARY

COMPONENT BALANCE (IN-OUT)/IN :

STREAM #	[PURE GASES - 13]	[(1+55)-15]	[32 - (50+55+62+69)]
STREAM LOCATIONS	FRESH FEED GAS	REACTOR FEED	REACTOR EFFLUENT
COMPONENT :			
	<% diff.>	<% diff.>	<% diff.>
H2	-21.07623	-2.87454	-1.94792
CO	-3.98927	0.77409	-1.94795
CO2	-10.05823	1.97384	-1.22149
N2	-456.87442	2.59054	-1.71321
CH4	n.a.	-0.20825	-4.36278
H2O	-----	n.a.	n.a.
CH3OH	-----	9.95482	0.04122

OVERALL ELEMENTAL BALANCE (Kgs-atoms/hr) :

	INPUTS		OUTPUTS				(IN-OUT)/IN
STREAM #	15	55	50	62	69	TOTAL	%
STREAM NAME	REACTOR FEED	RECYCLE	PURGE GAS	FLASH GAS	MeOH PRODUCT		
CARBON:							
CO	88.2487	74.3503	3.6715	0.1422	-----	78.1639	11.4276
CO2	21.5139	20.4300	1.0089	0.3924	-----	21.8213	-1.4286
CH3OH	0.5409	0.5971	0.0295	0.0411	10.8213	11.4890	-2024.1116
OTHERS	0.2634	0.2628	0.0130	0.0018	0.1107	0.3883	-47.4453
TOTAL C	110.5668	95.6402	4.7228	0.5675	10.9320	111.8625	-1.1719
HYDROGEN:							
H2	121.4955	72.8530	3.5976	0.0617	-----	76.5122	37.0247
H2O	0.0000	0.0000	0.0000	0.0000	0.3049	0.3049	n.a.
OTHERS	3.2170	3.4399	0.1699	0.1709	43.6174	47.3980	-1373.3438
TOTAL H	124.7125	76.2928	3.7674	0.2326	43.9222	124.2151	0.3989
OXYGEN:							
TOTAL O	131.8174	115.8074	5.7187	0.9485	11.0736	133.5482	-1.3130
NITROGEN:							
TOTAL N	1.6663	1.6247	0.0802	0.0020	-----	1.7070	-2.4425
TOTAL MASS FLOW (kg/hr)	3584.6174	3096.8213	152.9242	22.2455	355.7076	3627.6927	-1.2018

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS
	GC#1	[15-(50+62+69)]
MASS BALANCE (%) :	0.04	0.00
ELEMENTAL BALANCE (%) :		
CARBON	0.48	0.52
HYDROGEN	1.60	2.11
OXYGEN	0.41	0.41
NITROGEN	0.16	-0.72

LAPORTE LPHETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY
=====

DATE :	06-DEC-99
TIME :	10:34:24
TIME INTERVAL :	FROM: 0600 23-Oct
	TO: 1600 23-Oct
NUMBER OF AVERAGED HOURS :	10
RUN ID NUMBER :	E7.51
FEED GAS TYPE:	CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) :	159.4
OIL/SLURRY REACTOR INLET TEMP. (des.C) :	23.8
AVG. REACTOR SLURRY TEMPERATURE (des.C) :	250.0
REACTOR FREEBOARD TEMPERATURE (des.C) :	246.8
OIL/SLURRY OUTLET TEMP. (des.C) :	244.1
REACTOR FEED GAS PRESSURE (kPa) :	5516
REACTOR EFFLUENT GAS PRESSURE (kPa) :	5282
GAS SUPERFICIAL VELOCITY (cm/sec) :	15.5
LIQUID SUPERFICIAL VELOCITY (cm/sec) :	0.0
SLURRY CONCENTRATION (wt%) :	37.4
CATALYST OXIDE IN REACTOR (kg oxide) :	393
GAS HOLD-UP (%) :	33.5
SPACE VELOCITY (1/kg-hr) :	9786
RECYCLE/FRESH FEED RATIO :	3.346
OIL/SLURRY CIRCULATION RATE (m3/hr) :	0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) :	139.14
PURGE GAS FLOW RATE <50> (ksmol/hr) :	6.87
HEAT TRANSFER COEFFICIENT (Watt/m2-des.C) :	590

STREAM #	1	55	15	15	32	32	62	62
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDM PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
=====	=====	=====	=====	=====	=====	=====	=====	=====
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	56.92	27.55	35.38	35.49	25.29	25.09	5.15	-----
CO	37.26	55.84	51.19	51.17	51.34	51.28	23.75	-----
CO2	3.83	15.24	12.39	12.39	14.32	14.32	63.87	-----
N2	0.12	0.71	0.58	0.55	0.65	0.67	0.17	-----
CH4	0.00	0.19	0.17	0.15	0.18	0.19	0.18	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.77
CH3OH	0.00	0.56	0.40	0.36	7.94	7.91	6.87	97.46
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.40
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.15
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.12
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.07
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.85
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.17
TOTAL :	98.13	100.10	100.10	100.11	99.72	99.47	100.05	100.00
DENS,g/cc	0.005	0.049	0.032	0.032	0.036	0.036	0.004	0.790
AV.MOL.WT	13.56	23.28	20.79	20.76	24.02	24.06	37.15	32.13
Mm3/hr	886.1	2964.9	3847.8	3851.1	3329.3	3326.4	11.6	-----
ksmol/hr	39.53	132.27	171.66	171.81	148.53	148.34	0.52	11.05
l/hr,prod	-----	-----	-----	-----	-----	-----	-----	449.26

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

	GC#1	GC#2
	----	----
CALCULATED BY GAS COMPOSITION		
HYDROGEN CONVERSION (%) :	38.7	38.4
CARBON MONOXIDE CONVERSION (%) :	13.4	13.3
CARBON DIOXIDE CONVERSION (%) :	0.0	0.1
RATIO H2 CONSUMED/CO CONSUMED :	2.00	2.01
CALCULATED BY METHANOL IN EXIT GAS		
HYDROGEN CONVERSION (%) :	36.4	36.7
CARBON MONOXIDE CONVERSION (%) :	12.6	12.7
CALCULATED BY OVERALL BALANCE		
HYDROGEN CONVERSION (%) :	36.2	36.1
CARBON MONOXIDE CONVERSION (%) :	12.5	12.5
RATIO H2 CONSUMED/CO CONSUMED :	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL *
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (%) :	94.8	100.1
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.3

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	gmo1/hr-kg cat	kg/1000 Na3 fresh feed	kg/1000 Na3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	28.25	402.1	92.5
As Net MeOH produced, OVERALL balance	27.63	393.2	90.5

REACTOR FEED (H2/(CO+1.5CO2)) :	0.51
REACTOR FEED ((H2-CO2)/(CO+CO2)) :	0.36
APPROACH TO METHANOL EQUILIBRIUM (des.C) :	21.07
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) :	9.49
METHANOL COLLECTED AS % OF CALCULATED :	97.1
CALCULATED METHANOL PRODUCTION RATE (Kgmol/hr) :	11.12

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
-----	<% diff.>	<% diff.>	<% diff.>
H2	-21.20615	-3.45487	-2.13886
CO	-3.98314	0.76455	-2.07639
CO2	-8.74459	1.78773	-1.41150
H2	-490.67603	4.15942	-2.69965
CH4	n.a.	-0.12286	-2.58755
H2O	-----	n.a.	n.a.
CH3OH	-----	16.73768	1.58227

OVERALL ELEMENTAL BALANCE (kg-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	?
CARBON:							
CO	87.9172	73.8661	3.8337	0.1369	-----	77.8367	11.4658
CO2	21.2869	20.1596	1.0463	0.3682	-----	21.5741	-1.3492
CH3OH	0.6137	0.7371	0.0383	0.0396	10.7958	11.6107	-1791.9050
OTHERS	0.2543	0.2540	0.0132	0.0017	0.1105	0.3793	-49.1847
TOTAL C	110.0721	95.0167	4.9315	0.5464	10.9063	111.4009	-1.2072
HYDROGEN:							
H2	121.9591	72.8846	3.7828	0.0594	-----	76.7749	37.0880
H2O	0.0000	0.0000	0.0000	0.0000	0.3022	0.3022	n.a.
OTHERS	3.4719	3.9641	0.2057	0.1646	43.5145	47.8490	-1278.1727
TOTAL H	125.4310	76.8489	3.9885	0.2240	43.9168	124.9781	0.4409
OXYGEN:							
TOTAL O	131.1047	114.9224	5.9646	0.9133	11.0472	132.9474	-1.3292
NITROGEN:							
TOTAL N	1.9002	1.8862	0.0979	0.0020	-----	1.9961	-4.5191
TOTAL MASS FLOW (kg/hr)	3567.2329	3079.4292	159.8260	21.4198	354.9340	3615.6099	-1.3561

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS [15 - (50+62+68)]
-----	GC#1	GC#2
MASS BALANCE (%) :	-0.01	0.00
ELEMENTAL BALANCE (%) :		
CARBON	0.67	0.44
HYDROGEN	2.22	1.65
OXYGEN	0.55	0.39
NITROGEN	0.01	-1.77

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

DATE : 06-DEC-89
TIME : 10:35:51
TIME INTERVAL : FROM: 0000 25-Oct
TO: 0600 25-Oct
NUMBER OF AVERAGED HOURS : 6
RUN ID NUMBER : E7.52
FEED GAS TYPE: CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) : 159.6
OIL/SLURRY REACTOR INLET TEMP. (des.C) : 23.7
AVG. REACTOR SLURRY TEMPERATURE (des.C) : 250.4
REACTOR FREEBOARD TEMPERATURE (des.C) : 247.3
OIL/SLURRY OUTLET TEMP. (des.C) : 244.1
REACTOR FEED GAS PRESSURE (kPa) : 5519
REACTOR EFFLUENT GAS PRESSURE (kPa) : 5285
GAS SUPERFICIAL VELOCITY (cm/sec) : 15.4
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 0.0
SLURRY CONCENTRATION (wt%) : 37.5
CATALYST OXIDE IN REACTOR (kg oxide) : 393
GAS HOLD-UP (%) : 34.0
SPACE VELOCITY (1/kg-hr) : 9747
RECYCLE/FRESH FEED RATIO : 3.394
OIL/SLURRY CIRCULATION RATE (m3/hr) : 0.0
PROD. SEPARATOR GAS FLOWRATE <50> + <35> (ksmol/hr) : 139.22
PURGE GAS FLOW RATE <50> (ksmol/hr) : 7.13
HEAT TRANSFER COEFFICIENT (Watt/m2-des.C) : 592

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDM PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
=====	=====	=====	=====	=====	=====	=====	=====	=====
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	56.74	27.49	34.85	35.31	25.30	25.09	5.15	-----
CO	37.52	55.35	50.83	50.85	50.80	50.90	23.75	-----
CO2	4.01	15.52	12.72	12.60	14.69	14.46	63.87	-----
N2	0.09	0.70	0.54	0.49	0.61	0.66	0.17	-----
CH4	0.01	0.27	0.22	0.22	0.25	0.25	0.19	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.85
CH3OH	0.00	0.88	0.69	0.59	8.10	8.09	6.87	97.41
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.01
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.41
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.15
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.13
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.07
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.78
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.17
TOTAL :	98.38	100.20	99.86	100.07	99.77	99.45	100.05	100.00
DENS, g/cc	0.006	0.049	0.032	0.032	0.037	0.037	0.004	0.793
AV. MOL. WT	13.67	23.35	20.97	20.84	24.07	24.08	37.15	32.10
Mm3/hr	874.8	2960.7	3823.6	3835.6	3325.3	3324.9	10.5	-----
ksmol/hr	39.03	132.09	170.58	171.12	148.35	148.27	0.47	10.93
1/hr.prod	-----	-----	-----	-----	-----	-----	-----	443.90

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

CONVERSIONS ACROSS REACTOR :

	GC#1	GC#2
CALCULATED BY GAS COMPOSITION	----	----
HYDROGEN CONVERSION (Z) :	37.4	37.9
CARBON MONOXIDE CONVERSION (Z) :	12.9	13.4
CARBON DIOXIDE CONVERSION (Z) :	1.1	-1.1
RATIO H2 CONSUMED/CO CONSUMED :	1.98	1.96
CALCULATED BY METHANOL IN EXIT GAS		
HYDROGEN CONVERSION (Z) :	36.4	36.5
CARBON MONOXIDE CONVERSION (Z) :	12.5	12.7
CALCULATED BY OVERALL BALANCE		
HYDROGEN CONVERSION (Z) :	36.3	35.7
CARBON MONOXIDE CONVERSION (Z) :	12.4	12.4
RATIO H2 CONSUMED/CO CONSUMED :	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL *
CO (+CO2) SELECTIVITY TO METHANOL (Z) :	95.4	99.7
CO (+CO2) SELECTIVITY TO ETHANOL (Z) :	-----	0.3

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	kmol/hr-kg cat	kg/1000 Nm3 fresh feed	kg/1000 Nm3 reactor feed
As calculated ACROSS REACTOR	27.74	399.8	91.2
As Net MeOH produced, OVERALL balance	27.11	390.7	89.1

REACTOR FEED $\{H_2/(CO+1.5CO_2)\}$: 0.51
 REACTOR FEED $\{(H_2-CO_2)/(CO+CO_2)\}$: 0.36

APPROACH TO METHANOL EQUILIBRIUM (des.C) : 19.95
 APPROACH TO WATER-GAS EQUILIBRIUM (des.C) : 11.08

METHANOL COLLECTED AS % OF CALCULATED : 96.8

CALCULATED METHANOL PRODUCTION RATE (Kmol/hr) : 10.92

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<u><% diff.></u>	<u><% diff.></u>	<u><% diff.></u>
H2	-19.89891	-3.40318	-1.97852
CO	-3.77744	0.83995	-2.41000
CO2	-11.15076	2.27047	-0.68453
N2	-81.86607	13.09709	-9.07253
CH4	n.a.	-6.53894	0.71355
H2O	-----	n.a.	n.a.
CH3OH	-----	13.07685	1.65856

OVERALL ELEMENTAL BALANCE (Kg-atoms/hr) :

	INPUTS		OUTPUTS				(IN-OUT)/IN
STREAM # STREAM NAME	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	87.0162	73.1105	3.9485	0.1242	-----	77.1832	11.3092
CO2	21.5680	20.5036	1.1074	0.3340	-----	21.9450	-1.7480
CH3OH	1.0058	1.1572	0.0625	0.0359	10.5674	11.8230	-1075.4302
OTHERS	0.3799	0.3527	0.0190	0.0016	0.1083	0.4816	-26.7623
TOTAL C	109.9699	95.1239	5.1374	0.4957	10.6757	111.4327	-1.3302
HYDROGEN:							
H2	120.8586	72.5888	3.9203	0.0539	-----	76.5630	36.6508
H2O	0.0000	0.0000	0.0000	0.0000	0.3276	0.3276	n.a.
OTHERS	5.5429	6.0393	0.3262	0.1493	42.5945	49.1093	-785.9819
TOTAL H	126.4016	78.6281	4.2465	0.2032	42.9221	125.9990	0.3177
OXYGEN:							
TOTAL O	131.1580	115.2749	6.2257	0.8285	10.8275	133.1565	-1.5237
NITROGEN:							
TOTAL N	1.6770	1.8571	0.1003	0.0018	-----	1.9592	-16.8291
TOTAL MASS FLOW (kg/hr)	3565.4563	3084.0586	166.5627	19.4311	347.5941	3617.6465	-1.4638

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS
	<u>GC#1</u>	<u>[15-(50+62+68)]</u>
MASS BALANCE (%) :	0.16	-0.15
ELEMENTAL BALANCE (%) :		
CARBON	0.60	-0.60
HYDROGEN	0.97	-3.91
OXYGEN	0.68	-0.61
NITROGEN	-5.37	-8.10

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

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DATE :                                06-DEC-89
TIME :                                10:37:32
TIME INTERVAL :                       FROM: 0600 25-Oct
                                         TO:  1300 25-Oct

NUMBER OF AVERAGED HOURS :             7
RUN ID NUMBER :                       E7.53A
FEED GAS TYPE:                        CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 163.2
OIL/SLURRY REACTOR INLET TEMP. (deg.C) : 22.9
AVG. REACTOR SLURRY TEMPERATURE (deg.C) : 250.1
REACTOR FREEBOARD TEMPERATURE (deg.C) : 247.4
OIL/SLURRY OUTLET TEMP. (deg.C) :      244.5
REACTOR FEED GAS PRESSURE (kPa) :      5522
REACTOR EFFLUENT GAS PRESSURE (kPa) :   5285
GAS SUPERFICIAL VELOCITY (cm/sec) :    15.5
LIQUID SUPERFICIAL VELOCITY (cm/sec) :   0.0
SLURRY CONCENTRATION (wt%) :           37.5
CATALYST OXIDE IN REACTOR (kg oxide) :   393
GAS HOLD-UP (%) :                      34.0
SPACE VELOCITY (1/kg-hr) :             9765
RECYCLE/FRESH FEED RATIO :             3.362
OIL/SLURRY CIRCULATION RATE (m3/hr) :   0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 139.45
PURGE GAS FLOW RATE <50> (ksmol/hr) :    7.31
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) : 593
  
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STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	56.59	27.26	34.85	34.97	25.07	24.61	5.15	-----
CO	37.64	56.18	51.54	51.73	51.84	51.83	23.75	-----
CO2	3.87	15.20	12.30	12.40	14.26	14.23	63.87	-----
N2	0.10	0.53	0.44	0.42	0.49	0.50	0.17	-----
CH4	0.00	0.25	0.21	0.20	0.24	0.25	0.18	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.85
CH3OH	0.00	0.71	0.50	0.48	7.95	7.91	5.87	97.41
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.01
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.41
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.15
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.13
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.07
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.09
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.78
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.17
TOTAL :	98.19	100.14	99.84	100.21	99.85	99.32	100.05	100.00
DENS,g/cc	0.005	0.049	0.032	0.032	0.037	0.037	0.004	0.787
AV.MOL.WT	13.66	23.35	20.89	20.90	24.06	24.15	37.15	32.10
M3/hr	881.0	2961.8	3837.0	3842.9	3331.8	3325.5	10.8	-----
ksmol/hr	39.30	132.14	171.18	171.44	148.64	148.30	0.48	10.79
l/hr,prod	-----	-----	-----	-----	-----	-----	-----	440.09

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	38.8	37.9
CARBON MONOXIDE CONVERSION	(%) :	12.9	13.1
CARBON DIOXIDE CONVERSION	(%) :	-0.3	0.3
RATIO H2 CONSUMED/CO CONSUMED	:	2.04	1.95
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	36.5	36.7
CARBON MONOXIDE CONVERSION	(%) :	12.3	12.4
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	36.0	35.8
CARBON MONOXIDE CONVERSION	(%) :	12.2	12.1
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL %
CO (+CO2) SELECTIVITY TO METHANOL (%) :	95.2	100.0
CO (+CO2) SELECTIVITY TO ETHANOL (%) :		0.3

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	mmol/hr-kg cat	kg/1000 Na3 fresh feed	kg/1000 Na3 reactor feed
As calculated ACROSS REACTOR	27.79	397.7	91.2
As Net MeOH produced, OVERALL balance	26.99	386.2	89.5

REACTOR FEED (H2/(CO+1.5CO2)) : 0.50
REACTOR FEED ((H2-CO2)/(CO+CO2)) : 0.35

APPROACH TO METHANOL EQUILIBRIUM (des.C) : 20.74
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) : 14.80

METHANOL COLLECTED AS % OF CALCULATED : 96.3

CALCULATED METHANOL PRODUCTION RATE (Kmmol/hr) : 10.93

LAPORTE LPHETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-19.25154	-2.91340	-2.08954
CO	-4.29537	0.38572	-1.93909
CO2	-8.90700	1.64386	-1.64084
N2	-219.94708	1.15457	-0.80542
CH4	n.a.	-4.31709	0.34423
H2O	-----	n.a.	n.a.
CH3OH	-----	12.04141	2.19288

OVERALL ELEMENTAL BALANCE (Kg-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	88.6894	74.2393	4.1096	0.1279	-----	78.4768	11.5150
CO2	21.2556	20.0913	1.1122	0.3439	-----	21.5473	-1.3729
CH3OH	0.8266	0.9397	0.0520	0.0370	10.5302	11.5589	-1298.4384
OTHERS	0.3446	0.3303	0.0183	0.0016	0.1079	0.4581	-32.9450
TOTAL C	111.1161	95.6007	5.2921	0.5103	10.6381	112.0412	-0.8326
HYDROGEN:							
H2	119.9212	72.0406	3.9879	0.0555	-----	76.0840	36.5550
H2O	0.0000	0.0000	0.0000	0.0000	0.3265	0.3265	n.a.
OTHERS	4.6846	5.0802	0.2812	0.1537	42.4446	47.9597	-923.7639
TOTAL H	124.6059	77.1208	4.2691	0.2092	42.7711	124.3702	0.1991
OXYGEN:							
TOTAL O	132.0271	115.3616	6.3860	0.8529	10.7894	133.3899	-1.0322
NITROGEN:							
TOTAL N	1.4538	1.3954	0.0772	0.0018	-----	1.4744	-1.4162
TOTAL MASS FLOW (kg/hr)	3583.5103	3085.3774	170.7957	20.0041	346.3708	3622.5481	-1.0894

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]		FRESH FEED GAS
	GC#1	GC#2	[15-(50+62+68)]
MASS BALANCE (Z) :	-0.19	0.19	-0.06
ELEMENTAL BALANCE (Z) :			
CARBON	0.36	0.62	-0.78
HYDROGEN	2.23	1.13	-6.21
OXYGEN	0.26	0.57	-1.10
NITROGEN	0.78	-0.61	-4.78

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

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DATE :                                04-DEC-99
TIME :                                10:39:00
TIME INTERVAL :                       FROM: 1400 25-Oct
                                         TO:  0600 26-Oct

NUMBER OF AVERAGED HOURS :            16
RUN ID NUMBER :                      E7.53P
FEED GAS TYPE:                       CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) : 140.0
OIL/SLURRY REACTOR INLET TEMP. (des.C) : 24.5
AVG. REACTOR SLURRY TEMPERATURE (des.C) : 249.7
REACTOR FREEBOARD TEMPERATURE (des.C) : 240.7
OIL/SLURRY OUTLET TEMP. (des.C) :     236.1
REACTOR FEED GAS PRESSURE (kPa) :     5361
REACTOR EFFLUENT GAS PRESSURE (kPa) :  5295
GAS SUPERFICIAL VELOCITY (cm/sec) :    7.5
LIQUID SUPERFICIAL VELOCITY (cm/sec) :  0.0
SLURRY CONCENTRATION (wt%) :          36.9
CATALYST OXIDE IN REACTOR (ks oxide) : 393
GAS HOLD-UP (%) :                    26.7
SPACE VELOCITY (1/ks-hr) :           4748
RECYCLE/FRESH FEED RATIO :           1.971
OIL/SLURRY CIRCULATION RATE (m3/hr) :  0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 62.34
PURGE GAS FLOW RATE <50> (ksmol/hr) :  0.01
HEAT TRANSFER COEFFICIENT (Watt/m2-des.C) : 536
  
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STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEOH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT	=====	=====	=====	=====	=====	=====	=====	=====
	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<WTX>
H2	54.47	25.10	35.53	35.42	22.40	22.40	5.15	-----
CO	39.69	57.94	51.66	51.74	51.90	51.82	23.75	-----
CO2	4.69	15.89	12.09	12.07	14.61	14.66	63.87	-----
N2	0.11	0.43	0.33	0.32	0.39	0.39	0.17	-----
CH4	0.00	0.18	0.15	0.13	0.16	0.18	0.18	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.83
CH3OH	0.00	0.49	0.32	0.31	10.03	10.01	6.87	97.54
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.01
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.43
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.16
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.13
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.08
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.68
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.16
TOTAL :	98.96	100.02	100.09	100.00	99.50	99.47	100.05	100.00
DENS,g/cc	0.005	0.050	0.032	0.032	0.039	0.038	0.004	0.790
AV.MOL.WT	14.46	24.02	20.71	20.72	24.90	24.90	37.15	32.09
Nm3/hr	650.8	1217.8	1966.9	1868.5	1553.9	1553.9	6.8	-----
ksmol/hr	29.03	54.33	83.29	83.36	69.32	69.29	0.30	6.70
l/hr:prod	-----	-----	-----	-----	-----	-----	-----	272.32

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

=====

CONVERSIONS ACROSS REACTOR :

	GC#1	GC#2
	-----	-----
CALCULATED BY GAS COMPOSITION		
HYDROGEN CONVERSION (Z) :	47.5	47.4
CARBON MONOXIDE CONVERSION (Z) :	15.5	16.6
CARBON DIOXIDE CONVERSION (Z) :	-0.9	-0.7
RATIO H2 CONSUMED/CO CONSUMED :	1.98	1.96
CALCULATED BY METHANOL IN EXIT GAS		
HYDROGEN CONVERSION (Z) :	45.1	45.3
CARBON MONOXIDE CONVERSION (Z) :	15.5	15.5
CALCULATED BY OVERALL BALANCE		
HYDROGEN CONVERSION (Z) :	45.1	45.2
CARBON MONOXIDE CONVERSION (Z) :	15.5	15.5
RATIO H2 CONSUMED/CO CONSUMED :	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC average	OVERALL *
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (Z) :	94.8	99.0
CO (+CO2) SELECTIVITY TO ETHANOL (Z) :	-----	0.3

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEDH SOURCE	saol/hr-ks cat	ks/1000 Nm3 fresh feed	ks/1000 Nm3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	16.98	329.0	114.6
As Net MeOH produced, OVERALL balance	16.80	325.5	113.4

REACTOR FEED (H2/(CO+1.5CO2)) : 0.51

REACTOR FEED ((H2-CO2)/(CO+CO2)) : 0.37

APPROACH TO METHANOL EQUILIBRIUM (des.C) : 10.47

APPROACH TO WATER-GAS EQUILIBRIUM (des.C) : 39.31

METHANOL COLLECTED AS % OF CALCULATED : 99.0

CALCULATED METHANOL PRODUCTION RATE (Ksaol/hr) : 5.68

LAPORTE LPNETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-32.37474	-0.28085	-0.85992
CO	-15.49072	-0.30094	-0.59160
CO2	-19.28863	-0.69643	0.09351
N2	-228.76472	1.32842	0.15806
CH4	n.a.	-11.81350	0.10632
H2O	-----	n.a.	n.a.
CH3OH	-----	1.66516	1.15248

OVERALL ELEMENTAL BALANCE (Kg-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	43.1277	31.4751	4.6392	0.0799	-----	36.1942	16.0765
CO2	10.0648	8.6338	1.2726	0.2150	-----	10.1214	-0.5620
CH3OH	0.2609	0.2653	0.0391	0.0231	6.5487	6.8762	-2535.8516
OTHERS	0.1100	0.0994	0.0147	0.0010	0.0670	0.1821	-65.5123
TOTAL C	53.5634	40.4736	5.9656	0.3190	6.6157	53.3739	0.3537
HYDROGEN:							
H2	59.0601	27.2684	4.0192	0.0347	-----	31.3223	46.9653
H2O	0.0000	0.0000	0.0000	0.0000	0.1975	0.1975	n.a.
OTHERS	1.4836	1.4567	0.2147	0.0961	26.3958	28.1632	-1798.2750
TOTAL H	60.5438	28.7251	4.2339	0.1308	26.5933	59.6831	1.4216
OXYGEN:							
TOTAL O	63.5182	49.0091	7.2237	0.5332	6.7039	63.4699	0.0760
NITROGEN:							
TOTAL N	0.5268	0.4683	0.0690	0.0011	-----	0.5385	-2.2110
TOTAL MASS FLOW (kg/hr)	1727.3737	1305.0188	192.3524	12.5047	215.1430	1725.0189	0.1363

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]		FRESH FEED GAS
	GC#1	GC#2	[15-(50+62+68)]
MASS BALANCE (%) :	-0.08	0.08	-0.03
ELEMENTAL BALANCE (%) :			
CARBON	0.64	0.71	-0.11
HYDROGEN	2.34	2.01	2.13
OXYGEN	0.39	0.50	-1.51
NITROGEN	1.79	-2.37	-6.94

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

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=====
DATE :                                06-DEC-99
TIME :                                10:40:29
TIME INTERVAL :                       FROM: 1800 27-Oct
                                         TO:  0600 28-Oct

NUMBER OF AVERAGED HOURS :            12
RUN ID NUMBER :                       E7.54
FEED GAS TYPE:                        CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) : 141.7
OIL/SLURRY REACTOR INLET TEMP. (des.C) : 24.0
AVG. REACTOR SLURRY TEMPERATURE (des.C) : 250.3
REACTOR FREEBOARD TEMPERATURE (des.C) : 241.0
OIL/SLURRY OUTLET TEMP. (des.C) :     236.4
REACTOR FEED GAS PRESSURE (kPa) :     5360
REACTOR EFFLUENT GAS PRESSURE (kPa) :   5292
GAS SUPERFICIAL VELOCITY (cm/sec) :    7.7
LIQUID SUPERFICIAL VELOCITY (cm/sec) :  0.0
SLURRY CONCENTRATION (wt%) :           37.5
CATALYST OXIDE IN REACTOR (kg oxide) :  393
GAS HOLD-UP (%) :                     29.4
SPACE VELOCITY (1/kg-hr) :             4889
RECYCLE/FRESH FEED RATIO :             1.912
OIL/SLURRY CIRCULATION RATE (m3/hr) :  0.0
PROD. SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 64.44
PURGE GAS FLOW RATE <50> (ksmol/hr) :   8.09
HEAT TRANSFER COEFFICIENT (Watt/m2-des.C) : 521
  
```

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MECH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
=====	=====	=====	=====	=====	=====	=====	=====	=====
	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<WT%>
H2	55.02	24.99	35.52	35.13	22.42	22.53	5.31	-----
CO	39.57	57.74	51.56	51.66	51.82	51.73	24.39	-----
CO2	4.70	16.16	12.34	12.34	14.93	14.89	64.32	-----
N2	0.13	0.52	0.40	0.38	0.46	0.47	0.17	-----
CH4	0.04	0.18	0.15	0.13	0.16	0.17	0.18	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.62
CH3OH	0.00	0.51	0.40	0.30	9.82	9.96	5.67	96.66
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.03
C2N5OH	-----	-----	-----	-----	-----	-----	-----	0.69
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.27
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.21
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.13
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	1.21
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.19
TOTAL :	99.45	100.11	100.37	99.95	99.62	99.67	100.11	100.00
DENS,g/cc	0.006	0.049	0.032	0.032	0.038	0.038	0.004	0.791
AV.MOL.WT	14.38	24.10	20.77	20.84	24.93	24.90	37.14	32.31
Nm3/hr	660.8	1263.2	1927.3	1924.0	1608.0	1609.1	7.2	-----
ksmol/hr	29.48	56.36	85.98	85.84	71.74	71.76	0.32	6.69
1/hr,prod	-----	-----	-----	-----	-----	-----	-----	273.33

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
		----	----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	47.1	46.6
CARBON MONOXIDE CONVERSION	(%) :	16.2	16.2
CARBON DIOXIDE CONVERSION	(%) :	-0.8	-1.1
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	1.96
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	44.1	45.0
CARBON MONOXIDE CONVERSION	(%) :	15.2	15.3
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	43.8	44.4
CARBON MONOXIDE CONVERSION	(%) :	15.2	15.1
RATIO H2 CONSUMED/CO CONSUMED	:	1.99	1.99

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL %
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (%) :	95.4	97.4
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.5

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEDH SOURCE	smol/hr-ks cat	ks/1000 Nm3 fresh feed	ks/1000 Nm3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	17.17	327.7	112.6
As Net MeOH produced, OVERALL balance	16.73	319.3	109.7

REACTOR FEED (H2/(CO+1.5CO2)) :	0.50
REACTOR FEED ((H2-CO2)/(CO+CO2)) :	0.36
APPROACH TO METHANOL EQUILIBRIUM (deg.C) :	10.29
APPROACH TO WATER-GAS EQUILIBRIUM (deg.C) :	15.43
METHANOL COLLECTED AS % OF CALCULATED :	96.5
CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) :	6.76

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	(% diff.)	(% diff.)	(% diff.)
H2	-34.92825	0.49621	-0.23841
CO	-16.46984	-0.31593	-0.32455
CO2	-20.14443	-0.94486	0.60259
N2	-224.95985	0.29333	-0.71050
CH4	n.a.	3.94835	-1.55527
H2O	-----	n.a.	n.a.
CH3OH	-----	9.72495	2.45056

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	44.3463	32.5424	4.6701	0.0867	-----	37.2992	15.8911
CO2	10.5939	9.1089	1.3072	0.2287	-----	10.6448	-0.4808
CH3OH	0.2610	0.2891	0.0415	0.0202	6.5220	6.8728	-2533.3252
OTHERS	0.1099	0.1043	0.0150	0.0011	0.1339	0.2542	-131.3245
TOTAL C	55.3111	42.0447	6.0337	0.3367	6.6559	55.0710	0.4341
HYDROGEN:							
H2	60.3067	28.1703	4.0426	0.0377	-----	32.2507	46.5222
H2O	0.0000	0.0000	0.0000	0.0000	0.1495	0.1495	n.a.
OTHERS	1.4835	1.5712	0.2255	0.0846	26.4897	28.3710	-1812.4952
TOTAL H	61.7901	29.7415	4.2681	0.1223	26.6393	60.7712	1.6490
OXYGEN:							
TOTAL O	65.7951	51.0504	7.3261	0.5646	6.6927	65.6338	0.2451
NITROGEN:							
TOTAL N	0.6575	0.5827	0.0836	0.0012	-----	0.6676	-1.5336
TOTAL MASS FLOW (ks/hr)	1788.8225	1357.9630	194.8766	13.2061	216.2147	1782.2605	0.3668

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]		FRESH FEED GAS
	GC#1	GC#2	[15-(50+62+68)]
MASS BALANCE (%) :	-0.10	0.00	-0.07
ELEMENTAL BALANCE (%) :			
CARBON	0.70	0.47	0.28
HYDROGEN	2.85	1.57	4.49
OXYGEN	0.44	0.23	-1.02
NITROGEN	1.69	-0.82	-10.72

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY
=====

DATE :	06-DEC-89
TIME :	10:41:57
TIME INTERVAL :	FROM: 0600 28-Oct
	TO: 0800 29-Oct
NUMBER OF AVERAGED HOURS :	26
RUN ID NUMBER :	E7.55
FEED GAS TYPE:	CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) :	139.5
OIL/SLURRY REACTOR INLET TEMP. (deg.C) :	24.1
AVG. REACTOR SLURRY TEMPERATURE (deg.C) :	249.8
REACTOR FREEBOARD TEMPERATURE (deg.C) :	241.1
OIL/SLURRY OUTLET TEMP. (deg.C) :	236.4
REACTOR FEED GAS PRESSURE (kPa) :	5359
REACTOR EFFLUENT GAS PRESSURE (kPa) :	5282
GAS SUPERFICIAL VELOCITY (cm/sec) :	7.7
LIQUID SUPERFICIAL VELOCITY (cm/sec) :	0.0
SLURRY CONCENTRATION (wt%) :	37.6
CATALYST OXIDE IN REACTOR (kg oxide) :	393
GAS HOLD-UP (%) :	29.9
SPACE VELOCITY (1/kg-hr) :	4877
RECYCLE/FRESH FEED RATIO :	2.015
OIL/SLURRY CIRCULATION RATE (m3/hr) :	0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) :	64.64
PURGE GAS FLOW RATE <50> (ksmol/hr) :	7.42
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) :	513

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEOH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
=====	=====	=====	=====	=====	=====	=====	=====	=====
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	55.24	24.78	35.26	34.98	22.20	22.30	5.31	-----
CO	39.26	57.62	51.64	51.62	51.85	51.76	24.39	-----
CO2	4.62	16.27	12.49	12.49	15.07	15.06	64.32	-----
N2	0.14	0.56	0.44	0.42	0.50	0.52	0.17	-----
CH4	0.05	0.23	0.19	0.17	0.21	0.22	0.16	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.64
CH3OH	0.00	0.47	0.39	0.27	9.72	9.70	5.67	96.73
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.03
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.67
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.26
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.21
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.13
ALKA+ENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	1.16
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.19
TOTAL :	99.32	99.94	100.40	99.95	99.57	99.58	100.11	100.00
DENS,g/cc	0.006	0.050	0.032	0.032	0.038	0.038	0.004	0.792
AV.MOL.WT	14.29	24.15	20.86	20.90	25.00	24.97	37.14	32.29
M3/hr	636.5	1282.7	1920.6	1919.2	1603.7	1604.6	6.8	-----
ksmol/hr	28.40	57.22	85.68	85.62	71.54	71.56	0.30	5.64
l/hr:prod	-----	-----	-----	-----	-----	-----	-----	270.58

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

CONVERSIONS ACROSS REACTOR :

	GC#1	GC#2
CALCULATED BY GAS COMPOSITION		
HYDROGEN CONVERSION (Z) :	47.2	47.0
CARBON MONOXIDE CONVERSION (Z) :	16.3	16.1
CARBON DIOXIDE CONVERSION (Z) :	-0.7	-0.9
RATIO H2 CONSUMED/CO CONSUMED :	1.98	1.99
CALCULATED BY METHANOL IN EXIT GAS		
HYDROGEN CONVERSION (Z) :	43.8	44.9
CARBON MONOXIDE CONVERSION (Z) :	14.9	15.2
CALCULATED BY OVERALL BALANCE		
HYDROGEN CONVERSION (Z) :	43.9	44.3
CARBON MONOXIDE CONVERSION (Z) :	15.0	15.1
RATIO H2 CONSUMED/CO CONSUMED :	1.99	1.99

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL %
CO (+CO2) SELECTIVITY TO METHANOL (Z) :	94.4	97.7
CO (+CO2) SELECTIVITY TO ETHANOL (Z) :		0.5

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	smol/hr-ks cat	ks/1000 Me3 fresh feed	ks/1000 Me3 reactor feed
As calculated ACROSS REACTOR	16.94	335.6	111.3
As Net MeOH produced, OVERALL balance	16.58	328.4	108.9

REACTOR FEED $(H_2/(CO+1.5CO_2))$: 0.50
 REACTOR FEED $((H_2-CO_2)/(CO+CO_2))$: 0.35

APPROACH TO METHANOL EQUILIBRIUM (des.C) : 10.61
 APPROACH TO WATER-GAS EQUILIBRIUM (des.C) : 17.09

METHANOL COLLECTED AS % OF CALCULATED : 97.1

CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) : 6.67

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	(% diff.)	(% diff.)	(% diff.)
H2	-33.12054	-0.28302	-0.93336
CO	-14.92002	-0.17040	-0.62922
CO2	-18.19836	-0.64814	0.45181
N2	-335.07809	-0.06968	-1.25214
CH4	n.a.	1.90308	0.75410
H2O	-----	n.a.	n.a.
CH3OH	-----	13.51295	2.29477

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	44.1968	32.9728	4.2745	0.0823	-----	37.3296	15.5378
CO2	10.6934	9.3116	1.2071	0.2171	-----	10.7358	-0.3961
CH3OH	0.2331	0.2695	0.0349	0.0191	6.4697	6.7933	-2814.4365
OTHERS	0.1456	0.1333	0.0173	0.0010	0.1328	0.2844	-95.3816
TOTAL C	55.2689	42.6872	5.5339	0.3195	6.6024	55.1430	0.2277
HYDROGEN:							
H2	59.8983	28.3559	3.6760	0.0358	-----	32.0677	46.4631
H2O	0.0000	0.0000	0.0000	0.0000	0.1516	0.1518	n.a.
OTHERS	1.5146	1.6114	0.2089	0.0803	26.2770	28.1775	-1760.3962
TOTAL H	61.4129	29.9673	3.8849	0.1161	26.4288	60.3970	1.6542
OXYGEN:							
TOTAL O	65.8167	51.8654	6.7237	0.5358	6.6376	65.7625	0.0824
NITROGEN:							
TOTAL N	0.7261	0.6466	0.0838	0.0012	-----	0.7316	-0.7656
TOTAL MASS FLOW (ks/hr)	1789.2601	1382.2013	179.1856	12.5323	214.3133	1788.2324	0.0574

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS
	GC#1	GC#2
	-----	-----
MASS BALANCE (Z) :	-0.02	0.02
ELEMENTAL BALANCE (Z) :		
CARBON	0.91	0.51
HYDROGEN	3.24	1.99
OXYGEN	0.63	0.30
NITROGEN	1.45	0.48
		[15-(50+62+68)]

		-0.06
		0.17
		3.19
		-0.89
		-7.68

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY
=====

DATE :	06-DEC-89
TIME :	10:43:37
TIME INTERVAL :	FROM: 1100 29-Oct
	TO: 0700 30-Oct
NUMBER OF AVERAGED HOURS :	20
RUN ID NUMBER :	E7.56
FEED GAS TYPE:	CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) :	153.4
OIL/SLURRY REACTOR INLET TEMP. (des.C) :	20.5
AVG. REACTOR SLURRY TEMPERATURE (des.C) :	249.7
REACTOR FREEBOARD TEMPERATURE (des.C) :	247.3
OIL/SLURRY OUTLET TEMP. (des.C) :	244.1
REACTOR FEED GAS PRESSURE (kPa) :	5509
REACTOR EFFLUENT GAS PRESSURE (kPa) :	5281
GAS SUPERFICIAL VELOCITY (cm/sec) :	15.5
LIQUID SUPERFICIAL VELOCITY (cm/sec) :	0.0
SLURRY CONCENTRATION (wt%) :	37.8
CATALYST OXIDE IN REACTOR (kg oxide) :	393
GAS HOLD-UP (%) :	34.7
SPACE VELOCITY (1/kg-hr) :	9788
RECYCLE/FRESH FEED RATIO :	3.348
OIL/SLURRY CIRCULATION RATE (m3/hr) :	0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) :	139.42
PURGE GAS FLOW RATE <50> (ksmol/hr) :	7.10
HEAT TRANSFER COEFFICIENT (Watt/m2-des.C) :	587

STREAM #	1	55	15	15	32	32	62	62
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEOH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT	=====	=====	=====	=====	=====	=====	=====	=====
	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<WT%>
H2	57.39	27.56	35.44	35.19	25.34	25.53	5.31	-----
CO	37.38	55.79	51.27	51.16	51.39	51.42	24.39	-----
CO2	4.11	15.21	12.50	12.48	14.36	14.34	64.32	-----
N2	0.13	0.64	0.53	0.51	0.59	0.60	0.17	-----
CH4	0.06	0.32	0.27	0.26	0.29	0.31	0.18	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.56
CH3OH	0.02	0.43	0.38	0.30	7.66	7.71	5.67	96.86
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.03
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.64
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.25
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.20
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.12
ALK+ENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	1.18
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
CIL	-----	-----	-----	-----	-----	-----	-----	0.17
TOTAL :	99.10	99.96	100.39	99.89	99.64	99.93	100.11	100.00
DENS,g/cc	0.006	0.050	0.032	0.032	0.036	0.036	n.a.	0.794
AV.MOL.WT	13.61	23.25	20.80	20.83	23.98	23.94	37.14	32.30
M3/hr	885.8	2966.0	3953.9	3951.9	3346.0	3349.0	12.8	-----
ksmol/hr	39.52	132.32	171.94	171.85	149.27	149.34	0.57	10.82
l/hr,prod	-----	-----	-----	-----	-----	-----	-----	440.21

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
		----	----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	37.4	37.5
CARBON MONOXIDE CONVERSION	(%) :	12.9	12.7
CARBON DIOXIDE CONVERSION	(%) :	0.3	0.0
RATIO H2 CONSUMED/CO CONSUMED	:	2.01	2.02
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	35.7	35.1
CARBON MONOXIDE CONVERSION	(%) :	12.3	12.4
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	35.4	35.7
CARBON MONOXIDE CONVERSION	(%) :	12.3	12.3
RATIO H2 CONSUMED/CO CONSUMED	:	1.99	1.99

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL *
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (%) :	95.4	98.5
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.5

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	smol/hr-kg cat	kg/1000 Na3 fresh feed	kg/1000 Na3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	27.69	394.2	90.7
As Net MeOH produced, OVERALL balance	27.02	384.7	88.5

REACTOR FEED (H2/(CO+1.5CO2)) :	0.50
REACTOR FEED ((H2-CO2)/(CO+CO2)) :	0.36
APPROACH TO METHANOL EQUILIBRIUM (des.C) :	22.41
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) :	-11.44
METHANOL COLLECTED AS % OF CALCULATED :	97.0
CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) :	10.90

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	(% diff.)	(% diff.)	(% diff.)
H2	-23.76120	-2.23341	-1.68457
CO	-5.67037	0.76642	-1.59455
CO2	-16.27881	1.44486	-0.84288
N2	-384.86554	2.72624	-1.27056
CH4	n.a.	1.66394	-1.92770
H2O	-----	n.a.	n.a.
CH3OH	-----	11.17561	2.06241

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	87.9131	73.8212	3.9615	0.1550	-----	77.9377	11.3469
CO2	21.4395	20.1288	1.0802	0.4088	-----	21.6178	-0.8315
CH3OH	0.5160	0.5722	0.0307	0.0360	10.5664	11.2053	-2071.7219
OTHERS	0.4416	0.4234	0.0227	0.0019	0.2164	0.6645	-50.4666
TOTAL C	110.3102	94.9456	5.0952	0.6017	10.7828	111.4254	-1.0109
HYDROGEN:							
H2	120.9454	72.9412	3.9143	0.0674	-----	76.9230	35.3986
H2O	0.0000	0.0000	0.0000	0.0000	0.2161	0.2161	n.a.
OTHERS	3.8304	3.9825	0.2137	0.1511	42.8067	47.1541	-1131.0343
TOTAL H	124.7758	76.9237	4.1280	0.2186	43.0229	124.2932	0.3969
OXYGEN:							
TOTAL O	131.3081	114.6510	6.1526	1.0089	10.8221	132.6347	-1.0103
NITROGEN:							
TOTAL N	1.7460	1.6937	0.0909	0.0022	-----	1.7868	-2.3408
TOTAL MASS FLOW (kg/hr)	3578.6973	3076.3562	165.0900	23.5992	349.5434	3614.5886	-1.0029

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]		FRESH FEED GAS
	GC#1	GC#2	[15-(50+62+68)]
MASS BALANCE (Z) :	0.02	-0.02	-0.06
ELEMENTAL BALANCE (Z) :			
CARBON	0.48	0.25	-0.30
HYDROGEN	1.59	1.29	-4.11
OXYGEN	0.42	0.21	0.26
NITROGEN	2.12	-1.06	7.97

LAFORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY
=====

DATE :	06-DEC-89
TIME :	10:44:57
TIME INTERVAL :	FROM: 0700 30-Oct
	TO: 1800 30-Oct
NUMBER OF AVERAGED HOURS :	11
RUN ID NUMBER :	E7.57A
FEED GAS TYPE:	CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) :	154.7
OIL/SLURRY REACTOR INLET TEMP. (des.C) :	19.9
AVG. REACTOR SLURRY TEMPERATURE (des.C) :	249.9
REACTOR FREEBOARD TEMPERATURE (des.C) :	247.4
OIL/SLURRY OUTLET TEMP. (des.C) :	244.3
REACTOR FEED GAS PRESSURE (kPa) :	5506
REACTOR EFFLUENT GAS PRESSURE (kPa) :	5281
GAS SUPERFICIAL VELOCITY (cm/sec) :	15.4
LIQUID SUPERFICIAL VELOCITY (cm/sec) :	0.0
SLURRY CONCENTRATION (wt%) :	37.7
CATALYST OXIDE IN REACTOR (kg oxide) :	393
GAS HOLD-UP (%) :	34.5
SPACE VELOCITY (1/kg-hr) :	9707
RECYCLE/FRESH FEED RATIO :	3.409
OIL/SLURRY CIRCULATION RATE (m3/hr) :	0.0
PROD. SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) :	138.47
PURGE GAS FLOW RATE <50> (ksmol/hr) :	6.72
HEAT TRANSFER COEFFICIENT (Watt/m2-des.C) :	587

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
=====	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<WT%>
H2	57.69	27.60	35.43	35.24	25.35	25.53	5.31	-----
CO	37.23	55.58	51.11	51.01	51.31	51.20	24.39	-----
CO2	3.90	15.09	12.36	12.36	14.22	14.23	54.32	-----
N2	0.12	0.62	0.52	0.50	0.57	0.58	0.17	-----
CH4	0.13	0.65	0.53	0.52	0.59	0.63	0.18	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.54
CH3OH	0.00	0.44	0.39	0.30	7.68	7.72	5.67	96.87
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.03
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.64
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.25
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.20
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.12
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	1.19
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.17
TOTAL :	99.07	99.99	100.34	99.92	99.71	99.91	100.11	100.00
DENS,g/cc	0.005	0.049	0.032	0.032	0.036	0.036	0.004	0.793
AV.MOL.WT	13.49	23.18	20.75	20.76	23.92	23.88	37.14	32.31
Mm3/hr	866.4	2953.2	3823.6	3819.7	3315.4	3318.4	12.1	-----
ksmol/hr	38.65	131.75	170.59	170.41	147.91	147.98	0.54	10.64
1/hr,prod	-----	-----	-----	-----	-----	-----	-----	433.53

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2

CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(Z) :	37.5	37.6
CARBON MONOXIDE CONVERSION	(Z) :	13.1	12.7
CARBON DIOXIDE CONVERSION	(Z) :	0.1	0.1
RATIO H2 CONSUMED/CO CONSUMED	:	1.99	2.04
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(Z) :	35.6	36.1
CARBON MONOXIDE CONVERSION	(Z) :	12.4	12.5
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(Z) :	35.2	35.4
CARBON MONOXIDE CONVERSION	(Z) :	12.2	12.3
RATIO H2 CONSUMED/CO CONSUMED	:	1.99	1.99

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL %

CO (+CO2) SELECTIVITY TO METHANOL (Z) :	96.2	98.5
CO (+CO2) SELECTIVITY TO ETHANOL (Z) :	-----	0.5

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEDH SOURCE	saol/hr-ks cat	ks/1000 Na3 fresh feed	ks/1000 Na3 reactor feed
-----			
As calculated ACROSS REACTOR	27.46	399.7	90.6
As Net MeOH produced, OVERALL balance	26.58	386.8	87.7

REACTOR FEED $\{H_2/(CO+1.5CO_2)\}$: 0.51
 REACTOR FEED $\{(H_2-CO_2)/(CO+CO_2)\}$: 0.36

APPROACH TO METHANOL EQUILIBRIUM (deg.C) : 22.15
 APPROACH TO WATER-GAS EQUILIBRIUM (deg.C) : -13.53

METHANOL COLLECTED AS % OF CALCULATED : 96.2

CALCULATED METHANOL PRODUCTION RATE (Ksaol/hr) : 10.91

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-22.19732	-2.35319	-2.03332
CO	-4.74401	0.79380	-1.61631
CO2	-11.66750	1.53776	-1.17936
N2	-516.52582	2.71279	-1.92603
CH4	n.a.	2.99578	-4.25435
H2O	-----	n.a.	n.a.
CH3OH	-----	11.72290	2.77440

OVERALL ELEMENTAL BALANCE (Kg-atoms/hr) :

	INPUTS		OUTPUTS				(IN-OUT)/IN
STREAM # STREAM NAME	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	86.9257	73.2312	3.7343	0.1460	-----	77.1115	11.2903
CO2	21.0575	19.8790	1.0137	0.3951	-----	21.2778	-1.0463
CH3OH	0.5160	0.5845	0.0298	0.0340	10.3937	11.0419	-2039.9935
OTHERS	0.8827	0.8617	0.0439	0.0018	0.2128	1.1203	-24.9116
TOTAL C	109.3819	94.5563	4.8218	0.5669	10.6065	110.5515	-1.0693
HYDROGEN:							
H2	120.0942	72.7305	3.7088	0.0635	-----	76.5029	34.2976
H2O	0.0000	0.0000	0.0000	0.0000	0.2053	0.2053	n.a.
OTHERS	5.5948	5.7847	0.2950	0.1424	42.2132	48.4353	-765.7193
TOTAL H	125.6890	78.5152	4.0038	0.2059	42.4186	125.1435	0.4340
OXYGEN:							
TOTAL O	129.5567	113.5736	5.7915	0.9506	10.6423	130.9581	-1.0917
NITROGEN:							
TOTAL N	1.6871	1.6390	0.0836	0.0021	-----	1.7247	-2.2302
TOTAL MASS FLOW (kg/hr)	3538.5476	3054.0444	155.7366	22.2348	343.8109	3575.8267	-1.0535

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS
	GC#1	GC#2
	-----	-----
MASS BALANCE (%) :	0.12	0.00
ELEMENTAL BALANCE (%) :		
CARBON	0.56	0.22
HYDROGEN	1.60	1.44
OXYGEN	0.48	0.20
NITROGEN	2.86	-0.30
		[15-(50+62+68)]

		-0.09
		-0.31
		-4.10
		0.12
		9.91

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

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DATE : 06-DEC-89
TIME : 10:46:26
TIME INTERVAL : FROM: 1900 30-Oct
                TO: 0600 31-Oct

NUMBER OF AVERAGED HOURS : 12
RUN ID NUMBER : E7.578
FEED GAS TYPE: CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 151.4
OIL/SLURRY REACTOR INLET TEMP. (deg.C) : 20.2
AVG. REACTOR SLURRY TEMPERATURE (deg.C) : 249.8
REACTOR FREEBOARD TEMPERATURE (deg.C) : 247.3
OIL/SLURRY OUTLET TEMP. (deg.C) : 244.3
REACTOR FEED GAS PRESSURE (kPa) : 5504
REACTOR EFFLUENT GAS PRESSURE (kPa) : 5291
GAS SUPERFICIAL VELOCITY (cm/sec) : 15.4
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 0.0
SLURRY CONCENTRATION (wt%) : 37.7
CATALYST OXIDE IN REACTOR (kg oxide) : 393
GAS HOLD-UP (%) : 34.5
SPACE VELOCITY (1/kg-hr) : 9714
RECYCLE/FRESH FEED RATIO : 3.640
OIL/SLURRY CIRCULATION RATE (m3/hr) : 0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 138.92
PURGE GAS FLOW RATE <50> (ksmol/hr) : 5.14
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) : 584
  
```

STREAM #	1	55	15	15	32	32	62	69
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEOH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	58.82	27.12	35.07	34.85	25.00	25.11	5.31	-----
CO	36.94	57.98	53.12	52.92	53.52	53.53	24.39	-----
CO2	2.93	13.09	10.69	10.71	12.33	12.35	64.32	-----
N2	0.14	0.88	0.73	0.69	0.81	0.83	0.17	-----
CH4	0.07	0.47	0.40	0.38	0.43	0.47	0.18	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.54
CH3OH	0.00	0.40	0.39	0.30	7.57	7.64	5.67	96.87
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.03
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.64
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.24
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.20
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.12
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	1.19
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.17
TOTAL :	98.91	99.94	100.39	99.85	99.66	99.95	100.11	100.00
DENS,g/cc	0.005	0.049	0.032	0.032	0.036	0.036	0.004	0.794
AV.MOL.WT	13.02	23.00	20.60	20.61	23.72	23.71	37.14	32.31
M3/hr	823.8	2998.6	3823.2	3822.5	3321.0	3322.0	9.8	-----
ksmol/hr	36.75	133.77	170.56	170.53	148.16	148.14	0.44	10.59
l/hr,prod	-----	-----	-----	-----	-----	-----	-----	430.97

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
		----	----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	37.8	37.7
CARBON MONOXIDE CONVERSION	(%) :	12.4	12.1
CARBON DIOXIDE CONVERSION	(%) :	-0.4	0.0
RATIO H2 CONSUMED/CO CONSUMED	:	2.01	2.05
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	35.6	36.0
CARBON MONOXIDE CONVERSION	(%) :	11.7	11.9
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	35.4	35.6
CARBON MONOXIDE CONVERSION	(%) :	11.7	11.9
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL *
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (%) :	96.4	98.4
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.5

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	smol/hr-kg cat	kg/1000 Na3 fresh feed	kg/1000 Na3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	27.13	415.3	99.5
As Net MeOH produced, OVERALL balance	26.41	404.3	97.1

REACTOR FEED (H2/(CO+1.5CO2)) : 0.51
 REACTOR FEED ((H2-CO2)/(CO+CO2)) : 0.39

APPROACH TO METHANOL EQUILIBRIUM (des.C) : 22.93
 APPROACH TO WATER-GAS EQUILIBRIUM (des.C) : -2.32

METHANOL COLLECTED AS % OF CALCULATED : 96.9

CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) : 10.69

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<Z diff.>	<Z diff.>	<Z diff.>
H2	-20.30943	-2.66553	-1.78134
CO	-4.70054	0.98745	-1.72897
CO2	-7.18014	1.75652	-1.27019
N2	-376.01828	3.03894	-1.60960
CH4	n.a.	1.98618	-2.76116
H2O	-----	n.a.	n.a.
CH3OH	-----	5.69640	2.54398

OVERALL ELEMENTAL BALANCE (Kg-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	90.2424	77.5652	2.9830	0.1189	-----	90.6671	10.6107
CO2	18.2589	17.5071	0.6733	0.3137	-----	18.4940	-1.2875
CH3OH	0.5077	0.5384	0.0207	0.0277	10.3450	10.9317	-2053.2461
OTHERS	0.6480	0.6354	0.0244	0.0015	0.2118	0.8732	-34.7474
TOTAL C	109.6571	96.2461	3.7014	0.4617	10.5569	110.9660	-1.1937
HYDROGEN:							
H2	118.8783	72.5540	2.7902	0.0517	-----	75.3960	36.5772
H2O	0.0000	0.0000	0.0000	0.0000	0.2044	0.2044	n.a.
OTHERS	4.6228	4.6951	0.1806	0.1160	42.0156	47.0073	-916.8484
TOTAL H	123.5011	77.2491	2.9708	0.1677	42.2200	122.6076	0.7235
OXYGEN:							
TOTAL O	127.2680	113.1177	4.3502	0.7742	10.5924	128.8344	-1.2308
NITROGEN:							
TOTAL N	2.3704	2.3411	0.0900	0.0017	-----	2.4328	-2.6316
TOTAL MASS FLOW (kg/hr)	3514.8477	3077.3508	118.3468	18.1079	342.2071	3556.0127	-1.1712

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS
	GC#1	GC#2
	GC#1	GC#2
MASS BALANCE (%) :	0.00	0.01
ELEMENTAL BALANCE (%) :		
CARBON	0.49	0.22
HYDROGEN	1.98	1.61
OXYGEN	0.35	0.18
NITROGEN	1.55	-1.01

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES : ANALYTICAL SUMMARY
=====

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DATE :                                06-DEC-99
TIME :                                10:48:08
TIME INTERVAL :                       FROM: 0600 31-Oct
                                         TO:  0600 01-Nov

NUMBER OF AVERAGED HOURS :            24
RUN ID NUMBER :                       E7.59
FEED GAS TYPE:                        CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 144.4
OIL/SLURRY REACTOR INLET TEMP. (deg.C) : 16.6
AVG. REACTOR SLURRY TEMPERATURE (deg.C) : 249.6
REACTOR FREEBOARD TEMPERATURE (deg.C) : 246.9
OIL/SLURRY OUTLET TEMP. (deg.C) :     243.1
REACTOR FEED GAS PRESSURE (kPa) :     5503
REACTOR EFFLUENT GAS PRESSURE (kPa) :  5281
GAS SUPERFICIAL VELOCITY (cm/sec) :   15.4
LIQUID SUPERFICIAL VELOCITY (cm/sec) :  0.0
SLURRY CONCENTRATION (wt%) :          37.6
CATALYST OXIDE IN REACTOR (kg oxide) :  393
GAS HOLD-UP (%) :                     34.2
SPACE VELOCITY (1/kg-hr) :            9698
RECYCLE/FRESH FEED RATIO :            3.622
OIL/SLURRY CIRCULATION RATE (m3/hr) :  0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 138.62
PURGE GAS FLOW RATE <50> (ksmol/hr) :   5.20
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) : 577
  
```

STREAM #	1	55	15	15	32	32	62	69
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEOH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT	=====	=====	=====	=====	=====	=====	=====	=====
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	58.56	26.99	34.99	34.82	24.96	25.25	5.33	-----
CO	36.53	56.18	51.30	51.34	51.88	51.47	23.55	-----
CO2	3.62	15.32	12.58	12.60	14.45	14.46	66.96	-----
N2	0.14	0.89	0.73	0.72	0.82	0.84	0.25	-----
CH4	0.05	0.32	0.26	0.25	0.29	0.31	0.26	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.63
CH3OH	0.00	0.34	0.36	0.25	7.45	7.54	3.84	97.21
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.51
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.19
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.16
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.10
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	1.00
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.18
TOTAL :	98.90	100.03	100.21	99.98	99.74	99.89	100.23	100.00
DENS,g/cc	0.006	0.050	0.033	0.033	0.037	0.036	0.005	0.797
AV.MOL.WT	13.20	23.42	20.92	20.95	24.11	24.02	37.46	32.22
Na3/hr	825.6	2990.6	3819.3	3816.4	3317.7	3324.0	12.0	-----
ksmol/hr	36.83	133.42	170.39	170.26	148.01	148.23	0.54	10.62
1/hr,prod	-----	-----	-----	-----	-----	-----	-----	429.27

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

=====

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
		----	----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	37.2	37.9
CARBON MONOXIDE CONVERSION	(%) :	12.7	12.2
CARBON DIOXIDE CONVERSION	(%) :	0.0	0.3
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.11
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	35.4	35.8
CARBON MONOXIDE CONVERSION	(%) :	12.1	12.1
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	35.5	35.7
CARBON MONOXIDE CONVERSION	(%) :	12.0	12.0
RATIO H2 CONSUMED/CO CONSUMED	:	2.01	2.01

SELECTIVITIES :

	ACROSS REACTOR	OVERALL
	GC Average	%
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (%) :	97.3	99.0
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.4

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	smol/hr-kg cat	kg/1000 Nm3 fresh feed	kg/1000 Nm3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	26.89	410.6	88.8
As Net MeOH produced, OVERALL balance	26.48	404.4	87.5

REACTOR FEED (H2/(CO+1.5CO2)) : 0.50

REACTOR FEED ((H2-CO2)/(CO+CO2)) : 0.35

APPROACH TO METHANOL EQUILIBRIUM (des.C) : 22.51

APPROACH TO WATER-GAS EQUILIBRIUM (des.C) : -3.90

METHANOL COLLECTED AS % OF CALCULATED : 98.1

CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) : 10.58

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<u><% diff.></u>	<u><% diff.></u>	<u><% diff.></u>
H2	-20.42734	-2.95331	-1.76117
CO	-4.94129	1.12797	-1.61105
CO2	-9.34260	1.48060	-1.15155
N2	-297.08655	0.27670	-1.43234
CH4	n.a.	3.25366	-2.73927
H2O	-----	n.a.	n.a.
CH3OH	-----	7.44642	1.33209

OVERALL ELEMENTAL BALANCE (Kg-atoms/hr) :

	INPUTS		OUTPUTS				(IN-OUT)/IN
STREAM # STREAM NAME	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	87.4139	74.9569	2.9216	0.1412	-----	79.0198	10.7467
CO2	21.4478	20.4360	0.7965	0.4015	-----	21.6340	-0.8682
CH3OH	0.4200	0.4530	0.0177	0.0230	10.3796	10.8733	-2489.1221
OTHERS	0.4274	0.4229	0.0165	0.0021	0.1062	0.5477	-28.1630
TOTAL C	109.7090	96.2689	3.7523	0.5678	10.4857	111.0748	-1.2449
HYDROGEN:							
H2	118.5666	72.0283	2.8075	0.0639	-----	74.8997	36.8290
H2O	0.0000	0.0000	0.0000	0.0000	0.2382	0.2382	n.a.
OTHERS	3.3893	3.5038	0.1366	0.1000	42.0491	45.7895	-1251.0176
TOTAL H	121.9559	75.5321	2.9441	0.1639	42.2873	120.9274	0.8433
OXYGEN:							
TOTAL O	130.7295	116.2819	4.5324	0.9675	10.6180	132.3998	-1.2777
NITROGEN:							
TOTAL N	2.4654	2.3669	0.0923	0.0030	-----	2.4622	0.1305
TOTAL MASS FLOW (kg/hr)	3566.6353	3124.0386	121.7676	22.4627	342.1432	3610.4119	-1.2274

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS
	<u>GC#1</u>	<u>[15-(50+62+68)]</u>
MASS BALANCE (%) :	0.07	-0.03
ELEMENTAL BALANCE (%) :		
CARBON	0.45	0.01
HYDROGEN	1.59	-5.04
OXYGEN	0.34	0.03
NITROGEN	0.01	9.55

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY
=====

DATE : 06-DEC-99
TIME : 12:55:34
TIME INTERVAL : FROM: 0600 01-Nov TO: 0600 02-Nov
NUMBER OF AVERAGED HOURS : 24
RUN ID NUMBER : E7.59
FEED GAS TYPE: CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 149.5
OIL/SLURRY REACTOR INLET TEMP. (deg.C) : 15.8
AVG. REACTOR SLURRY TEMPERATURE (deg.C) : 249.9
REACTOR FREEBOARD TEMPERATURE (deg.C) : 247.3
OIL/SLURRY OUTLET TEMP. (deg.C) : 244.3
REACTOR FEED GAS PRESSURE (kPa) : 5507
REACTOR EFFLUENT GAS PRESSURE (kPa) : 5282
GAS SUPERFICIAL VELOCITY (cm/sec) : 15.4
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 0.0
SLURRY CONCENTRATION (wt%) : 37.7
CATALYST OXIDE IN REACTOR (kg oxide) : 393
GAS HOLD-UP (%) : 34.5
SPACE VELOCITY (1/kg-hr) : 9717
RECYCLE/FRESH FEED RATIO : 3.709
OIL/SLURRY CIRCULATION RATE (m3/hr) : 0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 138.96
PURGE GAS FLOW RATE <50> (ksmol/hr) : 4.59
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) : 592

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEOH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT	=====	=====	=====	=====	=====	=====	=====	=====
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	59.12	27.19	35.06	34.77	25.10	25.14	5.35	-----
CO	36.21	55.50	50.96	51.07	51.15	51.18	23.27	-----
CO2	3.43	15.47	12.72	12.73	14.60	14.61	67.67	-----
N2	0.15	1.02	0.84	0.81	0.94	0.96	0.27	-----
CH4	0.05	0.36	0.30	0.28	0.33	0.35	0.28	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.76
CH3OH	0.00	0.36	0.37	0.27	7.52	7.53	3.37	97.42
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.38
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.14
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.11
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.07
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.87
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.23
TOTAL :	98.96	99.90	100.25	99.94	99.64	99.79	100.26	100.00
DENS,g/cc	0.005	0.050	0.033	0.033	0.036	0.036	0.005	0.797
AV.MOL.WT	13.03	23.38	20.92	20.99	24.07	24.06	37.54	32.15
Mm3/hr	912.0	3011.8	3827.8	3823.8	3331.8	3332.4	12.1	-----
ksmol/hr	36.22	134.37	170.77	170.59	148.64	148.60	0.54	10.64
l/hr,prod	-----	-----	-----	-----	-----	-----	-----	429.13

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
		----	----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	37.6	37.1
CARBON MONOXIDE CONVERSION	(%) :	12.6	12.7
CARBON DIOXIDE CONVERSION	(%) :	0.0	0.1
RATIO H2 CONSUMED/CO CONSUMED	:	2.06	1.99
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	35.3	36.1
CARBON MONOXIDE CONVERSION	(%) :	12.1	12.3
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	35.3	35.6
CARBON MONOXIDE CONVERSION	(%) :	12.1	12.1
RATIO H2 CONSUMED/CO CONSUMED	:	2.01	2.01

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL *
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (%) :	96.6	98.9
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.3

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEDH SOURCE	kmol/hr-kg cat	kg/1000 Nm3 fresh feed	kg/1000 Nm3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	27.03	419.8	89.1
As Net MeOH produced, OVERALL balance	26.52	411.9	97.5
REACTOR FEED (H2/(CO+1.5CO2)) :		0.50	
REACTOR FEED ((H2-CO2)/(CO+CO2)) :		0.35	
APPROACH TO METHANOL EQUILIBRIUM (deg.C) :		22.15	
APPROACH TO WATER-GAS EQUILIBRIUM (deg.C) :		5.34	
METHANOL COLLECTED AS % OF CALCULATED :		97.8	
CALCULATED METHANOL PRODUCTION RATE (Kmol/hr) :		10.64	

LAPORTE LPHETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1455)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-20.80864	-2.34719	-1.38494
CO	-4.94082	0.65057	-1.61375
CO2	-8.71254	1.39105	-0.90129
N2	-357.67087	2.21648	-1.14740
CH4	n.a.	2.94867	-2.41067
H2O	-----	n.a.	n.a.
CH3OH	-----	5.81191	2.22020

OVERALL ELEMENTAL BALANCE (Kg-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	87.1204	74.5747	2.5497	0.1401	-----	77.2644	11.3130
CO2	21.7195	20.7838	0.7106	0.4073	-----	21.9017	-0.8387
CH3OH	0.4600	0.4884	0.0167	0.0203	10.3990	10.9244	-2274.6687
OTHERS	0.4828	0.4797	0.0164	0.0022	0.1064	0.6047	-25.2495
TOTAL C	109.7828	96.3266	3.2934	0.5698	10.5054	110.6953	-0.8312
HYDROGEN:							
H2	118.6318	73.0792	2.4986	0.0645	-----	75.6422	36.2378
H2O	0.0000	0.0000	0.0000	0.0000	0.2901	0.2901	n.a.
OTHERS	3.7712	3.8725	0.1324	0.0894	41.9153	46.0096	-1120.0101
TOTAL H	122.4031	76.9517	2.6310	0.1538	42.2054	121.9419	0.3768
OXYGEN:							
TOTAL O	131.0196	116.6307	3.9876	0.9752	10.6400	132.2335	-0.9255
NITROGEN:							
TOTAL N	2.7806	2.7357	0.0935	0.0033	-----	2.8325	-1.8669
TOTAL MASS FLOW (kg/hr)	3578.1296	3141.0835	107.3930	22.5989	342.0334	3613.1089	-0.9776

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS
	GC#1	GC#2
	-----	-----
MASS BALANCE (%) :	-0.13	0.00
ELEMENTAL BALANCE (%) :		
CARBON	0.33	0.35
HYDROGEN	2.15	0.95
OXYGEN	0.25	0.30
NITROGEN	0.36	-0.71
		10.30

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

```

DATE : 06-DEC-88
TIME : 12:57:10
TIME INTERVAL : FROM: 0600 02-Nov
                TO: 0600 03-Nov

NUMBER OF AVERAGED HOURS : 24
RUN ID NUMBER : E7.60
FEED GAS TYPE: CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) : 153.2
OIL/SLURRY REACTOR INLET TEMP. (des.C) : 17.5
AVG. REACTOR SLURRY TEMPERATURE (des.C) : 249.9
REACTOR FREEBOARD TEMPERATURE (des.C) : 247.1
OIL/SLURRY OUTLET TEMP. (des.C) : 244.5
REACTOR FEED GAS PRESSURE (kPa) : 5508
REACTOR EFFLUENT GAS PRESSURE (kPa) : 5282
GAS SUPERFICIAL VELOCITY (cm/sec) : 15.4
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 0.0
SLURRY CONCENTRATION (wt%) : 37.6
CATALYST OXIDE IN REACTOR (kg oxide) : 393
GAS HOLD-UP (%) : 34.2
SPACE VELOCITY (1/kg-hr) : 9716
RECYCLE/FRESH FEED RATIO : 3.613
OIL/SLURRY CIRCULATION RATE (m3/hr) : 0.0
PROD. SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 138.66
PURGE GAS FLOW RATE <50> (ksmol/hr) : 5.10
HEAT TRANSFER COEFFICIENT (Watt/m2-des.C) : 595
  
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STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
=====	=====	=====	=====	=====	=====	=====	=====	=====
<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	59.08	27.47	35.25	35.14	25.28	25.32	5.36	-----
CO	36.38	55.73	51.27	51.18	51.41	51.44	23.27	-----
CO2	3.33	14.89	12.23	12.16	14.03	14.01	67.67	-----
N2	0.17	1.11	0.90	0.88	1.02	1.04	0.27	-----
CH4	0.05	0.31	0.26	0.24	0.29	0.30	0.28	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.80
CH3OH	0.01	0.43	0.39	0.32	7.59	7.57	3.37	97.42
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.37
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.13
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.11
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.07
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.86
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.23
TOTAL :	99.02	99.92	100.31	99.93	99.62	99.72	100.26	100.00
DENS,g/cc	0.005	0.049	0.032	0.032	0.036	0.036	0.004	0.793
AV.MOL.WT	13.03	23.22	20.81	20.79	23.94	23.93	37.54	32.13
Nm3/hr	828.6	2993.7	3822.9	3822.4	3320.3	3321.1	11.7	-----
ksmol/hr	36.97	133.56	170.55	170.53	148.13	148.10	0.52	10.63
l/hr,prod	-----	-----	-----	-----	-----	-----	-----	430.70

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
		----	----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	37.6	37.5
CARBON MONOXIDE CONVERSION	(%) :	12.8	12.9
CARBON DIOXIDE CONVERSION	(%) :	0.5	-0.2
RATIO H2 CONSUMED/CO CONSUMED	:	2.02	2.02
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	35.1	35.7
CARBON MONOXIDE CONVERSION	(%) :	12.1	12.2
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	35.1	35.2
CARBON MONOXIDE CONVERSION	(%) :	12.0	12.1
RATIO H2 CONSUMED/CO CONSUMED	:	2.01	2.01

SELECTIVITIES :

		ACROSS REACTOR GC Average	OVERALL %
		-----	-----
CO (+CO2) SELECTIVITY TO METHANOL	(%) :	94.8	98.8
CO (+CO2) SELECTIVITY TO ETHANOL	(%) :	-----	0.3

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	smol/hr-kg cat	kg/1000 Me3 fresh feed	kg/1000 Me3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	26.99	410.6	89.0
As Net MeOH produced, OVERALL balance	26.50	403.2	97.4

REACTOR FEED (H2/(CO+1.5CO2)) :	0.51
REACTOR FEED ((H2-CO2)/(CO+CO2)) :	0.36
APPROACH TO METHANOL EQUILIBRIUM (des.C) :	22.40
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) :	10.35
METHANOL COLLECTED AS % OF CALCULATED :	97.8
CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) :	10.62

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-21.60667	-2.39105	-1.76319
CO	-5.16870	0.68240	-1.65029
CO2	-8.57607	1.72600	-1.15396
N2	-724.56012	2.72515	-2.23737
CH4	n.a.	3.73203	-0.81477
H2O	-----	n.a.	n.a.
CH3OH	-----	3.70405	2.15789

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	87.2758	74.4279	2.8398	0.1363	-----	77.4040	11.3111
CO2	20.7412	19.8738	0.7583	0.3963	-----	21.0283	-1.3843
CH3OH	0.5531	0.5692	0.0217	0.0197	10.3848	10.9955	-1087.9240
OTHERS	0.4144	0.4127	0.0157	0.0021	0.1063	0.5369	-29.5591
TOTAL C	108.9845	95.2836	3.6356	0.5544	10.4911	109.9646	-0.8993
HYDROGEN:							
H2	119.8397	73.3647	2.7993	0.0627	-----	76.2267	36.3928
H2O	0.0000	0.0000	0.0000	0.0000	0.3022	0.3022	n.a.
OTHERS	3.8700	3.9277	0.1499	0.0869	41.8581	46.0226	-1089.2207
TOTAL H	123.7097	77.2924	2.9491	0.1497	42.1603	122.5515	0.9362
OXYGEN:							
TOTAL O	129.3114	114.7446	4.3782	0.9488	10.6300	130.7016	-1.0751
NITROGEN:							
TOTAL N	3.0183	2.9757	0.1135	0.0032	-----	3.0925	-2.4565
TOTAL MASS FLOW (ks/hr)	3545.7712	3101.2717	118.3311	21.9858	341.5634	3583.1519	-1.0542

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS
	GC#1	GC#2
	-----	-----
MASS BALANCE (%) :	0.09	0.00
ELEMENTAL BALANCE (%) :		
CARBON	0.70	0.35
HYDROGEN	2.36	1.73
OXYGEN	0.63	0.27
NITROGEN	0.22	-0.21

		[15-(50+62+68)]

		-0.01
		0.15
		-3.41
		-0.25
		9.19

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

```

DATE :                                06-DEC-99
TIME :                                12:58:39
TIME INTERVAL :                       FROM: 0600 03-Nov
                                         TO:  0600 04-Nov

NUMBER OF AVERAGED HOURS :            24
RUN ID NUMBER :                       E7.61
FEED GAS TYPE :                       CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 155.0
OIL/SLURRY REACTOR INLET TEMP. (deg.C) : 21.9
AVG. REACTOR SLURRY TEMPERATURE (deg.C) : 249.8
REACTOR FREEBOARD TEMPERATURE (deg.C) : 246.7
OIL/SLURRY OUTLET TEMP. (deg.C) :     244.0
REACTOR FEED GAS PRESSURE (kPa) :     5507
REACTOR EFFLUENT GAS PRESSURE (kPa) :  5282
GAS SUPERFICIAL VELOCITY (cm/sec) :   15.3
LIQUID SUPERFICIAL VELOCITY (cm/sec) :  0.0
SLURRY CONCENTRATION (wt%) :          37.6
CATALYST OXIDE IN REACTOR (kg oxide) :  393
GAS HOLD-UP (%) :                     34.3
SPACE VELOCITY (1/kg-hr) :            9665
RECYCLE/FRESH FEED RATIO :            3.622
OIL/SLURRY CIRCULATION RATE (m3/hr) :  0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 138.19
PURGE GAS FLOW RATE <50> (ksmol/hr) :  5.26
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) : 584
  
```

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEOH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
H2	58.67	27.58	35.51	35.23	25.45	25.46	5.36	-----
CO	36.75	55.45	50.92	50.98	51.05	51.09	23.27	-----
CO2	3.49	14.92	12.21	12.24	14.04	14.06	67.67	-----
H2	0.20	1.18	0.96	0.95	1.08	1.11	0.27	-----
CH4	0.05	0.27	0.23	0.21	0.25	0.24	0.28	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.78
CH3OH	0.03	0.51	0.44	0.36	7.68	7.68	3.37	97.51
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.37
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.14
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.11
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.07
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.81
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.18
TOTAL :	99.18	99.91	100.28	99.98	99.55	99.69	100.26	100.00
DENS,g/cc	0.005	0.049	0.032	0.032	0.036	0.036	0.005	0.790
AV.MOL.WT	13.19	23.20	20.74	20.79	23.90	23.90	37.54	32.12
km3/hr	822.7	2979.7	3807.3	3802.3	3305.2	3305.0	11.5	-----
ksmol/hr	36.70	132.93	169.86	169.63	147.46	147.38	0.51	10.61
1/hrmprod	-----	-----	-----	-----	-----	-----	-----	431.37

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
		----	----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	37.8	37.2
CARBON MONOXIDE CONVERSION	(%) :	12.9	13.0
CARBON DIOXIDE CONVERSION	(%) :	0.1	0.3
RATIO H2 CONSUMED/CO CONSUMED	:	2.04	1.98
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	35.0	35.9
CARBON MONOXIDE CONVERSION	(%) :	12.2	12.4
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	35.0	35.3
CARBON MONOXIDE CONVERSION	(%) :	12.2	12.2
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL *
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (%) :	94.8	98.8
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.3

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	smol/hr-kg cat	kg/1000 Nm3 fresh feed	kg/1000 Nm3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	27.05	414.5	89.7
As Net MeOH produced, OVERALL balance	26.48	405.8	87.8

REACTOR FEED (H2/(CO+1.5CO2)) :	0.51
REACTOR FEED ((H2-CO2)/(CO+CO2)) :	0.36
APPROACH TO METHANOL EQUILIBRIUM (deg.C) :	22.36
APPROACH TO WATER-GAS EQUILIBRIUM (deg.C) :	8.65
METHANOL COLLECTED AS % OF CALCULATED :	97.5
CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) :	10.64

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-21.27507	-2.71182	-1.62628
CO	-3.50252	0.81852	-1.96901
CO2	-7.63210	1.66433	-1.47214
N2	n.a.	1.97020	-2.12916
CH4	n.a.	2.96379	-2.09095
H2O	-----	n.a.	n.a.
CH3OH	-----	12.84093	1.92540

OVERALL ELEMENTAL BALANCE (Kg-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	86.4826	73.7068	2.9157	0.1336	-----	76.7561	11.2468
CO2	20.7665	19.8375	0.7847	0.3886	-----	21.0108	-1.1760
CH3OH	0.6038	0.6836	0.0270	0.0194	10.3715	11.1015	-1739.5956
OTHERS	0.3630	0.3576	0.0141	0.0021	0.1061	0.4799	-32.2057
TOTAL C	108.2160	94.5854	3.7416	0.5436	10.4776	109.3483	-1.0463
HYDROGEN:							
H2	119.5374	73.3147	2.9002	0.0615	-----	76.2763	36.1904
H2O	0.0000	0.0000	0.0000	0.0000	0.2966	0.2966	n.a.
OTHERS	3.8673	4.1647	0.1647	0.0853	41.8043	46.2190	-1095.1323
TOTAL H	123.4047	77.4794	3.0649	0.1468	42.1009	122.7920	0.4965
OXYGEN:							
TOTAL O	128.6195	114.0653	4.5121	0.9304	10.6116	130.1195	-1.1662
NITROGEN:							
TOTAL N	3.2163	3.1319	0.1239	0.0031	-----	3.2589	-1.3264
TOTAL MASS FLOW (kg/hr)	3526.3433	3084.5549	122.0175	21.5600	340.8035	3568.9358	-1.2078

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS
	GC#1	GC#2 [15-(50+62+68)]
MASS BALANCE (%) :	-0.06	0.06
ELEMENTAL BALANCE (%) :		
CARBON	0.56	0.51
HYDROGEN	2.56	1.30
OXYGEN	0.46	0.48
NITROGEN	-0.32	0.79

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY
=====

DATE :	04-DEC-89
TIME :	13:00:05
TIME INTERVAL :	FROM: 0600 04-Nov
	TO: 0600 05-Nov
NUMBER OF AVERAGED HOURS :	24
RUN ID NUMBER :	E7.62
FEED GAS TYPE:	CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) :	154.4
OIL/SLURRY REACTOR INLET TEMP. (des.C) :	24.2
AUG. REACTOR SLURRY TEMPERATURE (des.C) :	249.9
REACTOR FREEBOARD TEMPERATURE (des.C) :	246.8
OIL/SLURRY OUTLET TEMP. (des.C) :	243.7
REACTOR FEED GAS PRESSURE (kPa) :	5506
REACTOR EFFLUENT GAS PRESSURE (kPa) :	5284
GAS SUPERFICIAL VELOCITY (cm/sec) :	15.3
LIQUID SUPERFICIAL VELOCITY (cm/sec) :	0.0
SLURRY CONCENTRATION (wt%) :	37.5
CATALYST OXIDE IN REACTOR (kg oxide) :	393
GAS HOLD-UP (%) :	34.0
SPACE VELOCITY (1/kg-hr) :	9679
RECYCLE/FRESH FEED RATIO :	3.499
OIL/SLURRY CIRCULATION RATE (m3/hr) :	0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) :	138.08
PURGE GAS FLOW RATE <50> (ksmol/hr) :	5.96
HEAT TRANSFER COEFFICIENT (Watt/m2-des.C) :	582

STREAM #	1	55	15	15	32	32	62	48
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEOH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
=====	=====	=====	=====	=====	=====	=====	=====	=====
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	58.07	27.55	35.10	35.21	25.37	24.57	5.36	-----
CO	36.41	55.56	51.05	51.09	51.27	51.06	23.27	-----
CO2	3.70	14.90	12.21	12.22	14.06	13.93	67.67	-----
N2	0.17	1.22	0.98	0.97	1.12	1.11	0.27	-----
CH4	0.28	0.24	0.20	0.19	0.22	0.25	0.28	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.78
CH3OH	0.00	0.50	0.44	0.35	7.63	7.62	3.37	97.55
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.38
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.14
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.11
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.07
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.80
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.16
TOTAL :	98.63	99.97	99.98	100.03	99.67	98.56	100.26	100.00
DENS,g/cc	0.005	0.049	0.032	0.032	0.036	0.037	0.004	0.791
AV.MOL.WT	13.27	23.22	20.83	20.80	23.93	24.07	37.54	32.11
M3/hr	946.5	2961.5	3806.4	3808.0	3309.6	3299.8	11.4	-----
ksmol/hr	37.76	132.12	169.81	169.89	147.65	147.15	0.51	10.64
1/hr:prod	-----	-----	-----	-----	-----	-----	-----	432.05

LAPORTE LPETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

=====

CONVERSIONS ACROSS REACTOR :

	GC#1	GC#2
	----	----
CALCULATED BY GAS COMPOSITION		
HYDROGEN CONVERSION (%) :	39.3	37.4
CARBON MONOXIDE CONVERSION (%) :	13.3	12.8
CARBON DIOXIDE CONVERSION (%) :	1.1	0.0
RATIO H2 CONSUMED/CO CONSUMED :	2.03	2.01
CALCULATED BY METHANOL IN EXIT GAS		
HYDROGEN CONVERSION (%) :	35.1	35.7
CARBON MONOXIDE CONVERSION (%) :	12.1	12.3
CALCULATED BY OVERALL BALANCE		
HYDROGEN CONVERSION (%) :	35.5	35.4
CARBON MONOXIDE CONVERSION (%) :	12.2	12.2
RATIO H2 CONSUMED/CO CONSUMED :	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL *
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (%) :	92.6	100.2
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.3

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEDH SOURCE	smol/hr-kg cat	kg/1000 Na3 fresh feed	kg/1000 Na3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	26.87	400.1	88.9
As Net MeOH produced, OVERALL balance	26.57	395.7	98.0

REACTOR FEED $\{H_2/(CO+1.5CO_2)\}$: 0.51

REACTOR FEED $\{(H_2-CO_2)/(CO+CO_2)\}$: 0.36

APPROACH TO METHANOL EQUILIBRIUM (deg.C) : 22.39

APPROACH TO WATER-GAS EQUILIBRIUM (deg.C) : 8.61

METHANOL COLLECTED AS % OF CALCULATED : 98.4

CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) : 10.57

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-22.78996	-2.54983	-1.60616
CO	-3.80615	0.40595	-1.51217
CO2	-11.94453	1.55430	-0.95649
N2	-686.29517	2.11633	-2.66863
CH4	n.a.	23.83753	-2.00540
H2O	-----	n.a.	n.a.
CH3OH	-----	10.00049	1.30525

OVERALL ELEMENTAL BALANCE (Kg-atoms/hr) :

	INPUTS		OUTPUTS				(IN-OUT)/IN
STREAM # STREAM NAME	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	86.7990	73.4038	3.3088	0.1323	-----	76.8449	11.4679
CO2	20.7569	19.6877	0.8974	0.3849	-----	20.9501	-0.9790
CH3OH	0.5983	0.6648	0.0300	0.0192	10.4043	11.1182	-1758.3638
OTHERS	0.3245	0.3184	0.0144	0.0021	0.1064	0.4413	-35.9885
TOTAL C	108.4786	94.0747	4.2405	0.5385	10.5107	109.3645	-0.8166
HYDROGEN:							
H2	119.6247	72.7894	3.2811	0.0609	-----	76.1315	36.3581
H2O	0.0000	0.0000	0.0000	0.0000	0.2952	0.2952	n.a.
OTHERS	3.6911	3.9327	0.1773	0.0845	41.9365	46.1309	-1149.8029
TOTAL H	123.3157	76.7221	3.4584	0.1454	42.2317	122.5576	0.6148
OXYGEN:							
TOTAL O	128.9110	113.4440	5.1136	0.9216	10.6433	130.1226	-0.9398
NITROGEN:							
TOTAL N	3.2890	3.2317	0.1457	0.0031	-----	3.3805	-2.7822
TOTAL MASS FLOW (kg/hr)	3533.3225	3067.2456	138.2601	21.3557	341.7678	3568.6292	-0.9997

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS
	GC#1	GC#2
	-----	-----
MASS BALANCE (%) :	-0.21	0.00
ELEMENTAL BALANCE (%) :		
CARBON	1.14	0.39
HYDROGEN	3.89	1.63
OXYGEN	1.13	0.33
NITROGEN	2.38	-0.11
		-15.89

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

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DATE :                                06-DEC-89
TIME :                                13:01:34
TIME INTERVAL :                       FROM: 0600 05-Nov
                                         TO: 0600 06-Nov

NUMBER OF AVERAGED HOURS :            24
RUN ID NUMBER :                       E7.63
FEED GAS TYPE:                        CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 159.5
OIL/SLURRY REACTOR INLET TEMP. (deg.C) : 21.5
AVG. REACTOR SLURRY TEMPERATURE (deg.C) : 249.9
REACTOR FREEBOARD TEMPERATURE (deg.C) : 247.0
OIL/SLURRY OUTLET TEMP. (deg.C) :     243.9
REACTOR FEED GAS PRESSURE (kPa) :      5509
REACTOR EFFLUENT GAS PRESSURE (kPa) :   5284
GAS SUPERFICIAL VELOCITY (cm/sec) :    15.3
LIQUID SUPERFICIAL VELOCITY (cm/sec) :  0.0
SLURRY CONCENTRATION (wt%) :           37.5
CATALYST OXIDE IN REACTOR (kg oxide) :  393
GAS HOLD-UP (%) :                     34.0
SPACE VELOCITY (1/kg-hr) :            9584
RECYCLE/FRESH FEED RATIO :            3.488
OIL/SLURRY CIRCULATION RATE (m3/hr) :  0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 137.90
PURGE GAS FLOW RATE <50> (ksmol/hr) :  5.80
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) : 587
  
```

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDM PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	59.61	37.60	35.33	35.20	25.41	25.36	5.36	-----
CO	36.69	55.69	51.25	51.17	51.39	51.35	23.27	-----
CO2	3.65	14.84	12.19	12.14	14.02	14.00	67.67	-----
N2	0.18	1.11	0.91	0.89	1.03	1.03	0.27	-----
CH4	0.08	0.27	0.23	0.22	0.25	0.27	0.28	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.74
CH3OH	0.03	0.38	0.37	0.27	7.62	7.67	3.37	97.55
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.01
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.37
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.13
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.11
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.07
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.87
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.16
TOTAL :	99.24	99.90	100.27	99.89	99.71	99.70	100.26	100.00
DENS,g/cc	0.005	0.050	0.032	0.032	0.036	0.036	0.004	0.796
AV.MOL.WT	13.24	23.18	20.78	20.77	23.91	23.92	37.54	32.13
Nm3/hr	848.9	2961.1	3809.2	3810.0	3309.7	3309.1	11.6	-----
ksmol/hr	37.87	132.10	169.94	169.98	147.65	147.56	0.52	10.76
l/hr,prod	-----	-----	-----	-----	-----	-----	-----	434.07

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
		----	----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	37.6	37.3
CARBON MONOXIDE CONVERSION	(%) :	13.0	12.8
CARBON DIOXIDE CONVERSION	(%) :	0.2	-0.3
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.01
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	35.6	36.1
CARBON MONOXIDE CONVERSION	(%) :	12.3	12.4
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	35.6	35.7
CARBON MONOXIDE CONVERSION	(%) :	12.2	12.3
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR	OVERALL
	GC Average	*
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (%) :	96.0	99.1
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.3

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEDH SOURCE	kmol/hr-kg cat	kg/1000 Nm3 fresh feed	kg/1000 Nm3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	27.30	405.4	90.3
As Net MeOH produced, OVERALL balance	26.85	398.7	88.9

REACTOR FEED {H2/(CO+1.5CO2)} :	0.51
REACTOR FEED {(H2-CO2)/(CO+CO2)} :	0.36
APPROACH TO METHANOL EQUILIBRIUM (des.C) :	22.51
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) :	6.59
METHANOL COLLECTED AS % OF CALCULATED :	98.0
CALCULATED METHANOL PRODUCTION RATE (Kmol/hr) :	10.74

LAPORTE LPHETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1455)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-23.32109	-2.00446	-1.55810
CO	-5.03085	0.55693	-1.39026
CO2	-10.89917	1.61807	-0.73548
N2	-655.61530	1.60883	-0.83746
CH4	n.a.	6.76116	-1.98561
H2O	-----	n.a.	n.a.
CH3OH	-----	11.13795	1.57558

OVERALL ELEMENTAL BALANCE (Kg-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	86.9757	73.5669	3.2292	0.1350	-----	76.9312	11.5487
CO2	20.6404	19.5975	0.8602	0.3926	-----	20.8503	-1.0173
CH3OH	0.4606	0.5084	0.0223	0.0196	10.5190	11.0694	-2303.4639
OTHERS	0.3672	0.3620	0.0159	0.0021	0.1076	0.4875	-32.7822
TOTAL C	108.4438	94.0348	4.1277	0.5492	10.6266	109.3383	-0.8249
HYDROGEN:							
H2	119.6777	72.9342	3.2015	0.0621	-----	76.1978	36.3308
H2O	0.0000	0.0000	0.0000	0.0000	0.2846	0.2846	n.a.
OTHERS	3.3108	3.4816	0.1528	0.0861	42.3988	46.1194	-1292.9837
TOTAL H	122.9885	76.4158	3.3543	0.1483	42.6935	122.6018	0.3144
OXYGEN:							
TOTAL O	128.7170	113.2704	4.9720	0.9399	10.7560	129.9384	-0.9489
NITROGEN:							
TOTAL N	3.0256	2.9380	0.1290	0.0032	-----	3.0701	-1.4714
TOTAL MASS FLOW (kg/hr)	3530.7708	3062.0195	134.4079	21.7814	345.5369	3563.7458	-0.9339

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]		FRESH FEED GAS
	GC#1	GC#2	[15-(50+62+68)]
MASS BALANCE (%) :	-0.01	0.00	-0.07
ELEMENTAL BALANCE (%) :			
CARBON	0.59	0.23	0.11
HYDROGEN	1.88	1.21	-3.65
OXYGEN	0.52	0.15	0.02
NITROGEN	0.98	-0.63	3.61

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

```

DATE : 06-DEC-89
TIME : 13:03:07
TIME INTERVAL : FROM: 0600 06-Nov
                TO: 0600 07-Nov

NUMBER OF AVERAGED HOURS : 24
RUN ID NUMBER : E7.64
FEED GAS TYPE: CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) : 165.5
OIL/SLURRY REACTOR INLET TEMP. (des.C) : 19.1
AVG. REACTOR SLURRY TEMPERATURE (des.C) : 250.0
REACTOR FREEBOARD TEMPERATURE (des.C) : 247.1
OIL/SLURRY OUTLET TEMP. (des.C) : 244.5
REACTOR FEED GAS PRESSURE (kPa) : 5513
REACTOR EFFLUENT GAS PRESSURE (kPa) : 5284
GAS SUPERFICIAL VELOCITY (cm/sec) : 15.3
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 0.0
SLURRY CONCENTRATION (wt%) : 37.6
CATALYST OXIDE IN REACTOR (kg oxide) : 393
GAS HOLD-UP (%) : 34.1
SPACE VELOCITY (1/kg-hr) : 9677
RECYCLE/FRESH FEED RATIO : 3.520
OIL/SLURRY CIRCULATION RATE (m3/hr) : 0.0
PROD. SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 137.92
PURGE GAS FLOW RATE <50> (ksmol/hr) : 5.66
HEAT TRANSFER COEFFICIENT (Watt/m2-des.C) : 591
  
```

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
=====	=====	=====	=====	=====	=====	=====	=====	=====
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	58.67	27.56	35.39	35.16	25.38	25.48	5.36	-----
CO	36.66	55.44	50.97	50.98	51.07	51.11	23.27	-----
CO2	3.66	15.08	12.39	12.36	14.24	14.25	67.67	-----
N2	0.18	1.08	0.87	0.86	0.99	1.00	0.27	-----
CH4	0.05	0.31	0.26	0.25	0.29	0.30	0.28	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.72
CH3OH	0.00	0.41	0.37	0.29	7.61	7.56	3.37	97.56
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.01
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.36
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.13
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.11
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.07
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.90
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.14
TOTAL :	99.22	99.88	100.26	99.89	99.57	99.72	100.26	100.00
DENS, g/cc	0.005	0.050	0.031	0.031	0.036	0.036	0.005	0.795
AV. MOL. WT	13.22	23.23	20.79	20.82	23.94	23.92	37.54	32.13
Na3/hr	842.3	2964.6	3809.8	3807.0	3309.4	3310.9	12.1	-----
ksmol/hr	37.58	132.26	169.97	169.84	147.64	147.64	0.54	10.67
1/hr, prod	-----	-----	-----	-----	-----	-----	-----	431.37

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
		----	----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(Z) :	37.4	37.2
CARBON MONOXIDE CONVERSION	(Z) :	12.9	12.9
CARBON DIOXIDE CONVERSION	(Z) :	0.1	-0.1
RATIO H2 CONSUMED/CO CONSUMED	:	2.02	1.99
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(Z) :	35.0	36.0
CARBON MONOXIDE CONVERSION	(Z) :	12.2	12.4
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(Z) :	35.3	35.5
CARBON MONOXIDE CONVERSION	(Z) :	12.2	12.2
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL %
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (Z) :	95.4	99.8
CO (+CO2) SELECTIVITY TO ETHANOL (Z) :	-----	0.3

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	saol/hr-ks cat	ks/1000 Ma3 fresh feed	ks/1000 Ma3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	27.05	494.8	89.6
As Net MeOH produced, OVERALL balance	26.65	398.9	88.3

REACTOR FEED {H2/(CO+1.5CO2)} :	0.51
REACTOR FEED {(H2-CO2)/(CO+CO2)} :	0.36
APPROACH TO METHANOL EQUILIBRIUM (des.C) :	22.32
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) :	2.96
METHANOL COLLECTED AS % OF CALCULATED :	98.1
CALCULATED METHANOL PRODUCTION RATE (Ksaol/hr) :	10.64

LAPORTE LPMEETHANOL PROCESS AVERAGE REPORT MATERIAL BALANCE SUMMARY

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-23.88481	-2.06856	-1.52770
CO	-5.20642	0.60237	-1.60224
CO2	-10.33069	1.51957	-0.88204
N2	-702.29877	2.60351	-1.54714
CH4	n.a.	2.32923	-1.62306
H2O	-----	n.a.	n.a.
CH3OH	-----	7.77551	1.93656

OVERALL ELEMENTAL BALANCE (Kg-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	86.5815	73.3312	3.1371	0.1399	-----	76.6082	11.5190
CO2	20.9940	19.9437	0.8532	0.4070	-----	21.2039	-0.9998
CH3OH	0.4970	0.5389	0.0231	0.0203	10.4415	11.0238	-2119.1240
OTHERS	0.4212	0.4113	0.0176	0.0022	0.1067	0.5378	-27.6913
TOTAL C	108.4937	94.2251	4.0309	0.5694	10.5483	109.3737	-0.8111
HYDROGEN:							
H2	119.4185	72.9026	3.1187	0.0644	-----	76.0858	36.2854
H2O	0.0000	0.0000	0.0000	0.0000	0.2734	0.2734	n.a.
OTHERS	3.6728	3.8009	0.1626	0.0893	42.0864	46.1392	-1156.2518
TOTAL H	123.0913	76.7035	3.2813	0.1537	42.3598	122.4984	0.4917
OXYGEN:							
TOTAL O	129.0666	113.7575	4.8665	0.9745	10.6735	130.2720	-0.9340
NITROGEN:							
TOTAL N	2.9043	2.8436	0.1216	0.0033	-----	2.9686	-2.2137
TOTAL MASS FLOW (kg/hr)	3535.5776	3071.7773	131.4090	22.5918	342.9605	3568.7785	-0.9376

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS
	GC#1	GC#2 [15-(50+62+68)]
MASS BALANCE (%) :	0.00	0.01
ELEMENTAL BALANCE (%) :		
CARBON	0.57	0.38
HYDROGEN	2.31	1.21
OXYGEN	0.47	0.30
NITROGEN	0.25	-0.66
		0.14
		-3.66
		0.06
		9.65

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

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=====
DATE :                                06-DEC-89
TIME :                                13:04:40
TIME INTERVAL :                       FROM: 0600 07-Nov
                                         TO:  0600 08-Nov

NUMBER OF AVERAGED HOURS :            24
RUN ID NUMBER :                       E7.65
FEED GAS TYPE:                        CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) : 168.4
OIL/SLURRY REACTOR INLET TEMP. (des.C) : 22.3
AVG. REACTOR SLURRY TEMPERATURE (des.C) : 250.2
REACTOR FREEBOARD TEMPERATURE (des.C) : 246.7
OIL/SLURRY OUTLET TEMP. (des.C) :     244.0
PEACTOR FEED GAS PRESSURE (kPa) :     5516
REACTOR EFFLUENT GAS PRESSURE (kPa) :   5284
GAS SUPERFICIAL VELOCITY (cm/sec) :    15.3
LIQUID SUPERFICIAL VELOCITY (cm/sec) :    0.0
SLURRY CONCENTRATION (wt%) :           37.7
CATALYST OXIDE IN REACTOR (ks oxide) :   393
GAS HOLD-UP (Z) :                      34.4
SPACE VELOCITY (1/ks-hr) :              9668
RECYCLE/FRESH FEED RATIO :              3.562
OIL/SLURRY CIRCULATION RATE (m3/hr) :    0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 138.24
PURGE GAS FLOW RATE <50> (ksmol/hr) :    5.75
HEAT TRANSFER COEFFICIENT (Watt/m2-des.C) : 588
  
```

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEOH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT	=====	=====	=====	=====	=====	=====	=====	=====
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	58.60	27.58	35.36	35.10	25.42	25.56	5.36	-----
CO	36.80	55.49	51.04	51.04	51.18	51.21	23.27	-----
CO2	3.62	15.17	12.44	12.44	14.34	14.28	67.67	-----
N2	0.16	0.91	0.74	0.73	0.84	0.85	0.27	-----
CH4	0.06	0.34	0.28	0.27	0.31	0.33	0.28	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.72
CH3OH	0.01	0.54	0.47	0.40	7.66	7.67	3.37	97.56
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.01
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.36
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.13
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.11
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.07
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.90
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.14
TOTAL :	99.24	100.02	100.34	99.98	99.77	99.90	100.26	100.00
DENS,g/cc	0.005	0.049	0.031	0.031	0.036	0.036	0.004	0.789
AV.MOL.WT	13.24	23.24	20.81	20.85	23.96	23.92	37.54	32.13
Mm3/hr	833.7	2969.8	3806.7	3803.5	3310.1	3312.7	11.3	-----
ksmol/hr	37.19	132.49	169.83	169.68	147.67	147.72	0.51	10.52
l/hr,prod	-----	-----	-----	-----	-----	-----	-----	428.23

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		<u>GC#1</u>	<u>GC#2</u>
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	37.1	37.0
CARBON MONOXIDE CONVERSION	(%) :	12.7	12.7
CARBON DIOXIDE CONVERSION	(%) :	0.1	-0.3
RATIO H2 CONSUMED/CO CONSUMED	:	2.02	2.00
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	35.1	35.7
CARBON MONOXIDE CONVERSION	(%) :	12.2	12.3
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	34.8	35.1
CARBON MONOXIDE CONVERSION	(%) :	12.0	12.1
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.00

SELECTIVITIES :

	<u>ACROSS REACTOR</u> <u>GC Average</u>	<u>OVERALL</u> <u>*</u>
CO (+CO2) SELECTIVITY TO METHANOL (%) :	96.3	99.9
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.3

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	<u>smol/hr-kg cat</u>	<u>kg/1000 Na3 fresh feed</u>	<u>kg/1000 Na3 reactor feed</u>
As calculated ACROSS REACTOR	26.94	407.3	89.3
As Net MeOH produced, OVERALL balance	26.28	397.3	87.1

REACTOR FEED $\{H_2/(CO+1.5CO_2)\}$: 0.50
 REACTOR FEED $\{(H_2-CO_2)/(CO+CO_2)\}$: 0.36

APPROACH TO METHANOL EQUILIBRIUM (des.C) : 21.99
 APPROACH TO WATER-GAS EQUILIBRIUM (des.C) : 1.34

METHANOL COLLECTED AS % OF CALCULATED : 97.1

CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) : 10.60

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-23.57293	-2.08463	-1.63334
CO	-4.48107	0.67187	-1.66027
CO2	-9.57681	1.52317	-0.84604
N2	-979.67975	2.77546	-1.28068
CH4	n.a.	3.30222	-1.38396
H2O	-----	n.a.	n.a.
CH3OH	-----	5.76644	2.37774

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	86.6137	73.5134	3.1915	0.1315	-----	76.8364	11.2884
CO2	21.1172	20.0974	0.8725	0.3825	-----	21.3524	-1.1135
CH3OH	0.6744	0.7123	0.0309	0.0190	10.2872	11.0495	-1538.5045
OTHERS	0.4565	0.4505	0.0196	0.0020	0.1052	0.5772	-26.4595
TOTAL C	108.8617	94.7735	4.1145	0.5351	10.3924	109.8155	-0.8761
HYDROGEN:							
H2	119.1083	73.0814	3.1728	0.0605	-----	76.3148	35.9282
H2O	0.0000	0.0000	0.0000	0.0000	0.2693	0.2693	n.a.
OTHERS	4.5233	4.6510	0.2019	0.0839	41.4643	46.4012	-925.8353
TOTAL H	123.6315	77.7324	3.3747	0.1445	41.7337	122.9853	0.5227
OXYGEN:							
TOTAL O	129.5225	114.4204	4.9675	0.9157	10.5157	130.8194	-1.0013
NITROGEN:							
TOTAL N	2.4638	2.4166	0.1049	0.0031	-----	2.5246	-2.4682
TOTAL MASS FLOW (kg/hr)	3538.0894	3079.0657	133.6759	21.2194	337.8914	3571.8528	-0.9543

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS [15-(50+62+68)]
	GC#1	GC#2
MASS BALANCE (%) :	-0.01	0.01
ELEMENTAL BALANCE (%) :		
CARBON	0.44	0.30
HYDROGEN	1.87	1.14
OXYGEN	0.38	0.21
NITROGEN	0.78	-1.17

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

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DATE : 06-DEC-89
TIME : 13:06:00
TIME INTERVAL : FROM: 0600 08-Nov
                TO: 0600 09-Nov

NUMBER OF AVERAGED HOURS : 22
RUN ID NUMBER : E7.66
FEED GAS TYPE: CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 171.0
OIL/SLURRY REACTOR INLET TEMP. (deg.C) : 24.4
AVG. REACTOR SLURRY TEMPERATURE (deg.C) : 250.2
REACTOR FREEBOARD TEMPERATURE (deg.C) : 247.0
OIL/SLURRY OUTLET TEMP. (deg.C) : 244.5
REACTOR FEED GAS PRESSURE (kPa) : 5515
REACTOR EFFLUENT GAS PRESSURE (kPa) : 5283
GAS SUPERFICIAL VELOCITY (cm/sec) : 15.3
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 0.0
SLURRY CONCENTRATION (wt%) : 37.6
CATALYST OXIDE IN REACTOR (kg oxide) : 393
GAS HOLD-UP (%) : 34.3
SPACE VELOCITY (1/kg-hr) : 9682
RECYCLE/FRESH FEED RATIO : 3.508
OIL/SLURRY CIRCULATION RATE (m3/hr) : 0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 138.34
PURGE GAS FLOW RATE <50> (ksmol/hr) : 6.10
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) : 590
  
```

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
=====	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	59.47	27.66	35.46	35.15	25.50	25.58	5.36	-----
CO	36.98	55.68	51.25	51.22	51.37	51.44	23.27	-----
CO2	3.62	14.85	12.19	12.16	14.01	14.00	67.67	-----
N2	0.18	0.99	0.80	0.79	0.91	0.92	0.27	-----
CH4	0.05	0.30	0.25	0.23	0.27	0.28	0.28	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.77
CH3OH	0.00	0.55	0.47	0.41	7.66	7.32	3.37	97.56
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.01
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.36
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.13
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.11
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.07
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.90
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.14
TOTAL :	99.31	100.02	100.41	99.95	99.73	99.54	100.26	100.00
DENS,g/cc	0.005	0.049	0.031	0.031	0.036	0.036	0.004	0.789
AV.MOL.WT	13.28	23.17	20.75	20.80	23.89	23.84	37.54	32.13
m3/hr	844.9	2964.2	3811.1	3809.0	3315.4	3318.8	11.2	-----
ksmol/hr	37.69	132.24	170.02	169.93	147.91	148.00	0.50	10.54
l/hr,prod	-----	-----	-----	-----	-----	-----	-----	429.35

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

CONVERSIONS ACROSS REACTOR :

	GC#1	GC#2
CALCULATED BY GAS COMPOSITION		
HYDROGEN CONVERSION (%) :	37.2	36.8
CARBON MONOXIDE CONVERSION (%) :	12.6	12.7
CARBON DIOXIDE CONVERSION (%) :	0.0	-0.3
RATIO H2 CONSUMED/CO CONSUMED :	2.04	1.99
CALCULATED BY METHANOL IN EXIT GAS		
HYDROGEN CONVERSION (%) :	33.3	35.6
CARBON MONOXIDE CONVERSION (%) :	11.5	12.2
CALCULATED BY OVERALL BALANCE		
HYDROGEN CONVERSION (%) :	34.8	35.1
CARBON MONOXIDE CONVERSION (%) :	12.0	12.0
RATIO H2 CONSUMED/CO CONSUMED :	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL *
CO (+CO2) SELECTIVITY TO METHANOL (%) :	94.2	98.8
CO (+CO2) SELECTIVITY TO ETHANOL (%) :		0.3

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	kmol/hr-kg cat	kg/1000 Na3 fresh feed	kg/1000 Na3 reactor feed
As calculated ACROSS REACTOR	26.29	392.3	87.0
As Net MeOH produced, OVERALL balance	26.35	393.2	87.2

REACTOR FEED $\{H_2/(CO+1.5CO_2)\}$: 0.51
 REACTOR FEED $\{(H_2-CO_2)/(CO+CO_2)\}$: 0.36

APPROACH TO METHANOL EQUILIBRIUM (des.C) : 22.25
 APPROACH TO WATER-GAS EQUILIBRIUM (des.C) : 2.82

METHANOL COLLECTED AS % OF CALCULATED : 99.7

CALCULATED METHANOL PRODUCTION RATE (Kmol/hr) : 10.34

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-18.51741	-1.89258	-1.50978
CO	-4.76599	0.61983	-1.55507
CO2	-9.80367	1.58720	-0.93661
N2	-902.77460	2.06743	-1.57637
CH4	n.a.	3.25868	-2.17265
H2O	-----	n.a.	n.a.
CH3OH	-----	4.75255	2.14938

OVERALL ELEMENTAL BALANCE (Kg-atoms/hr) :

	INPUTS		OUTPUTS				(IN-OUT)/IN
STREAM # STREAM NAME	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	87.0305	73.6330	3.3970	0.1301	-----	77.1602	11.3412
CO2	20.6688	19.6364	0.9059	0.3785	-----	20.9208	-1.2194
CH3OH	0.6902	0.7239	0.0334	0.0189	10.3142	11.0904	-1506.7347
OTHERS	0.3976	0.3914	0.0181	0.0020	0.1054	0.5169	-30.0043
TOTAL C	108.7871	94.3848	4.3543	0.5295	10.4196	109.6883	-0.8284
HYDROGEN:							
H2	119.4449	73.1477	3.3746	0.0599	-----	76.5822	35.8849
H2O	0.0000	0.0000	0.0000	0.0000	0.2700	0.2700	n.a.
OTHERS	4.3515	4.4615	0.2058	0.0830	41.5731	46.3234	-944.5308
TOTAL H	123.7964	77.6092	3.5804	0.1430	41.8431	123.1756	0.5015
OXYGEN:							
TOTAL O	129.0583	113.6299	5.2422	0.9061	10.5433	130.3215	-0.9798
NITROGEN:							
TOTAL N	2.6849	2.6051	0.1202	0.0031	-----	2.7284	-1.6193
TOTAL MASS FLOW (kg/hr)	3533.7275	3064.5503	141.3796	20.9980	338.7774	3565.7053	-0.9049

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS [15-(50+62+68)]
MASS BALANCE (%) :	GC#1	GC#2
ELEMENTAL BALANCE (%) :	-----	-----
CARBON	-0.02	0.02
HYDROGEN	0.84	0.15
OXYGEN	3.69	-3.18
NITROGEN	0.70	-0.11
	0.10	9.68

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

```

DATE : 06-DEC-90
TIME : 13:07:33
TIME INTERVAL : FROM: 0600 09-Nov
                TO: 0600 10-Nov

NUMBER OF AVERAGED HOURS : 24
RUN ID NUMBER : E7.67
FEED GAS TYPE: CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 169.5
OIL/SLURRY REACTOR INLET TEMP. (deg.C) : 24.9
AVG. REACTOR SLURRY TEMPERATURE (deg.C) : 250.0
REACTOR FREEBOARD TEMPERATURE (deg.C) : 246.6
OIL/SLURRY OUTLET TEMP. (deg.C) : 243.9
REACTOR FEED GAS PRESSURE (kPa) : 5518
REACTOR EFFLUENT GAS PRESSURE (kPa) : 5282
GAS SUPERFICIAL VELOCITY (cm/sec) : 15.3
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 0.0
SLURRY CONCENTRATION (wt%) : 37.6
CATALYST OXIDE IN REACTOR (kg oxide) : 393
GAS HOLD-UP (Z) : 34.2
SPACE VELOCITY (1/kg-hr) : 9680
RECYCLE/FRESH FEED RATIO : 3.506
OIL/SLURRY CIRCULATION RATE (m3/hr) : 0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 138.36
PURGE GAS FLOW RATE <50> (ksmol/hr) : 6.17
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) : 588
  
```

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDH PRODUCT
ON-LINE EC#	1	2	1	2	2	1		
COMPONENT								
=====	=====	=====	=====	=====	=====	=====	=====	=====
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	58.33	27.69	35.40	35.19	25.58	25.61	5.36	-----
CO	36.97	55.55	51.08	51.09	51.23	51.24	23.27	-----
CO2	3.66	14.86	12.19	12.19	14.05	14.01	67.67	-----
N2	0.19	1.01	0.82	0.81	0.93	0.94	0.27	-----
CH4	0.05	0.29	0.25	0.23	0.27	0.28	0.28	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.85
CH3OH	0.00	0.56	0.47	0.40	7.68	7.67	3.37	97.58
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.01
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.36
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.14
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.11
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.07
ALK+ENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.75
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.12
TOTAL :	99.19	99.96	100.21	99.91	99.73	99.76	100.26	100.00
DENS,g/cc	0.005	0.049	0.031	0.031	0.035	0.035	0.004	0.789
AV.MOL.WT	13.31	23.16	20.76	20.78	23.87	23.86	37.54	32.07
Nm3/hr	845.1	2963.1	3811.5	3808.4	3315.4	3316.4	11.3	-----
ksmol/hr	37.70	132.19	170.04	169.90	147.91	147.89	0.50	10.55
l/hr,prod	-----	-----	-----	-----	-----	-----	-----	428.68

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
		----	----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	37.0	36.7
CARBON MONOXIDE CONVERSION	(%) :	12.7	12.7
CARBON DIOXIDE CONVERSION	(%) :	0.0	-0.3
RATIO H2 CONSUMED/CO CONSUMED	:	2.02	1.99
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	35.1	35.7
CARBON MONOXIDE CONVERSION	(%) :	12.1	12.3
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	34.8	35.1
CARBON MONOXIDE CONVERSION	(%) :	12.0	12.0
RATIO H2 CONSUMED/CO CONSUMED	:	2.01	2.01

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL *
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (%) :	96.4	98.9
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.3

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	kmol/hr-kg cat	kg/1000 Nm3 fresh feed	kg/1000 Nm3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	26.98	402.4	89.3
As Net MeOH produced, OVERALL balance	26.32	392.6	87.1

REACTOR FEED (H2/(CO+1.5CO2)) :	0.51
REACTOR FEED ((H2-CO2)/(CO+CO2)) :	0.36
APPROACH TO METHANOL EQUILIBRIUM (deg.C) :	22.42
APPROACH TO WATER-GAS EQUILIBRIUM (deg.C) :	12.90
METHANOL COLLECTED AS % OF CALCULATED :	97.1
CALCULATED METHANOL PRODUCTION RATE (Kmol/hr) :	10.61

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	PURE GASES - 13 FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-17.02848	-2.03506	-1.35841
CO	-4.69340	0.64442	-1.60238
CO2	-9.70921	1.50459	-0.78684
N2	n.a.	2.27923	-1.51794
CH4	n.a.	3.16741	-1.47103
H2O	-----	n.a.	n.a.
CH3OH	-----	7.87390	2.31829

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	86.8035	73.4297	3.4251	0.1307	-----	76.9855	11.3106
CO2	20.7078	19.6427	0.9162	0.3800	-----	20.9389	-1.1161
CH3OH	0.6816	0.7399	0.0345	0.0189	10.3005	11.0938	-1527.5647
OTHERS	0.3959	0.3900	0.0182	0.0020	0.1055	0.5157	-30.2594
TOTAL C	108.5887	94.2023	4.3940	0.5316	10.4059	109.5338	-0.8703
HYDROGEN:							
H2	119.5812	73.2116	3.4149	0.0602	-----	76.6867	35.8706
H2O	0.0000	0.0000	0.0000	0.0000	0.3199	0.3199	n.a.
OTHERS	4.3100	4.5194	0.2108	0.0834	41.5182	46.3318	-974.9918
TOTAL H	123.8911	77.7310	3.6257	0.1435	41.8382	123.3384	0.4461
OXYGEN:							
TOTAL O	128.9007	113.4550	5.2920	0.9098	10.5465	130.2033	-1.0106
NITROGEN:							
TOTAL N	2.7354	2.6597	0.1241	0.0031	-----	2.7869	-1.8905
TOTAL MASS FLOW (ks/hr)	3531.2646	3062.1384	142.8316	21.0832	338.2458	3564.2991	-0.9355

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]		FRESH FEED GAS
	GC#1	GC#2	[15-(50+62+68)]
MASS BALANCE (%) :	-0.01	0.01	-0.07
ELEMENTAL BALANCE (%) :			
CARBON	0.46	0.26	0.04
HYDROGEN	1.90	0.96	-3.51
OXYGEN	0.39	0.17	-0.29
NITROGEN	0.19	-0.36	8.86

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY
=====

DATE :	06-DEC-89
TIME :	13:08:58
TIME INTERVAL :	FROM: 0600 10-Nov
	TO: 0600 11-Nov
NUMBER OF AVERAGED HOURS :	22
RUN ID NUMBER :	E7.68
FEED GAS TYPE:	CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) :	168.9
OIL/SLURRY REACTOR INLET TEMP. (des.C) :	24.2
AVG. REACTOR SLURRY TEMPERATURE (des.C) :	250.1
REACTOR FREEBOARD TEMPERATURE (des.C) :	247.0
OIL/SLURRY OUTLET TEMP. (des.C) :	244.0
REACTOR FEED GAS PRESSURE (kPa) :	5433
REACTOR EFFLUENT GAS PRESSURE (kPa) :	5282
GAS SUPERFICIAL VELOCITY (cm/sec) :	15.3
LIQUID SUPERFICIAL VELOCITY (cm/sec) :	0.0
SLURRY CONCENTRATION (wtZ) :	37.4
CATALYST OXIDE IN REACTOR (ks oxide) :	393
GAS HOLD-UP (Z) :	33.7
SPACE VELOCITY (1/ks-hr) :	9651
RECYCLE/FRESH FEED RATIO :	3.525
OIL/SLURRY CIRCULATION RATE (m3/hr) :	0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) :	137.98
PURGE GAS FLOW RATE <50> (ksmol/hr) :	6.03
HEAT TRANSFER COEFFICIENT (Watt/m2-des.C) :	588

STREAM #	1	55	15	15	32	32	62	69
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEOH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
=====	=====	=====	=====	=====	=====	=====	=====	=====
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	58.43	27.79	35.44	35.36	25.54	25.68	5.69	-----
CO	36.85	55.28	50.97	50.82	50.95	51.10	24.08	-----
CO2	3.71	15.07	12.44	12.34	14.33	14.25	63.77	-----
N2	0.17	0.95	0.78	0.76	0.88	0.89	0.28	-----
CH4	0.05	0.30	0.25	0.24	0.27	0.28	0.25	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.86
CH3OH	0.01	0.53	0.46	0.40	7.64	7.65	5.96	97.58
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.01
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.36
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.13
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.11
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.07
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.77
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.11
TOTAL :	99.22	99.91	100.34	99.92	99.61	99.86	100.09	100.00
DENS,g/cc	0.005	0.049	0.031	0.031	0.036	0.036	0.004	0.790
AV.MOL.WT	13.30	23.17	20.79	20.76	23.92	23.89	36.95	32.06
Mm3/hr	839.2	2957.9	3788.9	3797.1	3296.0	3298.5	11.3	-----
ksmol/hr	37.44	131.96	169.03	169.40	147.05	147.09	0.50	10.54
l/hr,prod	-----	-----	-----	-----	-----	-----	-----	427.71

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

	GC#1	GC#2
CALCULATED BY GAS COMPOSITION		
HYDROGEN CONVERSION (Z) :	36.9	37.3
CARBON MONOXIDE CONVERSION (Z) :	12.7	13.0
CARBON DIOXIDE CONVERSION (Z) :	0.2	-0.8
RATIO H2 CONSUMED/CO CONSUMED :	2.02	2.00
CALCULATED BY METHANOL IN EXIT GAS		
HYDROGEN CONVERSION (Z) :	35.0	35.2
CARBON MONOXIDE CONVERSION (Z) :	12.2	12.3
CALCULATED BY OVERALL BALANCE		
HYDROGEN CONVERSION (Z) :	35.0	35.0
CARBON MONOXIDE CONVERSION (Z) :	12.1	12.2
RATIO H2 CONSUMED/CO CONSUMED :	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL *
CO (+CO2) SELECTIVITY TO METHANOL (Z) :	95.6	99.1
CO (+CO2) SELECTIVITY TO ETHANOL (Z) :		0.3

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	smol/hr-ks cat	ks/1000 Na3 fresh feed	ks/1000 Na3 reactor feed
As calculated ACROSS REACTOR	26.74	401.7	88.8
As Net MeOH produced, OVERALL balance	26.32	395.4	87.4

REACTOR FEED (H2/(CO+1.5CO2)) : 0.51
 REACTOR FEED ((H2-CO2)/(CO+CO2)) : 0.36

APPROACH TO METHANOL EQUILIBRIUM (des.C) : 22.36
 APPROACH TO WATER-GAS EQUILIBRIUM (des.C) : 11.87

METHANOL COLLECTED AS % OF CALCULATED : 97.8

CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) : 10.52

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT MATERIAL BALANCE SUMMARY

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-16.42927	-2.31598	-2.18192
CO	-4.40353	0.75052	-1.99304
CO2	-9.56903	1.75094	-0.37374
N2	-782.13171	1.97366	-1.75406
CH4	n.a.	2.32950	-2.09524
H2O	-----	n.a.	n.a.
CH3OH	-----	3.19495	1.58544

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	58 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	86.0908	72.9445	3.3308	0.1349	-----	76.4102	11.2446
CO2	20.8972	19.8810	0.9078	0.3572	-----	21.1460	-1.1908
CH3OH	0.6732	0.6932	0.0317	0.0334	10.2941	11.0524	-1541.6841
OTHERS	0.3998	0.3906	0.0178	0.0020	0.1054	0.5158	-29.0265
TOTAL C	108.0610	93.9093	4.2881	0.5275	10.3995	109.1244	-0.9841
HYDROGEN:							
H2	119.8031	73.3404	3.3488	0.0638	-----	76.7530	35.9340
H2O	0.0102	0.0000	0.0000	0.0000	0.3209	0.3209	-3056.7549
OTHERS	4.2921	4.3352	0.1980	0.1409	41.4927	46.1668	-975.6298
TOTAL H	124.1053	77.6756	3.5468	0.2047	41.8135	123.2406	0.6967
OXYGEN:							
TOTAL O	128.5634	113.3997	5.1780	0.8830	10.5409	130.0016	-1.1187
NITROGEN:							
TOTAL N	2.5884	2.5125	0.1147	0.0032	-----	2.6304	-1.6219
TOTAL MASS FLOW (kg/hr)	3517.5908	3057.3669	139.6046	20.6982	337.9092	3555.5789	-1.0799

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS [15-(50+62+68)]
GC#1	GC#2	
-----	-----	-----
0.00	0.00	-0.09
0.48	0.41	-0.05
1.84	1.99	-3.95
0.43	0.22	-0.15
1.14	0.13	7.91

MASS BALANCE (%) :

ELEMENTAL BALANCE (%) :

CARBON

HYDROGEN

OXYGEN

NITROGEN

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

```

=====
DATE :                                06-DEC-89
TIME :                                13:10:36
TIME INTERVAL :                       FROM: 0600 11-Nov
                                         TO: 0600 12-Nov

NUMBER OF AVERAGED HOURS :            24
RUN ID NUMBER :                       E7.69
FEED GAS TYPE:                        CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 167.2
OIL/SLURRY REACTOR INLET TEMP. (deg.C) : 22.9
AVG. REACTOR SLURRY TEMPERATURE (deg.C) : 249.9
REACTOR FREEBOARD TEMPERATURE (deg.C) : 246.6
OIL/SLURRY OUTLET TEMP. (deg.C) :     243.8
REACTOR FEED GAS PRESSURE (kPa) :      5518
REACTOR EFFLUENT GAS PRESSURE (kPa) :   5282
GAS SUPERFICIAL VELOCITY (cm/sec) :    15.3
LIQUID SUPERFICIAL VELOCITY (cm/sec) :   0.0
SLURRY CONCENTRATION (wt%) :           37.5
CATALYST OXIDE IN REACTOR (kg oxide) :   393
GAS HOLD-UP (%) :                     34.0
SPACE VELOCITY (1/kg-hr) :             9685
RECYCLE/FRESH FEED RATIO :             3.588
OIL/SLURRY CIRCULATION RATE (m3/hr) :   0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 138.66
PURGE GAS FLOW RATE <50> (ksmol/hr) :   5.72
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) : 590
  
```

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEOH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT	=====	=====	=====	=====	=====	=====	=====	=====
	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<WT%>
H2	59.54	27.86	35.65	35.28	25.60	25.75	5.76	-----
CO	36.71	55.00	50.63	50.66	50.54	50.81	24.26	-----
CO2	3.67	15.09	12.39	12.34	14.45	14.27	62.94	-----
N2	0.19	1.08	0.89	0.86	1.00	1.01	0.29	-----
CH4	0.05	0.28	0.24	0.22	0.26	0.27	0.25	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.88
CH3OH	0.00	0.51	0.45	0.38	7.63	7.65	6.51	97.57
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.01
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.35
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.13
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.11
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.07
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.80
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.10
TOTAL :	99.15	99.81	100.25	99.74	99.48	99.77	100.06	100.00
DENS,g/cc	0.005	0.049	0.031	0.031	0.036	0.036	0.004	0.790
AV.MOL.WT	13.25	23.15	20.73	20.77	23.92	23.86	36.82	32.06
Mm3/hr	830.4	2979.9	3814.6	3810.2	3308.8	3312.8	11.3	-----
ksmol/hr	37.05	132.94	170.18	169.99	147.62	147.73	0.50	10.54
l/hr:prod	-----	-----	-----	-----	-----	-----	-----	427.90

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
		----	----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	37.3	37.0
CARBON MONOXIDE CONVERSION	(%) :	12.8	13.4
CARBON DIOXIDE CONVERSION	(%) :	0.0	-1.7
RATIO H2 CONSUMED/CO CONSUMED	:	2.04	1.93
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	34.7	35.4
CARBON MONOXIDE CONVERSION	(%) :	12.2	12.3
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	34.6	35.0
CARBON MONOXIDE CONVERSION	(%) :	12.1	12.2
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL %
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (%) :	95.2	99.0
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.2

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	smol/hr-ks cat	kg/1000 Na3 fresh feed	kg/1000 Na3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	26.87	407.9	88.9
As Net MeOH produced, OVERALL balance	26.33	399.7	87.1

REACTOR FEED {H2/(CO+1.5CO2)} :	0.51
REACTOR FEED {(H2-CO2)/(CO+CO2)} :	0.36
APPROACH TO METHANOL EQUILIBRIUM (deg.C) :	22.49
APPROACH TO WATER-GAS EQUILIBRIUM (deg.C) :	12.12
METHANOL COLLECTED AS % OF CALCULATED :	97.4
CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) :	10.57

LAPORTE LPNETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<Z diff.>	<Z diff.>	<Z diff.>
H2	-16.88397	-2.12161	-2.31911
CO	-3.78470	0.69395	-2.39495
CO2	-9.00392	2.08232	0.28725
N2	-869.93341	2.68141	-1.78408
CH4	n.a.	4.35302	-1.21323
H2O	-----	n.a.	n.a.
CH3OH	-----	3.56511	2.05706

OVERALL ELEMENTAL BALANCE (Kgs-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	Z
CARBON:							
CO	86.1120	73.1136	3.1465	0.1353	-----	76.3954	11.2837
CO2	20.9730	20.0608	0.8633	0.3511	-----	21.2753	-1.4412
CH3OH	0.6500	0.6722	0.0289	0.0363	10.2934	11.0308	-1597.1093
OTHERS	0.3689	0.3682	0.0158	0.0020	0.1054	0.4915	-33.2488
TOTAL C	108.1038	94.2148	4.0545	0.5248	10.3988	109.1929	-1.0075
HYDROGEN:							
H2	119.9428	74.0774	3.1879	0.0643	-----	77.3216	35.5279
H2O	0.0000	0.0000	0.0000	0.0000	0.3288	0.3288	n.a.
OTHERS	4.0754	4.1616	0.1791	0.1527	41.4899	45.9832	-1028.3148
TOTAL H	124.0182	78.2390	3.3670	0.2170	41.8186	123.6416	0.3036
OXYGEN:							
TOTAL O	128.7079	113.9073	4.9020	0.8743	10.5442	130.2278	-1.1809
NITROGEN:							
TOTAL N	2.9238	2.8635	0.1232	0.0032	-----	2.9900	-2.2645
TOTAL MASS FLOW (kg/hr)	3531.3086	3077.8503	132.4556	20.5441	338.0580	3568.9082	-1.0647

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]		FRESH FEED GAS
	GC#1	GC#2	[15-(50+62+68)]
MASS BALANCE (Z) :	0.00	0.00	-0.03
ELEMENTAL BALANCE (Z) :			
CARBON	0.49	0.48	0.00
HYDROGEN	2.44	1.51	-4.49
OXYGEN	0.40	0.13	-0.01
NITROGEN	1.29	-0.47	10.19

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY
=====

DATE :	06-DEC-89
TIME :	13:12:09
TIME INTERVAL :	FROM: 0600 12-Nov
	TO: 0600 13-Nov
NUMBER OF AVERAGED HOURS :	24
RUN ID NUMBER :	E7.70
FEED GAS TYPE:	CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) :	167.7
OIL/SLURRY REACTOR INLET TEMP. (des.C) :	23.2
AVG. REACTOR SLURRY TEMPERATURE (des.C) :	249.9
REACTOR FREEBOARD TEMPERATURE (des.C) :	246.6
OIL/SLURRY OUTLET TEMP. (des.C) :	243.8
REACTOR FEED GAS PRESSURE (kPa) :	5517
REACTOR EFFLUENT GAS PRESSURE (kPa) :	5282
GAS SUPERFICIAL VELOCITY (cm/sec) :	15.3
LIQUID SUPERFICIAL VELOCITY (cm/sec) :	0.0
SLURRY CONCENTRATION (wt%) :	37.5
CATALYST OXIDE IN REACTOR (kg oxide) :	393
GAS HOLD-UP (%) :	34.0
SPACE VELOCITY (1/kg-hr) :	9671
RECYCLE/FRESH FEED RATIO :	3.552
OIL/SLURRY CIRCULATION RATE (m3/hr) :	0.0
PROD. SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) :	138.51
PURGE GAS FLOW RATE <50> (ksmol/hr) :	6.06
HEAT TRANSFER COEFFICIENT (Watt/m2-des.C) :	588

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	NEOH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<WTZ>
H2	58.33	27.80	35.51	35.11	25.52	25.74	5.76	-----
CO	36.97	55.35	50.96	50.97	50.94	51.11	24.26	-----
CO2	3.76	15.08	12.43	12.38	14.45	14.26	62.94	-----
N2	0.17	0.91	0.75	0.73	0.84	0.86	0.29	-----
CH4	0.05	0.27	0.23	0.22	0.25	0.27	0.25	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.81
CH3OH	0.00	0.53	0.44	0.38	7.58	7.62	6.51	97.62
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.01
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.36
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.13
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.11
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.06
ALKYLENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.78
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.11
TOTAL :	99.28	99.93	100.32	99.79	99.58	99.87	100.06	100.00
DENS, g/cc	0.005	0.049	0.031	0.031	0.036	0.036	0.004	0.790
AV. MOL. WT	13.34	23.17	20.77	20.83	23.95	23.87	36.82	32.09
Mm3/hr	835.9	2968.9	3809.4	3804.8	3309.7	3315.1	11.5	-----
ksmol/hr	37.29	132.45	169.95	169.74	147.66	147.83	0.51	10.49
l/hr, prod	-----	-----	-----	-----	-----	-----	-----	425.88

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

CONVERSIONS ACROSS REACTOR :

	GC#1	GC#2
	----	----
CALCULATED BY GAS COMPOSITION		
HYDROGEN CONVERSION (Z) :	36.9	36.8
CARBON MONOXIDE CONVERSION (Z) :	12.7	13.1
CARBON DIOXIDE CONVERSION (Z) :	0.2	-1.5
RATIO H2 CONSUMED/CO CONSUMED :	2.03	1.94
CALCULATED BY METHANOL IN EXIT GAS		
HYDROGEN CONVERSION (Z) :	34.9	35.4
CARBON MONOXIDE CONVERSION (Z) :	12.1	12.2
CALCULATED BY OVERALL BALANCE		
HYDROGEN CONVERSION (Z) :	34.6	35.0
CARBON MONOXIDE CONVERSION (Z) :	12.0	12.0
RATIO H2 CONSUMED/CO CONSUMED :	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL *
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (Z) :	95.7	99.0
CO (+CO2) SELECTIVITY TO ETHANOL (Z) :	-----	0.2

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEDH SOURCE	smol/hr-ks cat	ks/1000 Ma3 fresh feed	ks/1000 Ma3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	26.78	403.9	88.7
As Net MeOH produced, OVERALL balance	26.23	395.6	86.9

REACTOR FEED (H2/(CO+1.5CO2)) : 0.50
 REACTOR FEED ((H2-CO2)/(CO+CO2)) : 0.36

APPROACH TO METHANOL EQUILIBRIUM (des.C) : 22.66
 APPROACH TO WATER-GAS EQUILIBRIUM (des.C) : 8.04

METHANOL COLLECTED AS % OF CALCULATED : 97.3

CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) : 10.54

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT MATERIAL BALANCE SUMMARY

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-17.88350	-1.76067	-2.27642
CO	-4.41249	0.65535	-2.11199
CO2	-9.90084	1.64783	0.47973
N2	-747.83075	2.72939	-2.44652
CH4	n.a.	2.80332	-1.25618
H2O	-----	n.a.	n.a.
CH3OH	-----	7.76441	1.59193

OVERALL ELEMENTAL BALANCE (Kg-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	86.5233	73.3074	3.3547	0.1373	-----	76.7994	11.2384
CO2	21.0210	19.9699	0.9139	0.3563	-----	21.2401	-1.0421
CH3OH	0.6448	0.6991	0.0320	0.0369	10.2503	11.0192	-1608.8318
OTHERS	0.3666	0.3589	0.0164	0.0020	0.1049	0.4823	-31.5356
TOTAL C	108.5557	94.3354	4.3170	0.5325	10.3552	109.5400	-0.9067
HYDROGEN:							
H2	119.2006	73.6333	3.3696	0.0652	-----	77.0681	35.3459
H2O	0.0000	0.0000	0.0000	0.0000	0.3044	0.3044	n.a.
OTHERS	4.0457	4.2320	0.1937	0.1549	41.3158	45.8964	-1034.4485
TOTAL H	123.2463	77.8653	3.5633	0.2202	41.6202	123.2690	-0.0184
OXYGEN:							
TOTAL O	129.2101	113.9464	5.2144	0.8871	10.4886	130.5365	-1.0265
NITROGEN:							
TOTAL N	2.4749	2.4212	0.1108	0.0032	-----	2.5353	-2.4419
TOTAL MASS FLOW (kg/hr)	3535.7539	3069.3328	140.4590	20.8448	336.4643	3567.1008	-0.8866

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]		FRESH FEED GAS
	GC#1	GC#2	[15-(50+62+68)]
MASS BALANCE (%) :	0.01	-0.01	-0.08
ELEMENTAL BALANCE (%) :			
CARBON	0.48	0.40	0.02
HYDROGEN	1.98	1.31	-4.19
OXYGEN	0.42	0.67	0.02
NITROGEN	0.53	0.00	7.32

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

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DATE : 06-DEC-89
TIME : 13:13:32
TIME INTERVAL : FROM: 0600 13-Nov
                TO: 0600 14-Nov

NUMBER OF AVERAGED HOURS : 24
RUN ID NUMBER : E7.71
FEED GAS TYPE: CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) : 149.7
OIL/SLURRY REACTOR INLET TEMP. (des.C) : 21.3
AVG. REACTOR SLURRY TEMPERATURE (des.C) : 250.0
REACTOR FREEBOARD TEMPERATURE (des.C) : 247.3
OIL/SLURRY OUTLET TEMP. (des.C) : 244.4
REACTOR FEED GAS PRESSURE (kPa) : 5518
REACTOR EFFLUENT GAS PRESSURE (kPa) : 5282
GAS SUPERFICIAL VELOCITY (cm/sec) : 15.3
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 0.0
SLURRY CONCENTRATION (wt%) : 37.5
CATALYST OXIDE IN REACTOR (kg oxide) : 393
GAS HOLD-UP (%) : 34.0
SPACE VELOCITY (1/kg-hr) : 9664
RECYCLE/FRESH FEED RATIO : 3.575
OIL/SLURRY CIRCULATION RATE (m3/hr) : 0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 138.30
PURGE GAS FLOW RATE <50> (ksmol/hr) : 5.76
HEAT TRANSFER COEFFICIENT (Watt/m2-des.C) : 591
  
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STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEOH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	58.62	27.89	35.58	35.24	25.63	25.79	5.76	-----
CO	36.72	55.17	50.86	50.74	50.76	51.01	24.26	-----
CO2	3.71	15.27	12.53	12.53	14.60	14.40	62.94	-----
N2	0.15	0.85	0.71	0.69	0.78	0.80	0.29	-----
CH4	0.05	0.29	0.25	0.23	0.27	0.29	0.25	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.80
CH3OH	0.00	0.48	0.43	0.35	7.59	7.62	6.51	97.64
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.01
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.36
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.13
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.11
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.06
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.78
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.11
TOTAL :	99.26	99.96	100.36	99.77	99.63	99.92	100.06	100.00
DENS,g/cc	0.005	0.049	0.031	0.031	0.036	0.036	0.004	0.792
AV.MOL.WT	13.25	23.17	20.77	20.82	23.94	23.88	36.82	32.08
M3/hr	831.0	2971.0	3805.5	3802.0	3306.0	3310.3	11.4	-----
ksmol/hr	37.07	132.55	169.77	169.62	147.49	147.62	0.51	10.51
l/hr,prod	-----	-----	-----	-----	-----	-----	-----	425.88

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT CONVERSION-SELECTIVITY-PRODUCTIVITY

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	36.9	36.8
CARBON MONOXIDE CONVERSION	(%) :	12.8	13.0
CARBON DIOXIDE CONVERSION	(%) :	0.1	-1.4
RATIO H2 CONSUMED/CO CONSUMED	:	2.03	1.96
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	34.9	35.5
CARBON MONOXIDE CONVERSION	(%) :	12.2	12.3
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	34.6	35.0
CARBON MONOXIDE CONVERSION	(%) :	12.1	12.1
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL *
CO (+CO2) SELECTIVITY TO METHANOL (%) :	96.3	99.1
CO (+CO2) SELECTIVITY TO ETHANOL (%) :		0.3

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	smol/hr-kg cat	kg/1000 Nm3 fresh feed	kg/1000 Nm3 reactor feed
As calculated ACROSS REACTOR	26.85	407.2	89.0
As Net MeOH produced, OVERALL balance	26.29	398.8	97.2

REACTOR FEED (H2/(CO+1.5CO2)) :	0.51
REACTOR FEED ((H2-CO2)/(CO+CO2)) :	0.36
APPROACH TO METHANOL EQUILIBRIUM (des.C) :	22.65
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) :	5.54
METHANOL COLLECTED AS % OF CALCULATED :	97.3
CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) :	10.56

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-17.62438	-1.81057	-2.14820
CO	-4.50527	0.78016	-2.09398
CO2	-9.47579	1.67710	0.31914
N2	-599.25342	1.63577	-2.17421
CH4	n.a.	3.61748	-0.98612
H2O	-----	n.a.	n.a.
CH3OH	-----	6.71561	1.87684

OVERALL ELEMENTAL BALANCE (kg-atoms/hr) :

	INPUTS		OUTPUTS				(IN-OUT)/IN
STREAM # STREAM NAME	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	86.0628	73.1269	3.1772	0.1367	-----	76.4408	11.1802
CO2	21.2498	20.2358	0.8792	0.3546	-----	21.4695	-1.0340
CH3OH	0.5931	0.6357	0.0276	0.0367	10.2782	10.9782	-1751.1410
OTHERS	0.3918	0.3884	0.0169	0.0020	0.1051	0.5124	-30.7665
TOTAL C	108.2975	94.3868	4.1009	0.5299	10.3833	109.4009	-1.0189
HYDROGEN:							
H2	119.5336	73.9421	3.2126	0.0649	-----	77.2196	35.3993
H2O	0.0000	0.0000	0.0000	0.0000	0.2977	0.2977	n.a.
OTHERS	3.9395	4.0964	0.1780	0.1542	41.4280	45.8566	-1064.0261
TOTAL H	123.4731	78.0385	3.3906	0.2191	41.7257	123.3739	0.0803
OXYGEN:							
TOTAL O	129.1555	114.2342	4.9632	0.8828	10.5135	130.5938	-1.1136
NITROGEN:							
TOTAL N	2.3340	2.2586	0.0981	0.0032	-----	2.3599	-1.1137
TOTAL MASS FLOW (kg/hr)	3530.7812	3071.7515	133.4597	20.7446	337.3160	3563.2720	-0.9702

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS
	GC#1	GC#2 [15-(50+62+68)]
MASS BALANCE (%) :	0.01	-0.01
ELEMENTAL BALANCE (%) :		
CARBON	0.46	0.27
HYDROGEN	1.99	1.23
OXYGEN	0.38	0.01
NITROGEN	1.55	1.04

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY
=====

DATE :	06-DEC-89
TIME :	13:15:08
TIME INTERVAL :	FROM: 0600 14-Nov
	TO: 0600 15-Nov
NUMBER OF AVERAGED HOURS :	22
RUN ID NUMBER :	E7.72
FEED GAS TYPE:	CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) :	170.2
OIL/SLURRY REACTOR INLET TEMP. (des.C) :	24.7
AVG. REACTOR SLURRY TEMPERATURE (des.C) :	250.0
REACTOR FREEBOARD TEMPERATURE (des.C) :	246.7
OIL/SLURRY OUTLET TEMP. (des.C) :	243.9
REACTOR FEED GAS PRESSURE (kPa) :	5521
REACTOR EFFLUENT GAS PRESSURE (kPa) :	5283
GAS SUPERFICIAL VELOCITY (cm/sec) :	15.3
LIQUID SUPERFICIAL VELOCITY (cm/sec) :	0.0
SLURRY CONCENTRATION (wt%) :	37.5
CATALYST OXIDE IN REACTOR (ks oxide) :	393
GAS HOLD-UP (%) :	34.0
SPACE VELOCITY (1/ks-hr) :	9691
RECYCLE/FRESH FEED RATIO :	3.566
OIL/SLURRY CIRCULATION RATE (m3/hr) :	0.0
PROD. SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) :	138.71
PURGE GAS FLOW RATE <50> (ksmol/hr) :	5.87
HEAT TRANSFER COEFFICIENT (Watt/m2-des.C) :	589

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEOH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	59.57	27.95	35.61	35.27	25.72	25.93	5.76	-----
CO	36.75	55.18	50.80	50.78	50.75	50.96	24.26	-----
CO2	3.66	15.11	12.42	12.40	14.45	14.25	62.94	-----
N2	0.16	0.91	0.73	0.72	0.83	0.84	0.29	-----
CH4	0.05	0.27	0.22	0.21	0.25	0.26	0.25	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.80
CH3OH	0.00	0.57	0.49	0.42	7.62	7.66	6.51	97.63
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.37
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.13
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.10
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.06
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.79
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.10
TOTAL :	99.19	99.99	100.27	99.82	99.63	99.91	100.06	100.00
DENS,g/cc	0.005	0.049	0.031	0.031	0.036	0.036	0.004	0.788
AV.MOL.WT	13.25	23.14	20.75	20.80	23.90	23.83	36.82	32.08
Mm3/hr	935.0	2977.6	3817.5	3812.7	3318.3	3323.3	11.3	-----
ksmol/hr	37.25	132.84	170.31	170.10	148.04	148.20	0.50	10.50
l/hr,prod	-----	-----	-----	-----	-----	-----	-----	427.67

LAPORTE LPHETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

	GC#1	GC#2
CALCULATED BY GAS COMPOSITION		
HYDROGEN CONVERSION (Z) :	36.6	36.5
CARBON MONOXIDE CONVERSION (Z) :	12.7	13.0
CARBON DIOXIDE CONVERSION (Z) :	0.1	-1.4
RATIO H2 CONSUMED/CO CONSUMED :	2.03	1.95
CALCULATED BY METHANOL IN EXIT GAS		
HYDROGEN CONVERSION (Z) :	34.7	35.2
CARBON MONOXIDE CONVERSION (Z) :	12.2	12.2
CALCULATED BY OVERALL BALANCE		
HYDROGEN CONVERSION (Z) :	34.5	34.9
CARBON MONOXIDE CONVERSION (Z) :	12.1	12.1
RATIO H2 CONSUMED/CO CONSUMED :	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL %
CO (+CO2) SELECTIVITY TO METHANOL (Z) :	96.2	99.0
CO (+CO2) SELECTIVITY TO ETHANOL (Z) :		0.3

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEDM SOURCE	kmol/hr-kg cat	kg/1000 Nm3 fresh feed	kg/1000 Nm3 reactor feed
As calculated ACROSS REACTOR	26.81	404.7	88.6
As Net MeOH produced, OVERALL balance	26.28	396.7	86.9

REACTOR FEED (H2/(CO+1.5CO2)) :	0.51
REACTOR FEED ((H2-CO2)/(CO+CO2)) :	0.36
APPROACH TO METHANOL EQUILIBRIUM (des.C) :	22.70
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) :	5.95
METHANOL COLLECTED AS % OF CALCULATED :	97.4
CALCULATED METHANOL PRODUCTION RATE (Kmol/hr) :	10.55

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-18.85643	-1.76963	-1.91848
CO	-4.59103	0.69690	-2.05496
CO2	-9.43787	1.57911	0.38020
N2	-917.15698	2.53175	-2.28621
CH4	n.a.	3.35980	-2.04264
H2O	-----	n.a.	n.a.
CH3OH	-----	5.26380	1.68906

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

	INPUTS		OUTPUTS				(IN-OUT)/IN
STREAM # STREAM NAME	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	86.3804	73.2974	3.2401	0.1353	-----	76.6729	11.2381
CO2	21.1006	20.0745	0.8874	0.3511	-----	21.3130	-1.0070
CH3OH	0.7186	0.7581	0.0335	0.0363	10.2687	11.0967	-1444.3011
OTHERS	0.3606	0.3560	0.0157	0.0020	0.1051	0.4788	-32.7706
TOTAL C	108.5602	94.4860	4.1768	0.5248	10.3738	109.5614	-0.9223
HYDROGEN:							
H2	119.9933	74.2671	3.2830	0.0643	-----	77.6144	35.3177
H2O	0.0000	0.0000	0.0000	0.0000	0.2990	0.2990	n.a.
OTHERS	4.3167	4.4565	0.1970	0.1527	41.3901	46.1962	-970.1862
TOTAL H	124.3100	78.7236	3.4800	0.2170	41.6890	124.1096	0.1612
OXYGEN:							
TOTAL O	129.3001	114.2045	5.0485	0.8743	10.5055	130.6327	-1.0306
NITROGEN:							
TOTAL N	2.4630	2.4070	0.1064	0.0032	-----	2.5166	-2.1773
TOTAL MASS FLOW (kg/hr)	3537.1707	3074.1401	135.8939	20.5441	337.0255	3567.6038	-0.8604

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]		FRESH FEED GAS
	GC#1	GC#2	[15-(50+62+68)]
MASS BALANCE (%) :	0.02	-0.02	0.00
ELEMENTAL BALANCE (%) :			
CARBON	0.40	0.35	-0.03
HYDROGEN	1.81	1.24	-3.83
OXYGEN	0.34	0.07	-0.06
NITROGEN	0.02	0.11	8.63

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

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=====
DATE :                                06-DEC-89
TIME :                                13:22:07
TIME INTERVAL :                       FROM: 0600 15-Nov
                                         TO: 0600 16-Nov

NUMBER OF AVERAGED HOURS :            24
RUN ID NUMBER :                       E7.73
FEED GAS TYPE :                       CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 167.9
OIL/SLURRY REACTOR INLET TEMP. (deg.C) : 24.5
AVG. REACTOR SLURRY TEMPERATURE (deg.C) : 249.7
REACTOR FREEBOARD TEMPERATURE (deg.C) : 246.4
OIL/SLURRY OUTLET TEMP. (deg.C) :     243.4
REACTOR FEED GAS PRESSURE (kPa) :      5521
REACTOR EFFLUENT GAS PRESSURE (kPa) :   5285
GAS SUPERFICIAL VELOCITY (cm/sec) :    15.4
LIQUID SUPERFICIAL VELOCITY (cm/sec) :   0.0
SLURRY CONCENTRATION (wt%) :           37.4
CATALYST OXIDE IN REACTOR (kg oxide) :  393
GAS HOLD-UP (%) :                     33.8
SPACE VELOCITY (1/kg-hr) :            9708
RECYCLE/FRESH FEED RATIO :            3.580
OIL/SLURRY CIRCULATION RATE (m3/hr) :   0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 139.19
PURGE GAS FLOW RATE <50> (ksmol/hr) :    6.00
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) : 588
  
```

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDM PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT	=====	=====	=====	=====	=====	=====	=====	=====
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	58.49	27.98	35.54	35.29	25.71	25.94	5.76	-----
CO	36.84	55.35	50.95	50.92	50.96	51.05	24.26	-----
CO2	3.70	14.99	12.32	12.30	14.36	14.10	62.94	-----
N2	0.16	0.87	0.70	0.69	0.79	0.80	0.29	-----
CH4	0.05	0.28	0.24	0.22	0.26	0.27	0.25	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.80
CH3OH	0.00	0.55	0.48	0.41	7.57	7.63	6.51	97.65
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.01
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.36
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.13
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.11
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.06
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.78
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.10
TOTAL :	99.24	100.02	100.23	99.84	99.65	99.80	100.06	100.00
DENS,g/cc	0.005	0.049	0.031	0.031	0.036	0.036	0.004	0.789
AV.MOL.WT	13.28	23.11	20.75	20.77	23.88	23.79	36.82	32.08
m3/hr	833.8	2985.4	3821.8	3819.2	3324.2	3330.7	11.3	-----
ksmol/hr	37.20	133.19	170.50	170.39	148.30	148.53	0.50	10.45
l/hr,prod	-----	-----	-----	-----	-----	-----	-----	424.76

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

	GC#1	GC#2
	----	----
CALCULATED BY GAS COMPOSITION		
HYDROGEN CONVERSION (Z) :	36.4	36.6
CARBON MONOXIDE CONVERSION (Z) :	12.7	12.9
CARBON DIOXIDE CONVERSION (Z) :	0.3	-1.6
RATIO H2 CONSUMED/CO CONSUMED :	2.00	1.97
CALCULATED BY METHANOL IN EXIT GAS		
HYDROGEN CONVERSION (Z) :	34.7	35.0
CARBON MONOXIDE CONVERSION (Z) :	12.1	12.1
CALCULATED BY OVERALL BALANCE		
HYDROGEN CONVERSION (Z) :	34.3	34.6
CARBON MONOXIDE CONVERSION (Z) :	12.0	12.0
RATIO H2 CONSUMED/CO CONSUMED :	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL *
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (Z) :	96.0	99.1
CO (+CO2) SELECTIVITY TO ETHANOL (Z) :	-----	0.2

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEDH SOURCE	kmol/hr-ks cat	kg/1000 Na3 fresh feed	kg/1000 Na3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	26.77	404.7	88.3
As Net MeOH produced, OVERALL balance	26.14	395.2	86.3

REACTOR FEED (H2/(CO+1.5CO2)) :	0.51
REACTOR FEED ((H2-CO2)/(CO+CO2)) :	0.36
APPROACH TO METHANOL EQUILIBRIUM (des.C) :	23.24
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) :	6.74
METHANOL COLLECTED AS % OF CALCULATED :	97.0
CALCULATED METHANOL PRODUCTION RATE (Kmol/hr) :	10.53

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-18.54351	-1.87450	-2.22461
CO	-4.30916	0.75599	-2.11897
CO2	-9.60132	1.76565	0.37394
N2	-903.02765	2.37149	-3.03208
CH4	n.a.	4.14869	-2.18625
H2O	-----	n.a.	n.a.
CH3OH	-----	5.54819	1.87443

OVERALL ELEMENTAL BALANCE (kg-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	50 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	86.7652	73.7208	3.3216	0.1357	-----	77.1780	11.0495
CO2	20.9612	19.9608	0.8994	0.3520	-----	21.2122	-1.1976
CH3OH	0.6921	0.7324	0.0330	0.0364	10.2143	11.0161	-1491.7003
OTHERS	0.3766	0.3743	0.0169	0.0020	0.1045	0.4976	-32.1424
TOTAL C	108.7950	94.7892	4.2708	0.5261	10.3188	109.9040	-1.0193
HYDROGEN:							
H2	120.2635	74.5399	3.3585	0.0645	-----	77.9628	35.1733
H2O	0.0000	0.0000	0.0000	0.0000	0.2988	0.2988	n.a.
OTHERS	4.2746	4.4266	0.1994	0.1531	41.1707	45.9498	-974.9428
TOTAL H	124.5381	78.9664	3.5580	0.2175	41.4695	124.2114	0.2624
OXYGEN:							
TOTAL O	129.3796	114.3748	5.1533	0.8764	10.4487	130.8533	-1.1391
NITROGEN:							
TOTAL N	2.3650	2.3041	0.1038	0.0032	-----	2.4112	-1.9529
TOTAL MASS FLOW (kg/hr)	3539.4778	3078.3687	138.7010	20.5942	335.1540	3572.8181	-0.9420

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS
	GC#1	[15-(50+62+68)]
MASS BALANCE (%) :	0.06	-0.08
ELEMENTAL BALANCE (%) :		
CARBON	0.52	-0.09
HYDROGEN	1.57	-3.80
OXYGEN	0.48	-0.11
NITROGEN	0.01	9.52

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY
=====

DATE :	06-DEC-89
TIME :	13:23:42
TIME INTERVAL :	FROM: 0600 16-Nov
	TO: 0600 17-Nov
NUMBER OF AVERAGED HOURS :	24
RUN ID NUMBER :	E7.74
FEED GAS TYPE:	CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) :	157.1
OIL/SLURRY REACTOR INLET TEMP. (deg.C) :	16.5
AVG. REACTOR SLURRY TEMPERATURE (deg.C) :	249.7
REACTOR FREEBOARD TEMPERATURE (deg.C) :	246.6
OIL/SLURRY OUTLET TEMP. (deg.C) :	242.9
REACTOR FEED GAS PRESSURE (kPa) :	5518
REACTOR EFFLUENT GAS PRESSURE (kPa) :	5284
GAS SUPERFICIAL VELOCITY (cm/sec) :	15.5
LIQUID SUPERFICIAL VELOCITY (cm/sec) :	0.0
SLURRY CONCENTRATION (wt%) :	37.6
CATALYST OXIDE IN REACTOR (kg oxide) :	393
GAS HOLD-UP (X) :	34.3
SPACE VELOCITY (1/kg-hr) :	9762
RECYCLE/FRESH FEED RATIO :	3.655
OIL/SLURRY CIRCULATION RATE (m3/hr) :	0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) :	139.98
PURGE GAS FLOW RATE <50> (ksmol/hr) :	5.46
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) :	585

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<WTZ>
H2	58.64	27.71	35.28	35.01	25.52	25.69	5.76	-----
CO	36.52	55.53	51.08	51.02	51.13	51.26	24.26	-----
CO2	3.82	15.22	12.60	12.55	14.50	14.40	62.94	-----
N2	0.15	0.88	0.72	0.71	0.82	0.82	0.29	-----
CH4	0.05	0.30	0.25	0.23	0.28	0.29	0.25	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.82
CH3OH	0.00	0.29	0.32	0.22	7.40	7.42	6.51	97.69
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.01
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.34
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.13
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.11
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.05
ALKANES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.77
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.10
TOTAL :	99.18	99.94	100.24	99.74	99.65	99.89	100.06	100.00
DENS,g/cc	0.006	0.050	0.032	0.032	0.036	0.036	0.005	0.800
AV.MOL.WT	13.25	23.21	20.85	20.88	23.94	23.90	36.82	32.06
M3/hr	825.1	3015.4	3842.4	3840.5	3348.7	3352.0	12.0	-----
ksmol/hr	36.81	134.52	171.42	171.34	149.39	149.48	0.53	10.59
1/hr,prod	-----	-----	-----	-----	-----	-----	-----	424.31

LAPORTE LPHETANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

=====

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
		----	----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	36.5	36.4
CARBON MONOXIDE CONVERSION	(%) :	12.4	12.6
CARBON DIOXIDE CONVERSION	(%) :	0.3	-0.7
RATIO H2 CONSUMED/CO CONSUMED	:	2.02	1.98
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	34.9	35.6
CARBON MONOXIDE CONVERSION	(%) :	12.1	12.2
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	34.7	35.0
CARBON MONOXIDE CONVERSION	(%) :	12.0	12.0
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL *
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (%) :	97.3	99.4
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.2

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

METH SOURCE	kmol/hr-kg cat	kg/1000 Na3 fresh feed	kg/1000 Na3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	27.00	412.5	88.6
As Net MeOH produced, OVERALL balance	26.45	404.1	86.8

REACTOR FEED (H2/(CO+1.5CO2)) :	0.50
REACTOR FEED ((H2-CO2)/(CO+CO2)) :	0.35
APPROACH TO METHANOL EQUILIBRIUM (des.C) :	23.51
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) :	8.30
METHANOL COLLECTED AS % OF CALCULATED :	97.4
CALCULATED METHANOL PRODUCTION RATE (Kmol/hr) :	10.62

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT MATERIAL BALANCE SUMMARY

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<Z diff.>	<Z diff.>	<Z diff.>
H2	-16.39499	-1.91014	-1.81540
CO	-4.64841	0.83285	-1.94800
CO2	-11.02130	1.67906	-0.08299
N2	-292.67187	1.72367	-1.16201
CH4	n.a.	5.07064	-2.57530
H2O	-----	n.a.	n.a.
CH3OH	-----	6.63423	2.34934

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	Z
CARBON:							
CO	87.4131	74.7054	3.0318	0.1437	-----	77.8309	10.9048
CO2	21.5097	20.4706	0.8308	0.3728	-----	21.6742	-0.7644
CH3OH	0.3698	0.3954	0.0160	0.0386	10.3492	10.7992	-2820.1873
OTHERS	0.4009	0.4036	0.0164	0.0021	0.1059	0.5279	-31.6745
TOTAL C	109.6936	95.9749	3.8950	0.5572	10.4551	110.8872	-1.0836
HYDROGEN:							
H2	119.9741	74.5534	3.0256	0.0683	-----	77.6472	35.2800
H2O	0.0000	0.0000	0.0000	0.0000	0.3083	0.3083	n.a.
OTHERS	3.0830	3.1957	0.1297	0.1621	41.6087	45.0962	-1362.7517
TOTAL H	123.0571	77.7491	3.1553	0.2304	41.9170	123.0518	0.0043
OXYGEN:							
TOTAL O	130.8024	116.0419	4.7095	0.9283	10.5869	132.2664	-1.1193
NITROGEN:							
TOTAL N	2.4433	2.3757	0.0964	0.0034	-----	2.4755	-1.3194
TOTAL MASS FLOW (ks/hr)	3576.6750	3122.1746	126.7074	21.8135	339.4680	3610.1636	-0.9363

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]		FRESH FEED GAS
	GC#1	GC#2	[15-(50+62+68)]
MASS BALANCE (Z) :	0.02	-0.02	-0.04
ELEMENTAL BALANCE (Z) :			
CARBON	0.36	0.16	-0.26
HYDROGEN	1.50	0.74	-4.74
OXYGEN	0.34	0.03	0.19
NITROGEN	0.37	-0.16	9.61

LAPORTE LPHETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

```

DATE :                                06-DEC-89
TIME :                                13:24:56
TIME INTERVAL :                       FROM: 0600 17-Nov
                                         TO: 0600 18-Nov

NUMBER OF AVERAGED HOURS :            21
RUN ID NUMBER :                       E7.75
FEED GAS TYPE:                        CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 163.1
OIL/SLURRY REACTOR INLET TEMP. (deg.C) : 13.7
AVG. REACTOR SLURRY TEMPERATURE (deg.C) : 250.1
REACTOR FREEBOARD TEMPERATURE (deg.C) : 247.0
OIL/SLURRY OUTLET TEMP. (deg.C) :     244.0
REACTOR FEED GAS PRESSURE (kPa) :      5521
REACTOR EFFLUENT GAS PRESSURE (kPa) :   5286
GAS SUPERFICIAL VELOCITY (cm/sec) :    15.2
LIQUID SUPERFICIAL VELOCITY (cm/sec) :  0.0
SLURRY CONCENTRATION (wt%) :           37.6
CATALYST OXIDE IN REACTOR (kg oxide) :  393
GAS HOLD-UP (%) :                     34.0
SPACE VELOCITY (1/kg-hr) :             9644
RECYCLE/FRESH FEED RATIO :             3.637
OIL/SLURRY CIRCULATION RATE (m3/hr) :  0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (kscmol/hr) : 137.88
PURGE GAS FLOW RATE <50> (kscmol/hr) :  5.12
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) : 590
  
```

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEOH PRODUCT
ON-LINE SC#	1	2	1	2	2	1		
COMPONENT								
=====	=====	=====	=====	=====	=====	=====	=====	=====
	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<WT%>
H2	59.05	27.78	35.45	35.22	25.56	25.79	5.80	-----
CO	36.33	55.16	50.80	50.68	50.70	50.93	24.27	-----
CO2	3.61	15.21	12.52	12.51	14.59	14.33	62.70	-----
N2	0.17	1.03	0.83	0.82	0.95	0.95	0.29	-----
CH4	0.05	0.32	0.27	0.25	0.30	0.31	0.24	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.82
CH3OH	0.00	0.38	0.33	0.28	7.48	7.04	6.70	98.40
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.01
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.34
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.13
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.10
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.04
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.76
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.10
TOTAL :	99.21	99.88	100.21	99.77	99.57	99.36	100.05	100.00
DENS,g/cc	0.005	0.049	0.032	0.032	0.036	0.036	0.005	0.794
AV.MOL.WT	13.11	23.19	20.79	20.81	23.95	23.82	36.78	32.19
Wm3/hr	616.2	2975.8	3802.9	3794.1	3297.3	3306.5	12.2	-----
kscmol/hr	36.50	132.76	169.66	169.27	147.10	147.45	0.54	10.51
l/hr,prod	-----	-----	-----	-----	-----	-----	-----	424.91

LAPORTE LPNETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
		----	----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	36.8	36.9
CARBON MONOXIDE CONVERSION	(%) :	12.8	13.1
CARBON DIOXIDE CONVERSION	(%) :	0.5	-1.4
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	1.96
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	32.7	35.3
CARBON MONOXIDE CONVERSION	(%) :	11.4	12.3
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	34.7	35.0
CARBON MONOXIDE CONVERSION	(%) :	12.1	12.2
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR	OVERALL
	GC Average	*
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (%) :	92.2	99.9
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.2

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	gmo1/hr-ks cat	ks/1000 Na3 fresh feed	ks/1000 Na3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	25.87	398.5	85.9
As Net MeOH produced, OVERALL balance	26.56	409.1	88.2

REACTOR FEED (H2/(CO+1.5CO2)) :	0.51
REACTOR FEED ((H2-CO2)/(CO+CO2)) :	0.36
APPROACH TO METHANOL EQUILIBRIUM (des.C) :	22.85
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) :	8.07
METHANOL COLLECTED AS % OF CALCULATED :	102.1
CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) :	10.18

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-17.66363	-2.03628	-1.95914
CO	-5.45660	0.80807	-2.16596
CO2	-10.95949	1.57960	0.52013
N2	-491.30954	2.90617	-1.96800
CH4	n.a.	4.16568	-2.55269
H2O	-----	n.a.	n.a.
CH3OH	-----	5.46165	1.48419

OVERALL ELEMENTAL BALANCE (Kg-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	85.7899	73.2268	2.8234	0.1459	-----	76.1960	11.1830
CO2	21.1737	20.1969	0.7787	0.3768	-----	21.3524	-0.8441
CH3OH	0.4737	0.4993	0.0193	0.0403	10.2748	10.8336	-2196.7869
OTHERS	0.4299	0.4315	0.0166	0.0021	0.1051	0.5553	-29.1557
TOTAL C	107.8672	94.3544	3.6380	0.5651	10.3799	108.9373	-0.9921
HYDROGEN:							
H2	119.2456	73.7538	2.8437	0.0697	-----	76.6672	35.7065
H2O	0.0000	0.0000	0.0000	0.0000	0.3057	0.3057	n.a.
OTHERS	3.6148	3.7231	0.1435	0.1688	41.3095	45.3449	-1154.4392
TOTAL H	122.8604	77.4769	2.9872	0.2385	41.6153	122.3179	0.4416
OXYGEN:							
TOTAL O	128.6110	114.1198	4.4000	0.9401	10.5992	129.9691	-1.0560
NITROGEN:							
TOTAL N	2.7726	2.7322	0.1053	0.0034	-----	2.8410	-2.4667
TOTAL MASS FLOW (kg/hr)	3522.9653	3078.3201	118.6888	22.1068	338.2498	3557.3652	-0.9764

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS
	GC#1	GC#2
	-----	-----
MASS BALANCE (Z) :	0.40	0.00
ELEMENTAL BALANCE (Z) :		
CARBON	1.23	0.36
HYDROGEN	3.92	1.57
OXYGEN	1.11	0.08
NITROGEN	0.56	-0.49
		11.83

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

```

DATE : 06-DEC-89
TIME : 13:25:23
TIME INTERVAL : FROM: 0600 18-Nov
                TO: 0600 19-Nov

NUMBER OF AVERAGED HOURS : 24
RUN ID NUMBER : E7.76
FEED GAS TYPE: CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) : 167.5
OIL/SLURRY REACTOR INLET TEMP. (des.C) : 21.4
AVG. REACTOR SLURRY TEMPERATURE (des.C) : 249.9
REACTOR FREEBOARD TEMPERATURE (des.C) : 246.5
OIL/SLURRY OUTLET TEMP. (des.C) : 243.6
REACTOR FEED GAS PRESSURE (kPa) : 5526
REACTOR EFFLUENT GAS PRESSURE (kPa) : 5285
GAS SUPERFICIAL VELOCITY (cm/sec) : 15.3
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 0.0
SLURRY CONCENTRATION (wt%) : 37.5
CATALYST OXIDE IN REACTOR (kg oxide) : 393
GAS HOLD-UP (%) : 33.8
SPACE VELOCITY (1/kg-hr) : 9693
RECYCLE/FRESH FEED RATIO : 3.540
OIL/SLURRY CIRCULATION RATE (m3/hr) : 0.0
PROD. SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 138.86
PURGE GAS FLOW RATE <50> (ksmol/hr) : 6.21
HEAT TRANSFER COEFFICIENT (Watt/m2-des.C) : 588
  
```

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	58.41	28.13	35.75	35.41	26.01	26.19	5.85	-----
CO	37.04	55.49	51.12	51.10	51.14	51.33	24.05	-----
CO2	3.59	14.44	11.91	11.89	13.67	13.65	53.31	-----
N2	0.17	0.93	0.77	0.75	0.86	0.88	0.32	-----
CH4	0.05	0.25	0.22	0.20	0.23	0.25	0.23	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.86
CH3OH	0.00	0.56	0.48	0.41	7.61	7.63	6.26	97.77
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.34
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.12
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.10
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.06
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.75
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.09
OIL	-----	-----	-----	-----	-----	-----	-----	0.10
TOTAL :	99.26	99.80	100.25	99.74	99.53	99.93	100.07	100.00
DENS, g/cc	0.005	0.048	0.031	0.031	0.034	0.034	0.005	0.788
AV. MOL. WT	13.29	22.98	20.63	20.67	23.69	23.66	36.85	32.08
Nm3/hr	839.8	2973.4	3816.8	3813.3	3326.2	3328.4	11.2	-----
ksmol/hr	37.47	132.65	170.28	170.12	148.39	148.42	0.50	10.45
l/hr, prod	-----	-----	-----	-----	-----	-----	-----	425.31

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
		----	----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(Z) :	36.1	35.9
CARBON MONOXIDE CONVERSION	(Z) :	12.4	12.7
CARBON DIOXIDE CONVERSION	(Z) :	0.1	-0.4
RATIO H2 CONSUMED/CO CONSUMED	:	2.03	1.95
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(Z) :	34.5	35.2
CARBON MONOXIDE CONVERSION	(Z) :	12.1	12.2
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(Z) :	34.1	34.4
CARBON MONOXIDE CONVERSION	(Z) :	11.9	11.9
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR	OVERALL
	GC Average	%
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (Z) :	96.7	99.0
CO (+CO2) SELECTIVITY TO ETHANOL (Z) :	-----	0.2

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	smol/hr-ks cat	ks/1000 Nm3 fresh feed	ks/1000 Nm3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	26.83	402.7	88.7
As Net MeOH produced, OVERALL balance	26.17	392.9	86.5

REACTOR FEED (H2/(CO+1.5CO2)) : 0.51
 REACTOR FEED ((H2-CO2)/(CO+CO2)) : 0.37

APPROACH TO METHANOL EQUILIBRIUM (des.C) : 23.66
 APPROACH TO WATER-GAS EQUILIBRIUM (des.C) : 13.61

METHANOL COLLECTED AS % OF CALCULATED : 96.9

CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) : 10.56

LAPORTE LPHETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-18.51977	-1.74213	-1.28572
CO	-4.65040	0.63307	-1.71094
CO2	-9.88256	1.41741	-0.55231
N2	n.a.	1.93180	-1.88501
CH4	n.a.	3.06145	-1.20534
H2O	-----	n.a.	n.a.
CH3OH	-----	6.22751	2.42796

OVERALL ELEMENTAL BALANCE (Kg-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	Z
CARBON:							
CO	86.9346	73.6092	3.4435	0.1338	-----	77.1864	11.2137
CO2	20.2089	19.1547	0.8961	0.3521	-----	20.4029	-0.9599
CH3OH	0.6931	0.7392	0.0346	0.0348	10.2069	11.0155	-1489.1940
OTHERS	0.3385	0.3316	0.0155	0.0019	0.1045	0.4535	-33.9693
TOTAL C	108.1752	93.8347	4.3897	0.5225	10.3114	109.0584	-0.8165
HYDROGEN:							
H2	120.4709	74.6372	3.4916	0.0651	-----	78.1939	35.0931
H2O	0.0000	0.0000	0.0000	0.0000	0.3209	0.3209	n.a.
OTHERS	4.1268	4.2832	0.2004	0.1462	41.0367	45.6665	-1006.5901
TOTAL H	124.5977	78.9204	3.6920	0.2113	41.3575	124.1912	0.3342
OXYGEN:							
TOTAL O	128.0455	112.6578	5.2703	0.8730	10.4487	129.2498	-0.9405
NITROGEN:							
TOTAL N	2.5586	2.4779	0.1159	0.0036	-----	2.5974	-1.5142
TOTAL MASS FLOW (kg/hr)	3516.6125	3048.3110	142.6039	20.4934	335.1627	3546.5710	-0.8519

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS
	GC#1	[15-(50+62+68)]
MASS BALANCE (%) :	-0.02	-0.08
ELEMENTAL BALANCE (%) :		
CARBON	0.32	0.12
HYDROGEN	1.50	-3.24
OXYGEN	0.28	-0.14
NITROGEN	-0.29	8.89

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

```

DATE :                                06-DEC-89
TIME :                                13:28:10
TIME INTERVAL :                       FROM: 0600 19-Nov
                                         TO: 0500 20-Nov

NUMBER OF AVERAGED HOURS :            23
PUN ID NUMBER :                       E7.77
FEED GAS TYPE:                        CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) : 163.7
OIL/SLURRY REACTOR INLET TEMP. (des.C) : 22.6
AVG. REACTOR SLURRY TEMPERATURE (des.C) : 249.7
REACTOR FREEBOARD TEMPERATURE (des.C) : 246.4
OIL/SLURRY OUTLET TEMP. (des.C) :     243.4
REACTOR FEED GAS PRESSURE (kPa) :      5525
REACTOR EFFLUENT GAS PRESSURE (kPa) :   5285
GAS SUPERFICIAL VELOCITY (cm/sec) :    15.4
LIQUID SUPERFICIAL VELOCITY (cm/sec) :  0.0
SLURRY CONCENTRATION (wt%) :            37.5
CATALYST OXIDE IN REACTOR (kg oxide) :  393
GAS HOLD-UP (%) :                      34.1
SPACE VELOCITY (1/kg-hr) :              9753
RECYCLE/FRESH FEED RATIO :              3.553
OIL/SLURRY CIRCULATION RATE (m3/hr) :   0.0
PROD. SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 139.98
PURGE GAS FLOW RATE <50> (ksmol/hr) :   6.38
HEAT TRANSFER COEFFICIENT (Watt/m2-des.C) : 586
  
```

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEOH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
	<MOL%	<MOL%	<MOL%	<MOL%	<MOL%	<MOL%	<MOL%	<WT%
H2	58.26	28.01	35.48	35.28	25.92	26.03	5.86	-----
CO	37.11	55.56	51.24	51.24	51.43	51.42	23.99	-----
CO2	3.84	14.79	12.22	12.20	14.00	13.96	43.48	-----
N2	0.17	0.82	0.67	0.67	0.76	0.77	0.33	-----
CH4	0.05	0.28	0.24	0.22	0.26	0.27	0.22	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.83
CH3OH	0.00	0.49	0.42	0.34	7.45	7.53	6.14	97.67
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.01
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.34
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.13
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.11
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.06
ALKANES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.74
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.10
TOTAL :	99.43	99.95	100.27	99.95	99.82	99.98	100.08	100.00
DENS, g/cc	0.006	0.049	0.031	0.031	0.034	0.034	0.005	0.792
AV. MOL. WT	13.39	23.07	20.75	20.77	23.77	23.75	36.87	32.06
M3/hr	842.7	2994.5	3839.5	3837.2	3352.2	3354.0	11.5	-----
ksmol/hr	37.60	133.59	171.29	171.19	149.55	149.57	0.51	10.47
l/hr, prod	-----	-----	-----	-----	-----	-----	-----	423.74

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
		----	----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	35.9	35.8
CARBON MONOXIDE CONVERSION	(%) :	12.3	12.3
CARBON DIOXIDE CONVERSION	(%) :	0.2	-0.2
RATIO H2 CONSUMED/CO CONSUMED	:	2.02	2.01
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	34.7	35.0
CARBON MONOXIDE CONVERSION	(%) :	12.0	12.0
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	34.2	34.4
CARBON MONOXIDE CONVERSION	(%) :	11.9	11.9
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR	OVERALL
	GC Average	*
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (%) :	97.6	98.9
CO (+CO2) SELECTIVITY TO ETHANOL (%) :		0.2

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEDH SOURCE	smol/hr-kg cat	kg/1000 Na3 fresh feed	kg/1000 Na2 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	26.81	401.1	88.1
As Net MeOH produced, OVERALL balance	26.17	391.5	86.0
REACTOR FEED (H2/(CO+1.5CO2)) :		0.51	
REACTOR FEED ((H2-CO2)/(CO+CO2)) :		0.36	
APPROACH TO METHANOL EQUILIBRIUM (des.C) :		24.26	
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) :		10.28	
METHANOL COLLECTED AS % OF CALCULATED :		97.0	
CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) :		10.55	

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-18.44780	-1.81129	-1.24021
CO	-5.07433	0.52709	-1.27899
CO2	-10.45441	1.45935	-0.57988
N2	-583.79291	1.69427	-1.38685
CH4	n.a.	2.73661	-1.60946
H2O	-----	n.a.	n.a.
CH3OH	-----	11.45481	1.66699

OVERALL ELEMENTAL BALANCE (Kg-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	87.7108	74.2225	3.5460	0.1368	-----	77.9052	11.1795
CO2	20.8869	19.7533	0.9437	0.3619	-----	21.0589	-0.8237
CH3OH	0.5791	0.6540	0.0312	0.0350	10.2304	10.9506	-1791.0153
OTHERS	0.3800	0.3701	0.0177	0.0020	0.1047	0.4944	-30.0853
TOTAL C	109.5569	94.9998	4.5386	0.5357	10.3351	110.4092	-0.7780
HYDROGEN:							
H2	120.8018	74.8504	3.5760	0.0668	-----	78.4931	35.0232
H2O	0.0000	0.0000	0.0000	0.0000	0.3104	0.3104	n.a.
OTHERS	3.8365	4.0962	0.1957	0.1472	41.1309	45.5700	-1087.7968
TOTAL H	124.6384	78.9466	3.7717	0.2140	41.4413	124.3735	0.2125
OXYGEN:							
TOTAL O	130.0637	114.3830	5.4646	0.8960	10.4675	131.2112	-0.8822
NITROGEN:							
TOTAL N	2.2837	2.1990	0.1051	0.0038	-----	2.3078	-1.0554
TOTAL MASS FLOW (kg/hr)	3554.9290	3081.8928	147.2371	21.0230	335.6190	3585.7722	-0.8676

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS
	GC#1	[15-(50+62+68)]
MASS BALANCE (Z) :	0.01	-0.09
ELEMENTAL BALANCE (Z) :		
CARBON	0.30	0.05
HYDROGEN	1.17	-3.51
OXYGEN	0.29	0.07
NITROGEN	0.13	12.30

LAPORTE LPHETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

```

DATE : 06-DEC-99
TIME : 13:29:31
TIME INTERVAL : FROM: 0800 20-Nov
                TO: 0600 21-Nov

NUMBER OF AVERAGED HOURS : 22
RUN ID NUMBER : E7.78
FEED GAS TYPE: CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 158.9
OIL/SLURRY REACTOR INLET TEMP. (deg.C) : 12.6
AVG. REACTOR SLURRY TEMPERATURE (deg.C) : 249.9
REACTOR FREEBOARD TEMPERATURE (deg.C) : 246.7
OIL/SLURRY OUTLET TEMP. (deg.C) : 243.3
REACTOR FEED GAS PRESSURE (kPa) : 5521
REACTOR EFFLUENT GAS PRESSURE (kPa) : 5286
GAS SUPERFICIAL VELOCITY (cm/sec) : 15.3
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 0.0
SLURRY CONCENTRATION (wtZ) : 37.5
CATALYST OXIDE IN REACTOR (ks oxide) : 393
GAS HOLD-UP (%) : 33.9
SPACE VELOCITY (1/ks-hr) : 9686
RECYCLE/FRESH FEED RATIO : 3.655
OIL/SLURRY CIRCULATION RATE (m3/hr) : 0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 139.73
PURGE GAS FLOW RATE <50> (ksmol/hr) : 5.25
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) : 587
  
```

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEOH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	58.88	28.09	35.70	35.34	26.00	26.12	5.86	-----
CO	36.42	55.08	50.74	50.80	50.87	50.95	23.99	-----
CO2	3.65	15.09	12.44	12.46	14.25	14.28	63.48	-----
N2	0.14	0.82	0.66	0.67	0.76	0.76	0.33	-----
CH4	0.05	0.33	0.27	0.26	0.31	0.31	0.22	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.82
CH3OH	0.00	0.34	0.34	0.25	7.49	7.42	6.14	97.68
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.01
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.35
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.13
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.11
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.06
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.74
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.10
TOTAL :	99.14	99.76	100.16	99.78	99.68	99.86	100.08	100.00
DENS,g/cc	0.006	0.049	0.032	0.032	0.034	0.034	0.005	0.798
AV.MOL.WT	13.15	23.08	20.71	20.77	23.78	23.76	36.87	32.07
Nm3/hr	818.6	2992.0	3816.5	3810.6	3326.7	3328.4	11.7	-----
ksmol/hr	36.52	133.48	170.27	170.00	148.42	148.42	0.52	10.54
l/hr,prod	-----	-----	-----	-----	-----	-----	-----	423.51

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
		----	----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	36.2	35.8
CARBON MONOXIDE CONVERSION	(%) :	12.4	12.6
CARBON DIOXIDE CONVERSION	(%) :	-0.1	0.1
RATIO H2 CONSUMED/CO CONSUMED	:	2.05	1.99
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	34.4	35.6
CARBON MONOXIDE CONVERSION	(%) :	12.1	12.4
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	34.4	34.8
CARBON MONOXIDE CONVERSION	(%) :	12.1	12.1
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL *
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (%) :	97.9	99.2
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.2

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	smol/hr-kg cat	kg/1000 Na3 fresh feed	kg/1000 Na3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	26.87	413.7	88.9
As Net MeOH produced, OVERALL balance	26.33	405.4	87.1

REACTOR FEED {H2/(CO+1.5CO2)} :	0.51
REACTOR FEED {(H2-CO2)/(CO+CO2)} :	0.36
APPROACH TO METHANOL EQUILIBRIUM (des.C) :	23.84
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) :	8.11
METHANOL COLLECTED AS % OF CALCULATED :	97.5
CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) :	10.57

LAPORTE LPHETHANOL PROCESS AVERAGE REPORT MATERIAL BALANCE SUMMARY

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-16.28159	-1.81098	-1.10437
CO	-4.80881	0.52658	-1.40171
CO2	-10.97738	1.37431	-0.69227
N2	-270.36804	1.45594	-1.12729
CH4	n.a.	3.17787	-1.70479
H2O	-----	n.a.	n.a.
CH3OH	-----	6.59979	2.75118

OVERALL ELEMENTAL BALANCE (Kg-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	86.3648	73.5226	2.8929	0.1385	-----	76.5541	11.3596
CO2	21.1790	20.1396	0.7924	0.3665	-----	21.2986	-0.5648
CH3OH	0.4280	0.4583	0.0180	0.0354	10.3031	10.8149	-2426.6650
OTHERS	0.4471	0.4432	0.0174	0.0020	0.1054	0.5680	-27.0354
TOTAL C	108.4189	94.5637	3.7208	0.5425	10.4085	109.2755	-0.7532
HYDROGEN:							
H2	120.1444	74.9976	2.9510	0.0677	-----	78.0162	35.0646
H2O	0.0000	0.0000	0.0000	0.0000	0.3081	0.3081	n.a.
OTHERS	3.5005	3.6057	0.1419	0.1491	41.4233	45.3200	-1194.6528
TOTAL H	123.6449	78.6033	3.0928	0.2167	41.7313	123.6442	0.0006
OXYGEN:							
TOTAL O	129.1508	114.2601	4.4958	0.9074	10.5399	130.2032	-0.8149
NITROGEN:							
TOTAL N	2.2644	2.1971	0.0864	0.0038	-----	2.2873	-1.0117
TOTAL MASS FLOW (kg/hr)	3531.8083	3080.3396	121.2031	21.2906	337.9824	3560.8157	-0.8213

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]		FRESH FEED GAS
	GC#1	GC#2	[15-(50+62+68)]
MASS BALANCE (%) :	-0.06	0.05	-0.01
ELEMENTAL BALANCE (%) :			
CARBON	0.24	0.18	-0.13
HYDROGEN	1.74	0.15	-4.54
OXYGEN	0.18	0.18	0.16
NITROGEN	0.03	0.11	10.46

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

```

DATE :                                06-DEC-89
TIME :                                13:31:08
TIME INTERVAL :                       FROM: 0600 21-Nov
                                      TO: 0600 22-Nov

NUMBER OF AVERAGED HOURS :            24
RUN ID NUMBER :                       E7.79
FEED GAS TYPE:                        CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 163.0
OIL/SLURRY REACTOR INLET TEMP. (deg.C) : 10.4
AVG. REACTOR SLURRY TEMPERATURE (deg.C) : 249.8
REACTOR FREEBOARD TEMPERATURE (deg.C) : 246.8
OIL/SLURRY OUTLET TEMP. (deg.C) :     243.6
REACTOR FEED GAS PRESSURE (kPa) :     5529
REACTOR EFFLUENT GAS PRESSURE (kPa) :  5286
GAS SUPERFICIAL VELOCITY (cm/sec) :   15.4
LIQUID SUPERFICIAL VELOCITY (cm/sec) :  0.0
SLURRY CONCENTRATION (wt%) :           37.3
CATALYST OXIDE IN REACTOR (kg oxide) :  393
GAS HOLD-UP (%) :                     33.5
SPACE VELOCITY (1/kg-hr) :            9711
RECYCLE/FRESH FEED RATIO :            3.718
OIL/SLURRY CIRCULATION RATE (m3/hr) :  0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 139.28
PURGE GAS FLOW RATE <50> (ksmol/hr) :   4.96
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) : 588
  
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STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEOH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<WTX>
H2	59.35	28.30	35.79	35.52	26.17	26.27	5.86	-----
CO	36.24	54.66	50.57	50.42	50.50	50.64	23.99	-----
CO2	3.54	15.18	12.52	12.56	14.31	14.34	63.48	-----
N2	0.16	0.98	0.80	0.79	0.91	0.91	0.33	-----
CH4	0.05	0.32	0.26	0.25	0.29	0.30	0.22	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.82
CH3OH	0.00	0.43	0.39	0.33	7.51	7.24	6.14	97.64
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.33
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.17
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.10
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.06
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.79
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.11
TOTAL :	99.33	99.86	100.34	99.88	99.70	99.71	100.08	100.00
DENS,g/cc	0.006	0.049	0.031	0.031	0.030	0.029	0.005	0.795
AV.MOL.WT	13.05	23.05	20.71	20.75	23.75	23.72	36.87	32.07
M3/hr	809.7	3010.8	3024.8	3820.4	3338.0	3340.6	11.4	-----
ksmol/hr	36.12	134.32	170.64	170.44	148.92	148.97	0.51	10.49
l/hr,prod	-----	-----	-----	-----	-----	-----	-----	423.06

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
		----	----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	35.9	35.6
CARBON MONOXIDE CONVERSION	(%) :	12.5	12.5
CARBON DIOXIDE CONVERSION	(%) :	0.0	0.4
RATIO H2 CONSUMED/CO CONSUMED	:	2.03	2.01
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	33.1	35.1
CARBON MONOXIDE CONVERSION	(%) :	11.7	12.4
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	34.2	34.5
CARBON MONOXIDE CONVERSION	(%) :	12.1	12.1
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL *
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (%) :	95.8	99.0
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.2

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	smol/hr-kg cat	kg/1000 Nm3 fresh feed	kg/1000 Nm3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	26.35	410.2	86.9
As Net MeOH produced, OVERALL balance	26.20	407.8	86.4

REACTOR FEED (H2/(CO+1.5CO2)) : 0.51
REACTOR FEED ((H2-CO2)/(CO+CO2)) : 0.36

APPROACH TO METHANOL EQUILIBRIUM (deg.C) : 23.98
APPROACH TO WATER-GAS EQUILIBRIUM (deg.C) : 6.84

METHANOL COLLECTED AS % OF CALCULATED : 98.9

CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) : 10.37

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-16.40908	-1.83574	-1.24007
CO	-4.63079	0.66004	-1.41267
CO2	-10.11365	1.20697	-0.83441
N2	-331.14810	1.05032	-0.11861
CH4	n.a.	2.98279	-2.14813
H2O	-----	n.a.	n.a.
CH3OH	-----	1.54157	2.75989

OVERALL ELEMENTAL BALANCE (kg-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	85.9402	73.4205	2.7117	0.1354	-----	76.2675	11.2551
CO2	21.4007	20.3830	0.7528	0.3582	-----	21.4940	-0.4361
CH3OH	0.5636	0.5724	0.0211	0.0346	10.2491	10.8773	-1829.8906
OTHERS	0.4312	0.4271	0.0158	0.0019	0.1049	0.5497	-27.4832
TOTAL C	108.3357	94.8031	3.5014	0.5301	10.3540	109.1886	-0.7877
HYDROGEN:							
H2	121.0921	76.0330	2.8082	0.0661	-----	78.9073	34.8370
H2O	0.0000	0.0000	0.0000	0.0000	0.3081	0.3081	n.a.
OTHERS	3.9794	3.9983	0.1477	0.1457	41.3111	45.6027	-1045.9785
TOTAL H	125.0715	80.0313	2.9558	0.2118	41.6191	124.8181	0.2026
OXYGEN:							
TOTAL O	129.3052	114.7589	4.2385	0.8867	10.4872	130.3713	-0.8245
NITROGEN:							
TOTAL N	2.7066	2.6219	0.0968	0.0037	-----	2.7225	-0.5857
TOTAL MASS FLOW (kg/hr)	3536.8396	3095.3965	114.3243	20.8056	336.3547	3566.8809	-0.8494

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]		FRESH FEED GAS
	GC#1	GC#2	[15-(50+62+68)]
MASS BALANCE (Z) :	0.01	-0.01	-0.05
ELEMENTAL BALANCE (Z) :			
CARBON	0.65	0.18	0.01
HYDROGEN	2.67	0.52	-4.29
OXYGEN	0.55	0.22	0.24
NITROGEN	0.43	-0.47	11.35

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY
=====

DATE :	06-DEC-89
TIME :	13:32:29
TIME INTERVAL :	FROM: 0600 22-Nov
	TO: 0600 23-Nov
NUMBER OF AVERAGED HOURS :	24
PUN ID NUMBER :	E7.80
FEED GAS TYPE:	CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) :	164.4
OIL/SLURRY REACTOR INLET TEMP. (des.C) :	12.0
AUG. REACTOR SLURRY TEMPERATURE (des.C) :	250.1
REACTOR FREEBOARD TEMPERATURE (des.C) :	247.3
OIL/SLURRY OUTLET TEMP. (des.C) :	244.4
REACTOR FEED GAS PRESSURE (kPa) :	5530
REACTOR EFFLUENT GAS PRESSURE (kPa) :	5286
GAS SUPERFICIAL VELOCITY (cm/sec) :	15.4
LIQUID SUPERFICIAL VELOCITY (cm/sec) :	0.0
SLURRY CONCENTRATION (wt%) :	37.4
CATALYST OXIDE IN REACTOR (kg oxide) :	393
GAS HOLD-UP (Z) :	33.8
SPACE VELOCITY (1/kg-hr) :	9715
RECYCLE/FRESH FEED RATIO :	3.712
OIL/SLURRY CIRCULATION RATE (m3/hr) :	0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) :	139.38
PURGE GAS FLOW RATE <50> (ksmol/hr) :	5.06
HEAT TRANSFER COEFFICIENT (Watt/m2-des.C) :	590

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	NEOH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	58.90	27.89	35.51	35.14	25.89	25.92	5.86	-----
CO	36.37	55.18	50.79	50.88	50.94	50.99	23.99	-----
CO2	3.56	14.87	12.31	12.30	14.10	14.12	63.48	-----
N2	0.17	1.03	0.84	0.83	0.96	0.96	0.33	-----
CH4	0.06	0.35	0.29	0.29	0.33	0.34	0.22	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.84
CH3OH	0.00	0.38	0.36	0.29	7.44	7.44	6.14	97.66
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.01
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.33
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.12
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.10
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.07
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.76
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.11
TOTAL :	99.06	99.71	100.12	99.73	99.65	99.77	100.08	100.00
DENS,g/cc	0.006	0.049	0.031	0.031	0.033	0.033	0.005	0.794
AV.MOL.WT	13.12	23.09	20.73	20.80	23.78	23.78	36.87	32.06
Nm3/hr	811.2	3010.9	3827.0	3822.2	3339.4	3339.4	11.6	-----
ksmol/hr	36.19	134.32	170.74	170.52	148.98	148.92	0.52	10.51
1/hr,prod	-----	-----	-----	-----	-----	-----	-----	423.51

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

*****

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
		----	----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	36.3	35.6
CARBON MONOXIDE CONVERSION	(%) :	12.4	12.5
CARBON DIOXIDE CONVERSION	(%) :	-0.1	-0.1
RATIO H2 CONSUMED/CO CONSUMED	:	2.05	1.96
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	34.5	35.4
CARBON MONOXIDE CONVERSION	(%) :	12.1	12.2
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	34.4	34.8
CARBON MONOXIDE CONVERSION	(%) :	12.0	12.0
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL *
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (Z) :	97.5	99.2
CO (+CO2) SELECTIVITY TO ETHANOL (Z) :	-----	0.2

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEDH SOURCE	saol/hr-ks cat	ks/1000 Ma3 fresh feed	ks/1000 Ma3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	26.77	416.0	88.3
As Net MeOH produced, OVERALL balance	26.26	408.0	86.6

REACTOR FEED (H2/(CO+1.5CO2)) : 0.51
 REACTOR FEED ((H2-CO2)/(CO+CO2)) : 0.36

APPROACH TO METHANOL EQUILIBRIUM (des.C) : 23.63
 APPROACH TO WATER-GAS EQUILIBRIUM (des.C) : 9.90

METHANOL COLLECTED AS % OF CALCULATED : 97.6

CALCULATED METHANOL PRODUCTION RATE (Ksaol/hr) : 10.53

LAPORTE LPHETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-15.81513	-1.95554	-0.86660
CO	-4.29366	0.60304	-1.53047
CO2	-9.94088	1.32968	-0.38134
N2	-375.86560	2.32123	-0.99571
CH4	n.a.	1.70897	-0.94944
H2O	-----	n.a.	n.a.
CH3OH	-----	4.65056	2.15687

OVERALL ELEMENTAL BALANCE (Kg-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	86.7620	74.1253	2.7899	0.1374	-----	77.0527	11.1907
CO2	20.9790	19.9726	0.7517	0.3636	-----	21.0880	-0.5196
CH3OH	0.4881	0.5119	0.0193	0.0352	10.2753	10.8417	-2121.1143
OTHERS	0.4860	0.4742	0.0178	0.0020	0.1051	0.5991	-23.2830
TOTAL C	108.7151	95.0841	3.5788	0.5382	10.3804	109.5815	-0.7970
HYDROGEN:							
H2	119.8445	74.9125	2.8196	0.0671	-----	77.7992	35.0832
H2O	0.0000	0.0000	0.0000	0.0000	0.3144	0.3144	n.a.
OTHERS	3.8964	3.9444	0.1485	0.1479	41.3114	45.5521	-1069.0853
TOTAL H	123.7409	78.8568	2.9680	0.2150	41.6258	123.6457	0.0607
OXYGEN:							
TOTAL O	129.2081	114.5825	4.3127	0.9002	10.5145	130.3099	-0.8527
NITROGEN:							
TOTAL N	2.8340	2.7805	0.1047	0.0038	-----	2.8889	-1.9370
TOTAL MASS FLOW (kg/hr)	3545.9521	3101.8093	116.7466	21.1234	337.1354	3576.8145	-0.8704

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]		FRESH FEED GAS
	GC#1	GC#2	[15-(50+62+68)]
MASS BALANCE (%) :	-0.09	0.08	-0.03
ELEMENTAL BALANCE (%) :			
CARBON	0.26	0.23	-0.17
HYDROGEN	1.70	0.27	-4.90
OXYGEN	0.20	0.17	0.09
NITROGEN	0.59	-0.93	10.30

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY
=====

DATE :	06-DEC-89
TIME :	13:34:07
TIME INTERVAL :	FROM: 0600 23-Nov
	TO: 0600 24-Nov
NUMBER OF AVERAGED HOURS :	24
RUN ID NUMBER :	E7.81
FEED GAS TYPE:	CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) :	168.1
OIL/SLURRY REACTOR INLET TEMP. (des.C) :	12.9
AVG. REACTOR SLURRY TEMPERATURE (des.C) :	250.1
REACTOR FREEBOARD TEMPERATURE (des.C) :	247.4
OIL/SLURRY OUTLET TEMP. (des.C) :	244.8
REACTOR FEED GAS PRESSURE (kPa) :	5528
REACTOR EFFLUENT GAS PRESSURE (kPa) :	5287
GAS SUPERFICIAL VELOCITY (cm/sec) :	15.3
LIQUID SUPERFICIAL VELOCITY (cm/sec) :	0.0
SLURRY CONCENTRATION (wt%) :	37.5
CATALYST OXIDE IN REACTOR (kg oxide) :	393
GAS HOLD-UP (%) :	34.0
SPACE VELOCITY (1/kg-hr) :	9649
RECYCLE/FRESH FEED RATIO :	3.690
OIL/SLURRY CIRCULATION RATE (m3/hr) :	0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) :	138.56
PURGE GAS FLOW RATE <50> (ksmol/hr) :	5.33
HEAT TRANSFER COEFFICIENT (Watt/m2-des.C) :	591

STREAM #	1	55	15	15	32	32	62	69
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
	<MOL%	<MOL%	<MOL%	<MOL%	<MOL%	<MOL%	<MOL%	<WT%
H2	58.80	27.95	35.48	35.17	25.83	25.94	5.86	-----
CO	36.51	54.99	50.71	50.76	50.90	50.85	23.99	-----
CO2	3.66	15.07	12.43	12.43	14.25	14.23	63.48	-----
N2	0.17	1.01	0.81	0.81	0.93	0.93	0.33	-----
CH4	0.06	0.35	0.29	0.28	0.32	0.33	0.22	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.85
CH3OH	0.01	0.42	0.38	0.32	7.46	7.49	6.14	97.62
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.01
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.33
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.12
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.10
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.06
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.80
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.11
TOTAL :	99.21	99.78	100.11	99.77	99.69	99.78	100.08	100.00
DENS,g/cc	0.006	0.049	0.031	0.031	0.036	0.036	0.005	0.794
AV.MOL.WT	13.19	23.11	20.76	20.81	23.83	23.80	36.87	32.07
Mm3/hr	809.4	2986.5	3800.7	3796.0	3314.6	3316.5	11.5	-----
ksmol/hr	36.11	133.23	169.56	169.35	147.88	147.89	0.52	10.36
l/hr,prod	-----	-----	-----	-----	-----	-----	-----	418.35

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		GC#1 ----	GC#2 ----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	36.2	35.9
CARBON MONOXIDE CONVERSION	(%) :	12.5	12.5
CARBON DIOXIDE CONVERSION	(%) :	0.1	-0.2
RATIO H2 CONSUMED/CO CONSUMED	:	2.03	2.00
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	34.7	35.2
CARBON MONOXIDE CONVERSION	(%) :	12.1	12.2
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	34.3	34.6
CARBON MONOXIDE CONVERSION	(%) :	12.0	12.0
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC Average -----	OVERALL %
CO (+CO2) SELECTIVITY TO METHANOL (%) :	97.7	99.0
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.2

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	mmol/hr-kg cat -----	kg/1000 Nm3 fresh feed -----	kg/1000 Nm3 reactor feed -----
As calculated ACROSS REACTOR	26.60	414.2	88.3
As Net MeOH produced, OVERALL balance	25.87	402.9	85.9

REACTOR FEED (H2/(CO+1.5CO2)) :	0.51
REACTOR FEED ((H2-CO2)/(CO+CO2)) :	0.36
APPROACH TO METHANOL EQUILIBRIUM (deg.C) :	23.39
APPROACH TO WATER-GAS EQUILIBRIUM (deg.C) :	9.22
METHANOL COLLECTED AS % OF CALCULATED :	96.7
CALCULATED METHANOL PRODUCTION RATE (Kmmol/hr) :	10.46

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<Z diff.>	<Z diff.>	<Z diff.>
H2	-15.94626	-1.87442	-1.48204
CO	-4.14213	0.56326	-1.42348
CO2	-9.10863	1.69041	-0.79970
N2	-401.25919	2.05679	-1.90847
CH4	n.a.	2.78681	-0.62251
H2O	-----	n.a.	n.a.
CH3OH	-----	4.59632	2.66447

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	Z
CARBON:							
CO	85.9689	73.2699	2.9300	0.1370	-----	76.3369	11.2041
CO2	21.0417	20.0812	0.8030	0.3625	-----	21.2467	-0.9739
CH3OH	0.5343	0.5578	0.0223	0.0351	10.1195	10.7347	-1909.2211
OTHERS	0.4691	0.4623	0.0185	0.0020	0.1036	0.5864	-24.9986
TOTAL C	108.0140	94.3712	3.7738	0.5365	10.2231	108.9046	-0.8245
HYDROGEN:							
H2	119.1276	74.4677	2.9779	0.0669	-----	77.5124	34.9333
H2O	0.0000	0.0000	0.0000	0.0000	0.3116	0.3116	n.a.
OTHERS	4.0135	4.0807	0.1632	0.1474	40.7887	45.1800	-1025.7047
TOTAL H	123.1411	78.5484	3.1410	0.2143	41.1003	123.0041	0.1113
OXYGEN:							
TOTAL O	128.5867	113.9901	4.5583	0.8974	10.3585	129.8043	-0.9469
NITROGEN:							
TOTAL N	2.7536	2.6887	0.1075	0.0038	-----	2.8000	-1.6822
TOTAL MASS FLOW (ks/hr)	3524.3452	3079.7256	123.1537	21.0565	332.1872	3556.1228	-0.9017

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS [15-(50+62+68)]
MASS BALANCE (Z) :	GC#1	GC#2
ELEMENTAL BALANCE (Z) :	-----	-----
CARBON	-0.03	-0.03
HYDROGEN	0.31	-0.02
OXYGEN	1.48	-4.46
NITROGEN	0.27	0.12
	-0.37	9.37

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES : ANALYTICAL SUMMARY

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DATE :                                06-DEC-89
TIME :                                13:35:36
TIME INTERVAL :                       FROM: 0600 24-Nov
                                         TO: 0600 25-Nov

NUMBER OF AVERAGED HOURS :            24
RUN ID NUMBER :                       E7.82
FEED GAS TYPE:                        CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 169.6
OIL/SLURRY REACTOR INLET TEMP. (deg.C) : 15.5
AVG. REACTOR SLURRY TEMPERATURE (deg.C) : 249.9
REACTOR FREEBOARD TEMPERATURE (deg.C) : 247.0
OIL/SLURRY OUTLET TEMP. (deg.C) :    244.2
REACTOR FEED GAS PRESSURE (kPa) :     5531
REACTOR EFFLUENT GAS PRESSURE (kPa) :  5287
GAS SUPERFICIAL VELOCITY (cm/sec) :   15.3
LIQUID SUPERFICIAL VELOCITY (cm/sec) :  0.0
SLURRY CONCENTRATION (wt%) :          37.4
CATALYST OXIDE IN REACTOR (kg oxide) : 393
GAS HOLD-UP (Z) :                     33.7
SPACE VELOCITY (1/kg-hr) :             9703
RECYCLE/FRESH FEED RATIO :             3.691
OIL/SLURRY CIRCULATION RATE (m3/hr) :  0.0
PROD.SEPARATOR GAS FLOWRATE <S0> + <S5> (ksmol/hr) : 139.58
PURGE GAS FLOW RATE <S0> (ksmol/hr) :  5.58
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) : 591
  
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STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<WTX>
H2	58.78	28.10	35.65	35.35	26.08	26.14	5.86	-----
CO	36.77	55.34	51.12	50.99	51.20	51.26	23.99	-----
CO2	3.58	14.84	12.26	12.25	14.02	14.02	63.48	-----
N2	0.13	0.75	0.62	0.61	0.69	0.70	0.33	-----
CH4	0.05	0.30	0.25	0.24	0.28	0.29	0.22	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.85
CH3OH	0.01	0.53	0.45	0.40	7.49	7.52	6.14	97.60
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.01
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.33
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.12
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.10
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.06
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.81
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.11
TOTAL :	99.33	99.86	100.35	99.84	99.76	99.93	100.08	100.00
DENS,g/cc	0.005	0.048	0.031	0.031	0.036	0.036	0.005	0.789
AV.MOL.WT	13.20	23.05	20.71	20.75	23.73	23.72	36.87	32.07
Nm3/hr	813.8	3003.6	3822.1	3817.4	3336.6	3337.1	11.2	-----
ksmol/hr	36.31	134.00	170.51	170.30	148.85	148.81	0.50	10.30
1/hr:prod	-----	-----	-----	-----	-----	-----	-----	418.57

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
		----	----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(Z) :	36.0	35.5
CARBON MONOXIDE CONVERSION	(Z) :	12.5	12.2
CARBON DIOXIDE CONVERSION	(Z) :	0.1	-0.1
RATIO H2 CONSUMED/CO CONSUMED	:	2.02	2.01
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(Z) :	34.3	34.8
CARBON MONOXIDE CONVERSION	(Z) :	12.0	12.1
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(Z) :	33.7	34.0
CARBON MONOXIDE CONVERSION	(Z) :	11.7	11.9
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.00

SELECTIVITIES :

		ACROSS REACTOR GC Average	OVERALL %
		-----	-----
CO (+CO2) SELECTIVITY TO METHANOL	(Z) :	97.1	99.7
CO (+CO2) SELECTIVITY TO ETHANOL	(Z) :		0.2

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEDH SOURCE	smol/hr-ks cat	ks/1000 Ma3 fresh feed	ks/1000 Ma3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	26.55	411.3	87.7
As Net MeOH produced, OVERALL balance	25.73	398.6	85.0

REACTOR FEED (H2/(CO+1.5CO2)) : 0.51
 REACTOR FEED ((H2-CO2)/(CO+CO2)) : 0.37

APPROACH TO METHANOL EQUILIBRIUM (des.C) : 24.11
 APPROACH TO WATER-GAS EQUILIBRIUM (des.C) : 9.53

METHANOL COLLECTED AS % OF CALCULATED : 96.3

CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) : 10.45

LAPORTE LPNETHANOL PROCESS AVERAGE REPORT MATERIAL BALANCE SUMMARY

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-16.21988	-2.05483	-1.13335
CO	-4.23505	0.75123	-1.52469
CO2	-8.88515	1.53387	-0.92267
N2	-495.89529	1.97595	-1.63447
CH4	n.a.	3.19404	-1.48975
H2O	-----	n.a.	n.a.
CH3OH	-----	4.93149	2.82168

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	86.8468	74.1523	3.0871	0.1330	-----	77.3724	10.9093
CO2	20.8640	19.8881	0.8280	0.3519	-----	21.0679	-0.9774
CH3OH	0.6768	0.7072	0.0294	0.0340	10.0599	10.8306	-1500.1949
OTHERS	0.4053	0.4020	0.0167	0.0019	0.1030	0.5236	-29.1877
TOTAL C	108.7929	95.1496	3.9613	0.5208	10.1629	109.7945	-0.9206
HYDROGEN:							
H2	120.4189	75.3100	3.1353	0.0650	-----	78.5103	34.8023
H2O	0.0000	0.0000	0.0000	0.0000	0.3102	0.3102	n.a.
OTHERS	4.3286	4.4369	0.1847	0.1431	40.5484	45.3131	-946.8285
TOTAL H	124.7475	79.7468	3.3201	0.2080	40.8586	124.1336	0.4921
OXYGEN:							
TOTAL O	129.2516	114.6357	4.7726	0.8710	10.2985	130.5777	-1.0260
NITROGEN:							
TOTAL N	2.0709	2.0153	0.0839	0.0036	-----	2.1029	-1.5448
TOTAL MASS FLOW (ks/hr)	3533.3064	3088.5381	128.5835	20.4377	330.2725	3567.8318	-0.9771

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS
	GC#1	GC#2 [15-(50+62+68)]
MASS BALANCE (%) :	-0.01	0.02
ELEMENTAL BALANCE (%) :		
CARBON	0.42	0.14
HYDROGEN	1.63	0.71
OXYGEN	0.37	0.11
NITROGEN	0.54	0.09
		10.02

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

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DATE : 06-DEC-89
TIME : 13:37:01
TIME INTERVAL : FROM: 0600 25-Nov
                TO: 0600 26-Nov

NUMBER OF AVERAGED HOURS : 24
RUN ID NUMBER : E7.83
FEED GAS TYPE: CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 168.1
OIL/SLURRY REACTOR INLET TEMP. (deg.C) : 21.1
AVG. REACTOR SLURRY TEMPERATURE (deg.C) : 249.9
REACTOR FREEBOARD TEMPERATURE (deg.C) : 246.4
OIL/SLURRY OUTLET TEMP. (deg.C) : 243.7
REACTOR FEED GAS PRESSURE (kPa) : 5529
REACTOR EFFLUENT GAS PRESSURE (kPa) : 5285
GAS SUPERFICIAL VELOCITY (cm/sec) : 15.4
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 0.0
SLURRY CONCENTRATION (wt%) : 37.5
CATALYST OXIDE IN REACTOR (kg oxide) : 393
GAS HOLD-UP (%) : 34.1
SPACE VELOCITY (1/kg-hr) : 9711
RECYCLE/FRESH FEED RATIO : 3.736
OIL/SLURRY CIRCULATION RATE (m3/hr) : 0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 139.74
PURGE GAS FLOW RATE <50> (ksmol/hr) : 5.29
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) : 586
  
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STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDM PRODUC
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
HC	59.10	28.14	35.53	35.29	26.05	26.14	5.86	-----
CO	36.44	54.78	50.70	50.66	50.79	50.83	23.99	-----
CO2	3.62	15.20	12.58	12.54	14.37	14.37	63.48	-----
N2	0.15	0.84	0.69	0.67	0.78	0.78	0.33	-----
CH4	0.05	0.28	0.23	0.22	0.25	0.27	0.22	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.95
CH3OH	0.00	0.54	0.47	0.41	7.45	7.48	6.14	97.54
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.01
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.35
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.13
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.11
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.06
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.74
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.11
TOTAL :	99.36	99.77	100.21	99.79	99.69	99.87	100.08	100.00
DENS,g/cc	0.005	0.048	0.031	0.031	0.036	0.036	0.005	0.789
AV.MOL.MT	13.13	23.10	20.79	20.81	23.79	23.78	36.87	32.04
Mm3/hr	806.7	3013.7	3822.2	3820.3	3340.8	3341.8	11.5	-----
ksmol/hr	35.99	134.45	170.52	170.44	149.04	149.02	0.51	10.28
l/hr,prod	-----	-----	-----	-----	-----	-----	-----	417.45

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	35.7	35.5
CARBON MONOXIDE CONVERSION	(%) :	12.3	12.3
CARBON DIOXIDE CONVERSION	(%) :	0.1	-0.2
RATIO H2 CONSUMED/CO CONSUMED	:	2.02	2.01
 CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	34.1	34.6
CARBON MONOXIDE CONVERSION	(%) :	12.0	12.0
 CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	33.7	33.9
CARBON MONOXIDE CONVERSION	(%) :	11.8	11.9
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL *
CO (+CO2) SELECTIVITY TO METHANOL (%) :	97.4	98.7
CO (+CO2) SELECTIVITY TO ETHANOL (%) :		0.2

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	ksol/hr-ks cat	ks/1000 Na3 fresh feed	ks/1000 Na3 reactor feed
As calculated ACROSS REACTOR	35	411.8	97.0
As Net MeOH produced, OVERALL balance	27	400.8	94.5

REACTOR FEED (H2/(CO+1.5CO2)) :	0.51
REACTOR FEED ((H2-CO2)/(CO+CO2)) :	0.36
 APPROACH TO METHANOL EQUILIBRIUM (deg.C) :	
APPROACH TO WATER-GAS EQUILIBRIUM (deg.C) :	24.02
	14.93
METHANOL COLLECTED AS % OF CALCULATED :	96.7
CALCULATED METHANOL PRODUCTION RATE (Ksol/hr) :	10.37

LAPORTE LPNETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-16.58959	-1.77106	-1.36257
CO	-4.24941	0.49307	-1.29319
CO2	-8.91514	1.65023	-0.83884
N2	-891.77704	2.92546	-0.87170
CH4	n.a.	3.28446	-2.65524
H2O	-----	n.a.	n.a.
CH3OH	-----	3.62866	2.51361

OVERALL ELEMENTAL BALANCE (Ks-stons/hr) :

	INPUTS		OUTPUTS				(IN-OUT)/IN
STREAM # STREAM NAME	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	86.3367	73.6506	2.8969	0.1365	-----	76.6840	11.1804
CO2	21.3780	20.4324	0.8037	0.3611	-----	21.5972	-1.0254
CH3OH	0.7030	0.7294	0.0287	0.0349	10.0263	10.8193	-1439.1116
OTHERS	0.3733	0.3697	0.0145	0.0020	0.1028	0.4891	-31.0252
TOTAL C	108.7909	95.1822	3.7438	0.5344	10.1291	109.5895	-0.7341
HYDROGEN:							
H2	120.2879	75.6579	2.9759	0.0667	-----	78.7005	34.5732
H2O	0.0000	0.0000	0.0000	0.0000	0.3492	0.3492	n.a.
OTHERS	4.3049	4.3967	0.1729	0.1468	40.3107	45.0271	-945.9603
TOTAL H	124.5927	80.0546	3.1488	0.2135	40.6599	124.0768	0.4141
OXYGEN:							
TOTAL O	129.7956	115.2449	4.5330	0.8918	10.2818	130.9535	-0.8921
NITROGEN:							
TOTAL N	2.2975	2.2588	0.0888	0.0037	-----	2.3514	-2.3443
TOTAL MASS FLOW (ks/hr)	3546.8015	3105.2668	122.1410	20.9729	329.3866	3577.7671	-0.8731

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS [15-(50+62+68)]
	GC#1	GC#2
MASS BALANCE (%) :	-0.02	0.01
ELEMENTAL BALANCE (%) :		
CARBON	0.33	0.18
HYDROGEN	1.46	0.84
OXYGEN	0.29	0.12
NITROGEN	0.79	-1.46

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

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=====
DATE :                                06-DEC-89
TIME :                                13:38:34
TIME INTERVAL :                       FROM: 0600 26-Nov
                                         TO: 0600 27-Nov

NUMBER OF AVERAGED HOURS :            24
RUN ID NUMBER :                       E7.84
FEED GAS TYPE:                        CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) : 170.7
OIL/SLURRY REACTOR INLET TEMP. (des.C) : 23.3
AVG. REACTOR SLURRY TEMPERATURE (des.C) : 249.8
REACTOR FREEBOARD TEMPERATURE (des.C) : 246.5
OIL/SLURRY OUTLET TEMP. (des.C) :     243.8
REACTOR FEED GAS PRESSURE (kPa) :     5524
REACTOR EFFLUENT GAS PRESSURE (kPa) :  5286
GAS SUPERFICIAL VELOCITY (cm/sec) :   15.3
LIQUID SUPERFICIAL VELOCITY (cm/sec) :  0.0
SLURRY CONCENTRATION (wt%) :          37.4
CATALYST OXIDE IN REACTOR (ks oxide) : 393
GAS HOLD-UP (%) :                     33.7
SPACE VELOCITY (1/ks-hr) :            9656
RECYCLE/FRESH FEED RATIO :            3.660
OIL/SLURRY CIRCULATION RATE (m3/hr) :  0.0
PROD. SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 139.22
PURGE GAS FLOW RATE <50> (ksmol/hr) :  6.11
HEAT TRANSFER COEFFICIENT (Watt/m2-des.C) : 586
  
```

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEOH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	58.29	27.81	35.29	34.97	25.81	25.90	5.86	-----
CO	37.15	55.75	51.42	51.47	51.65	51.70	23.99	-----
CO2	3.73	14.69	12.16	12.16	13.91	13.89	63.48	-----
N2	0.16	0.81	0.66	0.65	0.75	0.75	0.33	-----
CH4	0.05	0.27	0.23	0.22	0.26	0.27	0.22	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.91
CH3OH	0.01	0.57	0.50	0.43	7.40	7.37	6.14	97.65
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.01
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.33
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.13
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.10
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.06
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.70
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.10
TOTAL :	99.39	99.90	100.27	99.90	99.77	99.89	100.08	100.00
DENS,g/cc	0.005	0.048	0.031	0.031	0.036	0.036	0.005	0.789
AV.MOL.WT	13.36	23.11	20.79	20.84	23.78	23.76	36.87	32.03
M3/hr	815.3	2983.7	3804.2	3798.9	3327.6	3329.3	11.0	-----
ksmol/hr	36.37	133.11	169.72	169.48	148.45	148.46	0.49	10.14
l/hr:prod	-----	-----	-----	-----	-----	-----	-----	411.61

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

	GC#1	GC#2
CALCULATED BY GAS COMPOSITION		
HYDROGEN CONVERSION (Z) :	35.8	35.4
CARBON MONOXIDE CONVERSION (Z) :	12.0	12.1
CARBON DIOXIDE CONVERSION (Z) :	0.1	-0.2
RATIO H2 CONSUMED/CO CONSUMED :	2.05	1.98
CALCULATED BY METHANOL IN EXIT GAS		
HYDROGEN CONVERSION (Z) :	33.7	34.6
CARBON MONOXIDE CONVERSION (Z) :	11.6	11.9
CALCULATED BY OVERALL BALANCE		
HYDROGEN CONVERSION (Z) :	33.6	34.0
CARBON MONOXIDE CONVERSION (Z) :	11.5	11.5
RATIO H2 CONSUMED/CO CONSUMED :	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL *
CO (+CO2) SELECTIVITY TO METHANOL (Z) :	96.9	98.8
CO (+CO2) SELECTIVITY TO ETHANOL (Z) :		0.2

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEDH SOURCE	smol/hr-ks cat	ks/1000 Na3 fresh feed	ks/1000 Na3 reactor feed
As calculated ACROSS REACTOR	25.87	400.0	85.8
As Net MeOH produced, OVERALL balance	25.33	391.7	84.1

REACTOR FEED (H2/(CO+1.5CO2)) :	0.50
REACTOR FEED ((H2-CO2)/(CO+CO2)) :	0.36
APPROACH TO METHANOL EQUILIBRIUM (des.C) :	24.22
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) :	15.12
METHANOL COLLECTED AS % OF CALCULATED :	97.3
CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) :	10.18

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-15.49451	-1.78037	-1.14639
CO	-4.72498	0.55431	-1.39304
CO2	-9.22734	1.45621	-0.69257
N2	-558.40845	2.29414	-1.61031
CH4	n.a.	2.29701	0.03678
H2O	-----	n.a.	n.a.
CH3OH	-----	3.32344	2.39534

OVERALL ELEMENTAL BALANCE (kg-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	87.2347	74.2084	3.4062	0.1302	-----	77.7448	10.8786
CO2	20.6071	19.5541	0.8975	0.3444	-----	20.7960	-0.9169
CH3OH	0.7329	0.7548	0.0346	0.0333	9.8979	10.7206	-1362.8298
OTHERS	0.3712	0.3621	0.0166	0.0019	0.1014	0.4819	-29.8459
TOTAL C	108.9457	94.8794	4.3550	0.5097	9.9992	109.7433	-0.7321
HYDROGEN:							
H2	119.5172	74.0367	3.3983	0.0636	-----	77.4986	34.6099
H2O	0.0000	0.0000	0.0000	0.0000	0.3285	0.3285	n.a.
OTHERS	4.4161	4.4674	0.2051	0.1401	39.7942	44.6067	-910.0905
TOTAL H	122.9333	78.5041	3.6034	0.2036	40.1227	122.4338	0.4064
OXYGEN:							
TOTAL O	129.1816	114.0714	5.2359	0.8525	10.1383	130.2991	-0.8642
NITROGEN:							
TOTAL N	2.2100	2.1484	0.0986	0.0036	-----	2.2506	-1.8365
TOTAL MASS FLOW (kg/hr)	3532.1289	3075.8113	141.1805	20.0028	324.7798	3561.7747	-0.8393

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS
	GC#1	GC#2
	-----	-----
MASS BALANCE (%) :	-0.03	0.03
ELEMENTAL BALANCE (%) :		
CARBON	0.35	0.23
HYDROGEN	1.95	0.70
OXYGEN	0.30	0.17
NITROGEN	0.53	-0.22
		0.00
		0.18
		-3.39
		0.03
		9.96

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

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DATE : 06-DEC-90
TIME : 13:40:00
TIME INTERVAL : FROM: 0600 27-Nov
                TO: 0600 29-Nov

NUMBER OF AVERAGED HOURS : 24
RUN ID NUMBER : E7.85
FEED GAS TYPE: CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) : 164.0
OIL/SLURRY REACTOR INLET TEMP. (des.C) : 17.2
AVG. REACTOR SLURRY TEMPERATURE (des.C) : 249.8
REACTOR FREEBOARD TEMPERATURE (des.C) : 246.7
OIL/SLURRY OUTLET TEMP. (des.C) : 243.2
REACTOR FEED GAS PRESSURE (kPa) : 5522
REACTOR EFFLUENT GAS PRESSURE (kPa) : 5287
GAS SUPERFICIAL VELOCITY (cm/sec) : 15.3
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 0.0
SLURRY CONCENTRATION (wt%) : 37.5
CATALYST OXIDE IN REACTOR (kg oxide) : 393
GAS HOLD-UP (%) : 33.8
SPACE VELOCITY (1/kg-hr) : 9673
RECYCLE/FRESH FEED RATIO : 3.692
OIL/SLURRY CIRCULATION RATE (m3/hr) : 0.0
PROB. SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 139.45
PURGE GAS FLOW RATE <50> (ksmol/hr) : 5.85
HEAT TRANSFER COEFFICIENT (Watt/m2-des.C) : 585
  
```

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEOH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	58.42	27.86	35.34	35.05	25.85	26.03	5.86	-----
CO	36.79	55.21	50.98	51.02	51.16	51.19	23.99	-----
CO2	3.83	15.14	12.55	12.56	14.31	14.33	63.48	-----
N2	0.15	0.82	0.66	0.66	0.76	0.76	0.33	-----
CH4	0.05	0.29	0.24	0.23	0.27	0.28	0.22	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08
CH3OH	0.01	0.48	0.44	0.38	7.38	7.33	6.14	97.70
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.01
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.32
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.12
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.10
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.06
ALK+ENES	-----	-----	-----	-----	-----	-----	-----	0.09
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.70
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.09
OIL	-----	-----	-----	-----	-----	-----	-----	0.10
TOTAL :	99.26	99.80	100.21	99.90	99.71	99.91	100.08	100.00
DENS,g/cc	0.006	0.049	0.032	0.032	0.036	0.036	0.005	0.792
AV.MOL.WT	13.32	23.16	20.83	20.88	23.83	23.79	36.87	32.04
M3/hr	811.1	2994.6	3810.0	3805.7	3333.4	3336.2	11.2	-----
ksmol/hr	36.19	133.60	169.97	169.78	148.72	148.77	0.50	10.19
l/hr,prod	-----	-----	-----	-----	-----	-----	-----	412.06

LAPORTE LPHETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
		----	----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	35.5	35.4
CARBON MONOXIDE CONVERSION	(%) :	12.1	12.2
CARBON DIOXIDE CONVERSION	(%) :	0.0	0.2
RATIO H2 CONSUMED/CO CONSUMED	:	2.04	2.00
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	33.9	34.7
CARBON MONOXIDE CONVERSION	(%) :	11.7	11.9
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	33.7	34.0
CARBON MONOXIDE CONVERSION	(%) :	11.7	11.7
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL %
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (%) :	97.3	99.2
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.2

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	smol/hr-kg cat	kg/1000 Nm3 fresh feed	kg/1000 Nm3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	26.05	404.9	86.3
As Net MeOH produced, OVERALL balance	25.45	395.6	84.3

REACTOR FEED (H2/(CO+1.5CO2)) :	0.50
REACTOR FEED ((H2-CO2)/(CO+CO2)) :	0.35
APPROACH TO METHANOL EQUILIBRIUM (deg.C) :	24.10
APPROACH TO WATER-GAS EQUILIBRIUM (deg.C) :	10.47
METHANOL COLLECTED AS % OF CALCULATED :	97.1
CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) :	10.25

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-15.17454	-1.96528	-1.15138
CO	-4.37785	0.50626	-1.37108
CO2	-9.80245	1.36188	-0.90908
N2	-349.13635	2.37578	-1.62321
CH4	n.a.	2.68767	-2.86481
H2O	-----	n.a.	n.a.
CH3OH	-----	-0.06273	2.91995

OVERALL ELEMENTAL BALANCE (Ks-stoms/hr) :

	INPUTS		OUTPUTS				(IN-OUT)/IN
STREAM # STREAM NAME	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	86.6290	73.7574	3.2311	0.1329	-----	77.1214	10.9751
CO2	21.3249	20.2322	0.8863	0.3516	-----	21.4701	-0.6811
CH3OH	0.6428	0.6391	0.0280	0.0340	9.9512	10.6524	-1557.1793
OTHERS	0.3990	0.3901	0.0171	0.0019	0.1019	0.5110	-28.0650
TOTAL C	108.9957	95.0189	4.1626	0.5203	10.0531	109.7549	-0.6966
HYDROGEN:							
H2	119.0119	74.4334	3.2608	0.0649	-----	77.7591	34.6628
H2O	0.0000	0.0000	0.0000	0.0000	0.3181	0.3181	n.a.
OTHERS	4.1672	4.1170	0.1804	0.1430	40.0087	44.4490	-966.6454
TOTAL H	123.1791	78.5504	3.4411	0.2079	40.3268	122.5262	0.5300
OXYGEN:							
TOTAL O	129.9216	114.8610	5.0318	0.8703	10.1860	130.9491	-0.7909
NITROGEN:							
TOTAL N	2.2412	2.1857	0.0957	0.0036	-----	2.2851	-1.9599
TOTAL MASS FLOW (ks/hr)	3545.2637	3093.8877	135.5362	20.4209	326.3705	3576.2153	-0.8730

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS
	GC#1	GC#2
	-----	-----
MASS BALANCE (%) :	-0.02	0.03
ELEMENTAL BALANCE (%) :		[15-(50+62+68)]
CARBON	0.28	0.25
HYDROGEN	1.57	0.67
OXYGEN	0.24	0.24
NITROGEN	-0.13	-0.33
		9.65

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

```

DATE : 05-DEC-89
TIME : 13:41:33
TIME INTERVAL : FROM: 0600 29-Nov
                TO: 0600 29-Nov

NUMBER OF AVERAGED HOURS : 24
RUN ID NUMBER : E7.86
FEED GAS TYPE: CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) : 160.7
OIL/SLURRY REACTOR INLET TEMP. (des.C) : 11.2
AVG. REACTOR SLURRY TEMPERATURE (des.C) : 250.0
REACTOR FREEBOARD TEMPERATURE (des.C) : 247.3
OIL/SLURRY OUTLET TEMP. (des.C) : 244.2
REACTOR FEED GAS PRESSURE (kPa) : 5525
REACTOR EFFLUENT GAS PRESSURE (kPa) : 5279
GAS SUPERFICIAL VELOCITY (cm/sec) : 15.5
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 0.0
SLURRY CONCENTRATION (wt%) : 37.4
CATALYST OXIDE IN REACTOR (kg oxide) : 393
GAS HOLD-UP (%) : 33.6
SPACE VELOCITY (1/kg-hr) : 9690
RECYCLE/FRESH FEED RATIO : 3.746
OIL/SLURRY CIRCULATION RATE (m3/hr) : 0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 139.22
PURGE GAS FLOW RATE <50> (ksmol/hr) : 4.99
HEAT TRANSFER COEFFICIENT (Watt/m2-des.C) : 586
  
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STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEOH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	59.13	28.10	35.63	35.28	25.99	26.12	5.86	-----
CO	36.17	54.89	50.65	50.70	50.82	50.77	23.99	-----
CO2	3.69	15.11	12.53	12.55	14.32	14.30	63.48	-----
N2	0.16	1.01	0.81	0.81	0.93	0.93	0.33	-----
CH4	0.05	0.34	0.28	0.27	0.32	0.32	0.22	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.89
CH3OH	0.00	0.31	0.31	0.23	7.30	7.34	6.14	97.67
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.01
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.31
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.12
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.10
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.06
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.73
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.11
TOTAL :	99.20	99.76	100.20	99.85	99.67	99.79	100.08	100.00
DENS,g/cc	0.006	0.049	0.032	0.032	0.036	0.036	0.005	0.799
AV.MOL.WT	13.11	23.08	20.74	20.81	23.79	23.75	36.87	32.04
Mm3/hr	803.2	3008.8	3816.9	3812.1	3332.7	3334.9	11.8	-----
ksmol/hr	35.83	134.23	170.29	170.07	148.68	148.71	0.53	10.40
1/hr,prod	-----	-----	-----	-----	-----	-----	-----	417.23

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	35.9	35.6
CARBON MONOXIDE CONVERSION	(%) :	12.4	12.4
CARBON DIOXIDE CONVERSION	(%) :	0.3	0.3
RATIO H2 CONSUMED/CO CONSUMED	:	2.04	2.00
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	34.3	34.9
CARBON MONOXIDE CONVERSION	(%) :	12.1	12.1
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	34.0	34.4
CARBON MONOXIDE CONVERSION	(%) :	12.0	12.0
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL *
CO (+CO2) SELECTIVITY TO METHANOL (%) :	97.0	99.4
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	—	0.2

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

METH SOURCE	mol/hr-kg cat	kg/1000 Nm3 fresh feed	kg/1000 Nm3 reactor feed
As calculated ACROSS REACTOR	26.50	415.9	87.6
As Net MeOH produced, OVERALL balance	25.96	407.5	85.9

REACTOR FEED $\{H_2/(CO+1.5CO_2)\}$: 0.51
 REACTOR FEED $\{(H_2-CO_2)/(CO+CO_2)\}$: 0.36

APPROACH TO METHANOL EQUILIBRIUM (des.C) : 24.27
 APPROACH TO WATER-GAS EQUILIBRIUM (des.C) : 12.07

METHANOL COLLECTED AS % OF CALCULATED : 97.5

CALCULATED METHANOL PRODUCTION RATE (Kmol/hr) : 10.43

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT MATERIAL BALANCE SUMMARY

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<Z diff.>	<Z diff.>	<Z diff.>
H2	-15.45899	-1.84947	-1.30756
CO	-4.52029	0.47169	-1.32460
CO2	-9.86261	1.19967	-0.57415
N2	-299.91879	2.59189	-1.51059
CH4	n.a.	1.82876	-1.02756
H2O	-----	n.a.	n.a.
CH3OH	-----	4.69364	2.07350

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	Z
CARBON:							
CO	86.2316	73.6795	2.7372	0.1405	-----	76.5572	11.2191
CO2	21.3487	20.2854	0.7536	0.3717	-----	21.4107	-0.2903
CH3OH	0.3955	0.4150	0.0154	0.0359	10.1620	10.6284	-2587.3750
OTHERS	0.4660	0.4564	0.0170	0.0020	0.1041	0.5794	-24.3425
TOTAL C	108.4418	94.8362	3.5232	0.5502	10.2661	109.1756	-0.6767
HYDROGEN:							
H2	119.9834	75.4312	2.8023	0.0686	-----	78.3021	34.7397
H2O	0.0000	0.0000	0.0000	0.0000	0.3313	0.3313	n.a.
OTHERS	3.4459	3.4855	0.1295	0.1512	40.8562	44.6223	-1194.9316
TOTAL H	123.4293	78.9167	2.9317	0.2198	41.1875	123.2557	0.1407
OXYGEN:							
TOTAL O	129.3245	114.6652	4.2598	0.9202	10.4052	130.2504	-0.7159
NITROGEN:							
TOTAL N	2.7517	2.7088	0.1006	0.0039	-----	2.8133	-2.2390
TOTAL MASS FLOW (kg/hr)	3538.9570	3097.8423	115.0846	21.5917	333.3819	3567.9006	-0.8179

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS
	GC#1	[15-(50+62+68)]
MASS BALANCE (Z) :	-0.06	-0.09
ELEMENTAL BALANCE (Z) :		
CARBON	0.34	-0.26
HYDROGEN	1.61	-4.46
OXYGEN	0.32	0.13
NITROGEN	0.19	10.00

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

```

DATE :                                06-DEC-89
TIME :                                13:42:58
TIME INTERVAL :                       FROM: 0600 29-Nov
                                         TO:  0600 30-Nov

NUMBER OF AVERAGED HOURS :            24
RUN ID NUMBER :                       E7.87
FEED GAS TYPE:                        CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 164.0
OIL/SLURRY REACTOR INLET TEMP. (deg.C) : 13.5
AVG. REACTOR SLURRY TEMPERATURE (deg.C) : 250.0
REACTOR FREEBOARD TEMPERATURE (deg.C) : 247.3
OIL/SLURRY OUTLET TEMP. (deg.C) :     244.3
REACTOR FEED GAS PRESSURE (kPa) :      5529
REACTOR EFFLUENT GAS PRESSURE (kPa) :    5251
GAS SUPERFICIAL VELOCITY (cm/sec) :     15.4
LIQUID SUPERFICIAL VELOCITY (cm/sec) :    0.0
SLURRY CONCENTRATION (wt%) :            37.5
CATALYST OXIDE IN REACTOR (kg oxide) :   393
GAS HOLD-UP (%) :                      34.0
SPACE VELOCITY (1/kg-hr) :              9642
RECYCLE/FRESH FEED RATIO :              3.666
OIL/SLURRY CIRCULATION RATE (m3/hr) :    0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 138.15
PURGE GAS FLOW RATE <50> (ksmol/hr) :    5.19
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) : 589
  
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STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	59.20	28.57	36.00	34.26	26.47	26.55	5.86	-----
CO	36.32	54.68	50.63	50.93	50.60	50.72	23.99	-----
CO2	3.63	14.99	12.40	12.79	14.16	14.16	63.48	-----
N2	0.14	0.85	0.68	0.77	0.78	0.78	0.33	-----
CH4	0.05	0.33	0.28	0.34	0.30	0.31	0.22	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.88
CH3OH	0.00	0.41	0.36	1.30	7.42	7.39	6.14	97.64
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.32
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.12
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.10
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.06
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.78
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.09
TOTAL :	99.35	99.83	100.34	100.38	99.74	99.90	100.08	100.00
DENS,g/cc	0.005	0.049	0.031	0.032	0.036	0.036	0.005	0.796
AV.MOL.WT	13.10	22.94	20.64	21.15	23.64	23.63	36.87	32.05
M3/hr	813.0	2980.2	3831.3	3793.3	3345.1	3346.2	11.6	-----
ksmol/hr	36.27	132.96	170.93	169.23	149.24	149.22	0.52	10.45
1/hr,prod	-----	-----	-----	-----	-----	-----	-----	420.59

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

	GC#1	GC#2
CALCULATED BY GAS COMPOSITION		
HYDROGEN CONVERSION (Z) :	35.6	31.9
CARBON MONOXIDE CONVERSION (Z) :	12.5	12.4
CARBON DIOXIDE CONVERSION (Z) :	0.3	2.4
RATIO H2 CONSUMED/CO CONSUMED :	2.02	1.73
CALCULATED BY METHANOL IN EXIT GAS		
HYDROGEN CONVERSION (Z) :	33.9	30.6
CARBON MONOXIDE CONVERSION (Z) :	12.0	10.3
CALCULATED BY OVERALL BALANCE		
HYDROGEN CONVERSION (Z) :	33.7	35.8
CARBON MONOXIDE CONVERSION (Z) :	12.0	12.0
RATIO H2 CONSUMED/CO CONSUMED :	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC #1	OVERALL *
CO (+CO2) SELECTIVITY TO METHANOL (Z) :	95.7	98.9
CO (+CO2) SELECTIVITY TO ETHANOL (Z) :		0.2

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

METH SOURCE	smol/hr-kg cat	kg/1000 Me3 fresh feed	kg/1000 Me3 reactor feed
As calculated ACROSS REACTOR, GC#1	26.48	410.6	87.1
As Net MeOH Produced, OVERALL balance	26.08	404.3	85.9

REACTOR FEED (H2/(CO+1.5CO2)) :	0.49
REACTOR FEED ((H2-CO2)/(CO+CO2)) :	0.34
APPROACH TO METHANOL EQUILIBRIUM (des.C) :	24.29
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) :	10.51
METHANOL COLLECTED AS % OF CALCULATED, GC#1 :	97.9
CALCULATED METHANOL PRODUCTION RATE, GC#1 (Ksmol/hr) :	10.42

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-16.12619	2.49183	0.00434
CO	-4.85883	-0.35650	-0.20959
CO2	-9.73074	-1.85202	0.27257
N2	-369.78571	-10.14767	-0.53553
CH4	n.a.	-24.41866	-1.13422
H2O	-----	n.a.	n.a.
CH3OH	-----	-306.83795	2.39921

OVERALL ELEMENTAL BALANCE (Kg-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	69 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	86.1818	72.7021	2.8389	0.1382	-----	75.6793	12.1865
CO2	21.6394	19.9289	0.7782	0.3657	-----	21.0728	2.6184
CH3OH	2.2039	0.5417	0.0212	0.0354	10.2025	10.8007	-390.0680
OTHERS	0.5686	0.4374	0.0171	0.0020	0.1045	0.5610	1.3429
TOTAL C	110.5937	93.6102	3.6554	0.5412	10.3069	108.1137	2.2424
HYDROGEN:							
H2	115.9594	75.9769	2.9668	0.0675	-----	79.0112	31.8631
H2O	0.0000	0.0000	0.0000	0.0000	0.3282	0.3282	n.a.
OTHERS	11.0901	3.9166	0.1529	0.1487	41.0188	45.2371	-307.9042
TOTAL H	127.0495	79.8934	3.1197	0.2162	41.3470	124.5764	1.9465
OXYGEN:							
TOTAL O	131.6645	113.1017	4.4165	0.9052	10.4478	128.8712	2.1215
NITROGEN:							
TOTAL N	2.5994	2.2576	0.0882	0.0038	-----	2.3496	9.6104
TOTAL MASS FLOW (kg/hr)	3579.8794	3050.2959	119.1101	21.2405	334.8115	3525.4580	1.5202

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS
	GC#1	GC#2
	-----	-----
MASS BALANCE (%) :	0.00	1.43
ELEMENTAL BALANCE (%) :		
CARBON	0.43	2.19
HYDROGEN	1.67	1.55
OXYGEN	0.41	2.14
NITROGEN	0.26	10.09

		[15-(50+62+68)]

		-0.01
		0.05
		-3.85
		0.24
		10.11

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

```

DATE : 06-DEC-99
TIME : 13:44:25
TIME INTERVAL : FROM: 0600 30-Nov
                TO: 0600 01-Jan

NUMBER OF AVERAGED HOURS : 24
RUN ID NUMBER : E7.88
FEED GAS TYPE: CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) : 160.5
OIL/SLURRY REACTOR INLET TEMP. (des.C) : 13.8
AVG. REACTOR SLURRY TEMPERATURE (des.C) : 250.1
REACTOR FREEBOARD TEMPERATURE (des.C) : 247.1
OIL/SLURRY OUTLET TEMP. (des.C) : 243.9
REACTOR FEED GAS PRESSURE (kPa) : 5527
REACTOR EFFLUENT GAS PRESSURE (kPa) : 5288
GAS SUPERFICIAL VELOCITY (cm/sec) : 15.5
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 0.0
SLURRY CONCENTRATION (wt%) : 37.5
CATALYST OXIDE IN REACTOR (kg oxide) : 393
GAS HOLD-UP (%) : 33.9
SPACE VELOCITY (1/kg-hr) : 9719
RECYCLE/FRESH FEED RATIO : 3.792
OIL/SLURRY CIRCULATION RATE (m3/hr) : 0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 140.03
PURGE GAS FLOW RATE <50> (ksmol/hr) : 5.03
HEAT TRANSFER COEFFICIENT (Watt/m2-des.C) : 584
  
```

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDM PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<WT%>
H2	58.94	28.01	35.48	35.14	26.01	25.99	5.86	-----
CO	36.37	55.10	50.82	50.89	51.00	51.06	23.99	-----
CO2	3.71	15.07	12.51	12.50	14.23	14.29	63.48	-----
N2	0.15	0.91	0.74	0.73	0.84	0.84	0.33	-----
CH4	0.06	0.37	0.31	0.30	0.34	0.35	0.22	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.90
CH3OH	0.00	0.32	0.31	0.23	7.23	7.24	6.14	97.67
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.30
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.11
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.09
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.06
ALKANES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.77
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.08
TOTAL :	99.22	99.79	100.18	99.80	99.65	99.77	100.08	100.00
DENS,g/cc	0.006	0.049	0.032	0.032	0.036	0.037	0.005	0.798
AV.MOL.WT	13.16	23.09	20.77	20.83	23.76	23.78	36.87	32.03
M3/hr	797.9	3025.9	3829.7	3823.7	3349.6	3348.1	11.6	-----
ksmol/hr	35.60	134.99	170.85	170.59	149.44	149.30	0.52	10.34
1/hr,prod	-----	-----	-----	-----	-----	-----	-----	415.20

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
		---	---
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	36.0	35.2
CARBON MONOXIDE CONVERSION	(%) :	12.2	12.2
CARBON DIOXIDE CONVERSION	(%) :	0.2	0.3
RATIO H2 CONSUMED/CO CONSUMED	:	2.06	1.99
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	33.9	34.7
CARBON MONOXIDE CONVERSION	(%) :	11.8	12.0
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	33.8	34.2
CARBON MONOXIDE CONVERSION	(%) :	11.8	11.8
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL *
	---	---
CO (+CO2) SELECTIVITY TO METHANOL (Z) :	97.3	99.2
CO (+CO2) SELECTIVITY TO ETHANOL (Z) :	---	0.2

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEDH SOURCE	kmol/hr-kg cat	kg/1000 Na3 fresh feed	kg/1000 Na3 reactor feed
	---	---	---
As calculated ACROSS REACTOR	26.30	415.5	86.7
As Net MeOH produced, OVERALL balance	25.81	407.7	85.1

REACTOR FEED (H2/(CO+1.5CO2)) :	0.50
REACTOR FEED ((H2-CO2)/(CO+CO2)) :	0.36
APPROACH TO METHANOL EQUILIBRIUM (des.C) :	24.65
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) :	12.09
METHANOL COLLECTED AS % OF CALCULATED :	97.6
CALCULATED METHANOL PRODUCTION RATE (Kmol/hr) :	10.35

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<X diff.>	<X diff.>	<X diff.>
H2	-15.44420	-1.94114	-1.02318
CO	-4.23071	0.60316	-1.41850
CO2	-10.01691	1.55323	-0.98195
N2	-340.68155	2.21144	-1.41913
CH4	n.a.	1.40144	-1.01381
H2O	-----	n.a.	n.a.
CH3OH	-----	7.59636	2.09144

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

	INPUTS		OUTPUTS				(IN-OUT)/IN
STREAM # STREAM NAME	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	86.8081	74.3887	2.7722	0.1378	-----	77.2987	10.9545
CO2	21.3284	20.3450	0.7582	0.3645	-----	21.4677	-0.6530
CH3OH	0.3967	0.4293	0.0160	0.0353	10.1005	10.5811	-2567.2898
OTHERS	0.5135	0.5008	0.0187	0.0020	0.1034	0.6249	-21.7042
TOTAL C	109.0467	95.6639	3.5651	0.5395	10.2039	109.9724	-0.8489
HYDROGEN:							
H2	119.8780	75.6347	2.8186	0.0673	-----	78.5207	34.4995
H2O	0.0000	0.0000	0.0000	0.0000	0.3303	0.3303	n.a.
OTHERS	3.6407	3.7206	0.1387	0.1482	40.6088	44.6163	-1125.5038
TOTAL H	123.5187	79.3553	2.9573	0.2155	40.9392	123.4673	0.0416
OXYGEN:							
TOTAL O	129.8617	115.5081	4.3046	0.9024	10.3434	131.0585	-0.9216
NITROGEN:							
TOTAL N	2.5042	2.4569	0.0916	0.0038	-----	2.5522	-1.9179
TOTAL MASS FLOW (kg/hr)	3553.3184	3117.2932	116.1705	21.1736	331.3518	3585.9890	-0.9194

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]		FRESH FEED GAS
	GC#1	GC#2	[15-(50+62+68)]
MASS BALANCE (%) :	-0.08	0.08	-0.04
ELEMENTAL BALANCE (%) :			
CARBON	0.29	0.23	-0.16
HYDROGEN	1.97	0.41	-4.93
OXYGEN	0.27	0.25	0.23
NITROGEN	0.63	-0.49	8.28

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY
=====

DATE :	04-DEC-89
TIME :	15:11:27
TIME INTERVAL :	FROM: 0400 01-Dec
	TO: 0400 02-Dec
NUMBER OF AVERAGED HOURS :	23
RUN ID NUMBER :	E7.89
FEED GAS TYPE:	CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) :	149.4
OIL/SLURRY REACTOR INLET TEMP. (deg.C) :	13.4
AVG. REACTOR SLURRY TEMPERATURE (deg.C) :	250.2
REACTOR FREEBOARD TEMPERATURE (deg.C) :	247.2
OIL/SLURRY OUTLET TEMP. (deg.C) :	244.7
REACTOR FEED GAS PRESSURE (kPa) :	5525
REACTOR EFFLUENT GAS PRESSURE (kPa) :	5283
GAS SUPERFICIAL VELOCITY (cm/sec) :	15.4
LIQUID SUPERFICIAL VELOCITY (cm/sec) :	0.0
SLURRY CONCENTRATION (wt%) :	37.4
CATALYST OXIDE IN REACTOR (kg oxide) :	393
GAS HOLD-UP (%) :	33.7
SPACE VELOCITY (1/kg-hr) :	9604
RECYCLE/FRESH FEED RATIO :	3.742
OIL/SLURRY CIRCULATION RATE (m3/hr) :	0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) :	137.84
PURGE GAS FLOW RATE <50> (ksmol/hr) :	4.81
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) :	599

STREAM #	1	55	15	15	32	32	62	69
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEOH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT	=====	=====	=====	=====	=====	=====	=====	=====
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	59.35	27.79	35.29	34.95	25.79	25.80	5.96	-----
CO	36.13	55.24	51.11	51.04	51.23	51.42	23.99	-----
CO2	3.69	15.24	12.71	12.69	14.47	14.46	53.48	-----
N2	0.14	0.83	0.68	0.67	0.77	0.76	0.33	-----
CH4	0.05	0.34	0.28	0.29	0.32	0.33	0.22	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.87
CH3OH	0.00	0.35	0.36	0.26	7.26	7.23	5.14	97.67
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.31
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.11
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.09
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.06
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.79
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.07
TOTAL :	99.36	99.80	100.44	99.89	99.83	100.02	100.08	100.00
DENS,g/cc	0.006	0.049	0.031	0.031	0.036	0.036	0.005	0.797
AV.MOL.WT	13.07	23.18	20.88	20.92	23.87	23.97	36.87	32.04
Mm3/hr	796.8	2981.8	3779.6	3778.5	3308.9	3309.0	12.1	-----
ksmol/hr	35.55	133.03	168.62	168.57	147.62	147.56	0.54	10.34
l/hr:prod	-----	-----	-----	-----	-----	-----	-----	415.89

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
		----	----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	34.0	35.4
CARBON MONOXIDE CONVERSION	(%) :	11.9	12.1
CARBON DIOXIDE CONVERSION	(%) :	0.4	0.2
RATIO H2 CONSUMED/CO CONSUMED	:	2.08	2.00
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	33.8	34.9
CARBON MONOXIDE CONVERSION	(%) :	11.7	11.9
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	34.5	34.8
CARBON MONOXIDE CONVERSION	(%) :	11.9	11.9
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL *
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (%) :	97.7	99.2
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.2

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	smol/hr-ks cat	kg/1000 Nm3 fresh feed	kg/1000 Nm3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	25.84	408.7	96.2
As Net MeOH produced, OVERALL balance	25.92	408.4	95.1

REACTOR FEED (H2/(CO+1.5CO2)) :	0.50
REACTOR FEED ((H2-CO2)/(CO+CO2)) :	0.35
APPROACH TO METHANOL EQUILIBRIUM (deg.C) :	23.99
APPROACH TO WATER-GAS EQUILIBRIUM (deg.C) :	10.77
METHANOL COLLECTED AS % OF CALCULATED :	99.4
CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) :	10.15

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[1455]-151 REACTOR FEED	[32 - (50+55+62+69)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-15.83733	-1.43949	-0.77113
CO	-5.93435	0.34496	-0.87653
CO2	-12.02657	0.87892	-0.11325
N2	-394.48843	1.54144	-0.93325
CH4	n.a.	1.50615	-0.07728
H2O	-----	n.a.	n.a.
CH3OH	-----	3.41549	0.89257

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	69 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	86.0359	73.4912	2.6570	0.1436	-----	76.2918	11.3256
CO2	21.3986	20.2748	0.7330	0.3901	-----	21.3978	0.0502
CH3OH	0.4460	0.4618	0.0167	0.0368	10.1031	10.6183	-2280.8577
OTHERS	0.4653	0.4550	0.0164	0.0021	0.1034	0.5769	-23.9972
TOTAL C	108.3457	94.6826	3.4231	0.5625	10.2065	109.8748	-0.4884
HYDROGEN:							
H2	117.8185	73.9474	2.6735	0.0707	-----	76.4911	34.9074
H2O	0.0000	0.0000	0.0000	0.0000	0.3213	0.3213	n.a.
OTHERS	3.6450	3.6669	0.1326	0.1546	40.6193	44.5773	-1122.8660
TOTAL H	121.4635	77.6143	2.8060	0.2247	40.9405	121.5956	-0.1005
OXYGEN:							
TOTAL O	129.2790	114.5024	4.1397	0.9409	10.3440	129.9270	-0.5012
NITROGEN:							
TOTAL N	2.2724	2.2136	0.0800	0.0039	-----	2.2975	-1.1088
TOTAL MASS FLOW (kg/hr)	3526.6987	3093.7156	111.4870	22.0767	331.4735	3548.7527	-0.6253

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]		FRESH FEED GAS
	GC#1	GC#2	[15-(50+62+69)]
MASS BALANCE (%) :	-0.09	0.09	-0.07
ELEMENTAL BALANCE (%) :			
CARBON	0.27	0.16	-0.13
HYDROGEN	2.04	0.51	-4.03
OXYGEN	0.28	0.16	0.29
NITROGEN	1.21	-0.17	13.16

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

```

DATE : 06-DEC-89
TIME : 15:14:11
TIME INTERVAL : FROM: 0600 02-Dec
                TO: 0600 03-Dec

NUMBER OF AVERAGED HOURS : 24
RUN ID NUMBER : E7.90
FEED GAS TYPE: CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 172.0
OIL/SLURRY REACTOR INLET TEMP. (deg.C) : 14.4
AVG. REACTOR SLURRY TEMPERATURE (deg.C) : 250.2
REACTOR FREEBOARD TEMPERATURE (deg.C) : 247.6
OIL/SLURRY OUTLET TEMP. (deg.C) : 244.9
REACTOR FEED GAS PRESSURE (kPa) : 5528
REACTOR EFFLUENT GAS PRESSURE (kPa) : 5286
GAS SUPERFICIAL VELOCITY (cm/sec) : 15.5
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 0.0
SLURRY CONCENTRATION (wt%) : 37.5
CATALYST OXIDE IN REACTOR (kg oxide) : 793
GAS HOLD-UP (%) : 33.9
SPACE VELOCITY (1/kg-hr) : 9442
RECYCLE/FRESH FEED RATIO : 3.795
OIL/SLURRY CIRCULATION RATE (m3/hr) : 0.0
PROD. SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 139.88
PURGE GAS FLOW RATE <50> (ksmol/hr) : 4.94
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) : 591
  
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STREAM #	1	55	15	15	32	32	62	49
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<WT%>
H2	59.03	27.91	35.29	35.16	25.97	25.96	5.96	-----
CO	36.33	55.32	51.10	51.03	51.29	51.29	23.99	-----
CO2	3.59	14.89	12.37	12.36	14.13	14.13	63.49	-----
N2	0.13	0.81	0.65	0.65	0.74	0.74	0.33	-----
CH4	0.05	0.33	0.29	0.26	0.31	0.32	0.22	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.86
CH3OH	0.00	0.37	0.39	0.29	7.29	7.29	6.14	97.66
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.32
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.12
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.10
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.04
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.79
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.08
TOTAL :	99.13	99.63	100.09	99.73	99.61	99.75	100.08	100.00
DENS,g/cc	0.005	0.049	0.031	0.031	0.036	0.036	0.005	0.796
AV.MOL.WT	13.10	23.09	20.80	20.80	23.79	23.76	36.97	32.05
m3/hr	791.1	3002.2	3794.0	3793.3	3319.4	3319.7	11.5	-----
ksmol/hr	35.30	133.94	169.26	169.23	149.04	148.04	0.51	10.23
l/hr:prod	-----	-----	-----	-----	-----	-----	-----	411.84

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
		----	----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	35.6	35.6
CARBON MONOXIDE CONVERSION	(%) :	12.2	12.1
CARBON DIOXIDE CONVERSION	(%) :	0.1	0.0
RATIO H2 CONSUMED/CO CONSUMED	:	2.02	2.03
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	33.9	34.6
CARBON MONOXIDE CONVERSION	(%) :	11.7	11.9
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	34.0	34.1
CARBON MONOXIDE CONVERSION	(%) :	11.7	11.9
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL *
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (Z) :	97.4	99.2
CO (+CO2) SELECTIVITY TO ETHANOL (Z) :	-----	0.2

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	smol/hr-kg cat	kg/1000 Nm3 fresh feed	kg/1000 Nm3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	25.96	413.6	86.3
As Net MeOH produced, OVERALL balance	25.53	406.9	84.9

REACTOR FEED $\{H_2/(CO+1.5CO_2)\}$: 0.51
 REACTOR FEED $\{(H_2-CO_2)/(CO+CO_2)\}$: 0.36

APPROACH TO METHANOL EQUILIBRIUM (des.C) : 24.19
 APPROACH TO WATER-GAS EQUILIBRIUM (des.C) : 10.49

METHANOL COLLECTED AS % OF CALCULATED : 97.9

CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) : 10.21

LAPORTE LPNETHANOL PROCESS AVERAGE REPORT MATERIAL BALANCE SUMMARY

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 13 FRESH FEED GAS	[(1455)-15] REACTOR FEED	[12 - (50455+62469)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-13.58534	-2.22010	-1.28992
CO	-4.15912	0.65279	-1.36990
CO2	-8.57530	1.41591	-0.61972
N2	-304.62921	3.19122	-1.90435
CH4	n.a.	4.46248	-2.06136
H2O	-----	n.a.	n.a.
CH3OH	-----	4.44017	2.21970

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	86.3491	74.0926	2.7338	0.1362	-----	74.9627	10.8703
CO2	20.9099	19.9446	0.7359	0.3605	-----	21.0409	-0.6265
CH3OH	0.4736	0.4953	0.0193	0.0349	9.9919	10.5403	-2125.3655
OTHERS	0.4417	0.4447	0.0164	0.0020	0.1023	0.5653	-27.9925
TOTAL C	108.1744	94.9771	3.5044	0.5335	10.0941	109.1092	-0.8642
HYDROGEN:							
H2	119.0086	74.7556	2.7583	0.0665	-----	77.5804	34.8111
H2O	0.0069	0.0000	0.0000	0.0000	0.3141	0.3141	-4540.2563
OTHERS	3.6613	3.7599	0.1387	0.1466	40.1719	44.2171	-1107.6824
TOTAL H	122.6767	78.5155	2.9970	0.2132	40.4860	122.1116	0.4406
OXYGEN:							
TOTAL O	128.6460	114.4770	4.2238	0.8924	10.2290	129.8233	-0.9144
NITROGEN:							
TOTAL N	2.2000	2.1805	0.0805	0.0037	-----	2.2447	-2.9413
TOTAL MASS FLOW (kg/hr)	3520.1323	3092.4717	114.1027	20.9394	327.8400	3555.3535	-1.0006

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]		FRESH FEED GAS
	GC#1	GC#2	[15-(50462+68)]
MASS BALANCE (%) :	0.02	-0.03	-0.09
ELEMENTAL BALANCE (%) :			
CARBON	0.39	0.10	-0.17
HYDROGEN	1.54	0.94	-4.44
OXYGEN	0.31	0.09	0.07
NITROGEN	-0.23	-0.13	8.26

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

```

DATE : 04-DEC-80
TIME : 15:15:37
TIME INTERVAL : FROM: 0400 03-Dec
                TO: 0400 04-Dec

NUMBER OF AVERAGED HOURS : 24
RUN ID NUMBER : 57.91
FEED GAS TYPE: CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 172.8
OIL/SLURRY REACTOR INLET TEMP. (deg.C) : 15.4
AVG. REACTOR SLURRY TEMPERATURE (deg.C) : 250.3
REACTOR FREEBOARD TEMPERATURE (deg.C) : 247.4
OIL/SLURRY OUTLET TEMP. (deg.C) : 245.0
REACTOR FEED GAS PRESSURE (kPa) : 5527
REACTOR EFFLUENT GAS PRESSURE (kPa) : 5293
GAS SUPERFICIAL VELOCITY (cm/sec) : 15.2
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 0.0
SLURRY CONCENTRATION (wt%) : 37.4
CATALYST OXIDE IN REACTOR (kg oxide) : 393
GAS HOLD-UP (%) : 73.8
SPACE VELOCITY (1/kg-hr) : 9420
RECYCLE/FRESH FEED RATIO : 3.740
OIL/SLURRY CIRCULATION RATE (m3/hr) : 0.0
PROD. SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 179.60
PURGE GAS FLOW RATE <50> (ksmol/hr) : 5.22
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) : 591
  
```

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	W/L SEP	W/L SEP	FLASH GAS	MEDM PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	59.94	29.06	35.64	35.15	26.14	26.10	5.96	-----
CO	36.62	55.45	51.20	51.27	51.35	51.50	21.99	-----
CO2	3.59	14.77	12.22	12.26	13.97	13.98	63.48	-----
N2	0.14	0.79	0.64	0.63	0.73	0.72	0.33	-----
CH4	0.05	0.35	0.29	0.28	0.32	0.33	0.22	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.88
CH3OH	0.00	0.41	0.38	0.29	7.32	7.32	6.14	97.45
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.33
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.12
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.11
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.06
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.77
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.07
TOTAL :	99.34	99.82	100.38	99.88	99.82	99.97	100.08	100.00
DENS,g/cc	0.005	0.049	0.031	0.031	0.036	0.036	0.005	0.785
AV.MOL.WT	13.16	23.04	20.71	20.80	23.70	23.72	36.87	32.04
Mm3/hr	795.1	2989.6	3793.2	3784.8	3312.9	3311.8	11.1	-----
ksmol/hr	35.47	133.38	169.23	168.85	147.80	147.68	0.50	10.19
1/hr,prod	-----	-----	-----	-----	-----	-----	-----	410.26

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
		----	----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	34.1	34.9
CARBON MONOXIDE CONVERSION	(%) :	12.2	12.3
CARBON DIOXIDE CONVERSION	(%) :	0.1	0.2
RATIO H2 CONSUMED/CO CONSUMED	:	2.06	1.94
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	33.7	34.8
CARBON MONOXIDE CONVERSION	(%) :	11.7	11.9
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	33.5	34.0
CARBON MONOXIDE CONVERSION	(%) :	11.7	11.7
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.00

SELECTIVITIES :

		ACROSS REACTOR GC Average	OVERALL *
		-----	-----
CO (+CO2) SELECTIVITY TO METHANOL	(%) :	95.2	98.8
CO (+CO2) SELECTIVITY TO ETHANOL	(%) :	-----	0.2

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	gmol/hr-kg cat	kg/1000 Me3 fresh feed	kg/1000 Me3 reactor feed
		-----	-----
As calculated ACROSS REACTOR	26.03	412.7	86.7
As Net MeOH produced, OVERALL balance	25.41	402.9	84.6

REACTOR FEED (H2/(CO+1.5CO2)) :	0.50
REACTOR FEED ((H2-CO2)/(CO+CO2)) :	0.36
APPROACH TO METHANOL EQUILIBRIUM (deg.C) :	24.39
APPROACH TO WATER-GAS EQUILIBRIUM (deg.C) :	11.16
METHANOL COLLECTED AS % OF CALCULATED :	97.1
CALCULATED METHANOL PRODUCTION RATE (Kgmol/hr) :	10.24

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-15.75343	-1.75005	-0.75289
CO	-4.43047	0.44019	-1.44933
CO2	-8.92525	1.32603	-0.80904
N2	-328.52548	2.37313	-1.69445
CH4	n.a.	1.98532	-1.02611
H2O	-----	n.a.	n.a.
CH3OH	-----	8.79928	2.55264

OVERALL ELEMENTAL BALANCE (Kg-atoms/hr) :

	INPUTS		OUTPUTS				(IN-OUT)/IN
STREAM # STREAM NAME	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	86.5666	73.9614	2.8971	0.1319	-----	74.9904	11.0623
CO2	20.6927	19.6971	0.7715	0.3490	-----	20.9176	-0.6034
CH3OH	0.4941	0.5418	0.0212	0.0337	9.9405	10.5372	-2032.6545
OTHERS	0.4846	0.4615	0.0181	0.0019	0.1019	0.5932	-20.3551
TOTAL C	108.2380	94.6617	3.7080	0.5165	10.0423	109.9294	-0.6379
HYDROGEN:							
H2	118.6922	74.8403	2.9315	0.0644	-----	77.9363	34.4218
H2O	0.0000	0.0000	0.0000	0.0000	0.3169	0.3169	n.a.
OTHERS	3.9013	4.0130	0.1572	0.1419	39.9655	44.2776	-1034.9569
TOTAL H	122.5935	78.8533	3.0887	0.2063	40.2824	122.4307	0.1328
OXYGEN:							
TOTAL O	128.4529	113.8972	4.4614	0.8639	10.1788	129.4014	-0.7384
NITROGEN:							
TOTAL N	2.1444	2.0993	0.0822	0.0036	-----	2.1852	-1.9021
TOTAL MASS FLOW (kg/hr)	3511.7664	3072.8647	120.3661	20.2704	326.1784	3539.6797	-0.7049

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS
	GC#1	[15-(50+62+68)]
MASS BALANCE (%) :	0.00	-0.01
ELEMENTAL BALANCE (%) :		
CARBON	0.38	0.10
HYDROGEN	2.24	-4.03
OXYGEN	0.33	0.20
NITROGEN	2.00	11.67

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

```

DATE : 04-DEC-89
TIME : 15:17:17
TIME INTERVAL : FROM: 0400 04-Dec
                TO: 0400 05-Dec

NUMBER OF AVERAGED HOURS : 22
RUN ID NUMBER : E7.92
FEED GAS TYPE: CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 171.1
OIL/SLURRY REACTOR INLET TEMP. (deg.C) : 15.9
AVG. REACTOR SLURRY TEMPERATURE (deg.C) : 250.2
REACTOR FREEBOARD TEMPERATURE (deg.C) : 247.3
OIL/SLURRY OUTLET TEMP. (deg.C) : 244.4
REACTOR FEED GAS PRESSURE (kPa) : 5528
REACTOR EFFLUENT GAS PRESSURE (kPa) : 5283
GAS SUPERFICIAL VELOCITY (cm/sec) : 15.5
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 0.0
SLURRY CONCENTRATION (wt%) : 37.4
CATALYST OXIDE IN REACTOR (kg oxide) : 393
GAS HOLD-UP (%) : 33.7
SPACE VELOCITY (1/kg-hr) : 9684
RECYCLE/FRESH FEED RATIO : 3.741
OIL/SLURRY CIRCULATION RATE (m3/hr) : 0.0
PROD. SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 139.46
PURGE GAS FLOW RATE <50> (ksmol/hr) : 5.34
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) : 589
  
```

STREAM #	1	55	15	15	32	32	62	69
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDM PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	59.10	29.32	35.74	35.44	26.27	26.46	5.94	-----
CO	36.56	55.30	51.19	51.09	51.30	51.27	23.99	-----
CO2	3.62	14.72	12.23	12.21	13.94	13.94	43.49	-----
N2	0.15	0.87	0.70	0.70	0.81	0.80	0.33	-----
CH4	0.06	0.38	0.31	0.30	0.35	0.35	0.22	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.88
CH3OH	0.02	0.34	0.40	0.22	7.31	7.32	6.14	97.45
DME	0.00	0.02	0.00	0.03	0.00	0.00	0.06	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.33
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.12
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.11
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.06
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.77
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.04
TOTAL :	99.51	99.95	100.59	99.99	99.99	100.16	100.09	100.00
DENS,g/cc	0.005	0.049	0.031	0.031	0.036	0.036	0.004	0.795
AV.MOL.WT	13.15	22.97	20.69	20.72	23.66	23.62	36.87	32.04
Mm3/hr	803.6	3006.4	3813.6	3810.1	3337.1	3340.0	11.2	-----
ksmol/hr	35.85	134.12	170.14	169.98	148.88	148.94	0.50	10.25
1/hr,prod	-----	-----	-----	-----	-----	-----	-----	413.18

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		GC#1 ----	GC#2 ----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	35.2	35.1
CARBON MONOXIDE CONVERSION	(%) :	12.3	12.0
CARBON DIOXIDE CONVERSION	(%) :	0.2	0.0
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.02
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	33.6	34.9
CARBON MONOXIDE CONVERSION	(%) :	11.7	12.1
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	33.4	33.8
CARBON MONOXIDE CONVERSION	(%) :	11.7	11.7
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC Average -----	OVERALL *
CO (+CO2) SELECTIVITY TO METHANOL (%) :	97.9	98.9
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.2

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEDH SOURCE	gmol/hr-kg cat -----	kg/1000 Na3 fresh feed -----	kg/1000 Na3 reactor feed -----
As calculated ACROSS REACTOR	26.35	412.4	87.2
As Net MeOH produced, OVERALL balance	25.58	401.3	84.6

REACTOR FEED $\{H_2/(CO+1.5CO_2)\}$: 0.51
 REACTOR FEED $\{(H_2-CO_2)/(CO+CO_2)\}$: 0.37

APPROACH TO METHANOL EQUILIBRIUM (deg.C) : 24.66
 APPROACH TO WATER-GAS EQUILIBRIUM (deg.C) : 11.42

METHANOL COLLECTED AS % OF CALCULATED : 96.6

CALCULATED METHANOL PRODUCTION RATE (Kgmol/hr) : 10.37

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 13] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+69)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-17.21300	-1.80340	-1.04713
CO	-4.71864	0.50541	-1.14967
CO2	-10.04591	1.34888	-0.58190
N2	-361.55740	2.34541	-1.37258
CH4	n.a.	2.11760	-1.45343
H2O	-----	n.a.	n.a.
CH3OH	-----	20.26851	3.30475

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

	INPUTS		OUTPUTS				(IN-OUT)/IN
STREAM # STREAM NAME	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	69 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	96.8385	74.1736	2.9512	0.1329	-----	77.2577	11.0329
CO2	20.7595	19.7445	0.7956	0.3516	-----	20.8816	-0.5895
CH3OH	0.3734	0.4605	0.0183	0.0340	10.0109	10.5237	-2718.0520
OTHERS	0.6034	0.5499	0.0219	0.0019	0.1025	0.6762	-12.0645
TOTAL C	108.5748	94.9285	3.7770	0.5203	10.1134	109.3393	-0.7041
HYDROGEN:							
H2	120.4636	75.9548	3.0221	0.0649	-----	79.0418	34.3854
H2O	0.0000	0.0000	0.0000	0.0000	0.3213	0.3213	n.a.
OTHERS	3.8191	3.9960	0.1590	0.1430	40.2487	44.5467	-1066.4294
TOTAL H	124.2827	79.9508	3.1810	0.2079	40.5700	123.9097	0.3001
OXYGEN:							
TOTAL O	128.7751	114.1459	4.5416	0.8703	10.2521	129.8099	-0.8036
NITROGEN:							
TOTAL N	2.3865	2.3391	0.0931	0.0036	-----	2.4358	-2.0679
TOTAL MASS FLOW (kg/hr)	3522.6306	3080.5757	122.5684	20.4209	328.4993	3552.0642	-0.8356

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS
	GC#1	GC#2
	-----	-----
MASS BALANCE (%) :	0.00	-0.01
ELEMENTAL BALANCE (%) :		
CARBON	0.45	0.03
HYDROGEN	1.48	0.37
OXYGEN	0.40	-0.01
NITROGEN	-0.04	-0.69
		0.17
		-3.45
		0.30
		7.61

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES : ANALYTICAL SUMMARY

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=====
DATE :                                06-DEC-99
TIME :                                15:18:43
TIME INTERVAL :                       FROM: 0600 05-Dec
                                         TO: 0600 06-Dec

NUMBER OF AVERAGED HOURS :            24
RUN ID NUMBER :                       E7.93
FEED GAS TYPE:                        CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 171.6
OIL/SLURRY REACTOR INLET TEMP. (deg.C) : 13.9
AVG. REACTOR SLURRY TEMPERATURE (deg.C) : 250.3
REACTOR FREEBOARD TEMPERATURE (deg.C) : 247.5
OIL/SLURRY OUTLET TEMP. (deg.C) :     244.8
REACTOR FEED GAS PRESSURE (kPa) :      5529
REACTOR EFFLUENT GAS PRESSURE (kPa) :   5283
GAS SUPERFICIAL VELOCITY (cm/sec) :    15.8
LIQUID SUPERFICIAL VELOCITY (cm/sec) :   0.0
SLURRY CONCENTRATION (wt%) :           37.4
CATALYST OXIDE IN REACTOR (kg oxide) :   393
GAS HOLD-UP (%) :                     33.7
SPACE VELOCITY (1/kg-hr) :             9663
RECYCLE/FRESH FEED RATIO :             3.749
OIL/SLURRY CIRCULATION RATE (m3/hr) :   0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 139.20
PURGE GAS FLOW RATE <50> (ksmol/hr) :   5.32
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) : 590
  
```

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	U/L SEP	U/L SEP	FLASH GAS	MEDM PRODUC
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT	=====	=====	=====	=====	=====	=====	=====	=====
	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<WT%>
H2	59.97	28.28	35.60	35.29	26.21	26.26	5.94	-----
CO	36.60	55.27	51.09	51.08	51.22	51.35	23.99	-----
CO2	3.66	14.73	12.26	12.26	14.00	14.00	43.49	-----
H2	0.14	0.79	0.64	0.65	0.74	0.74	0.33	-----
CH4	0.06	0.34	0.28	0.28	0.32	0.32	0.22	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.86
CH3OH	0.01	0.36	0.39	0.29	7.26	7.26	6.14	97.68
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.07
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.32
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.12
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.10
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.06
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.76
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.07
TOTAL :	99.44	99.78	100.26	99.94	99.76	99.94	100.08	100.00
DENS,g/cc	0.006	0.049	0.031	0.031	0.036	0.036	0.005	0.796
AV.MOL.WT	13.18	22.97	20.71	20.76	23.69	23.67	36.87	32.05
M3/hr	900.6	3000.8	3806.9	3901.5	3331.5	3331.9	11.4	-----
ksmol/hr	75.72	133.87	169.84	169.60	149.63	149.59	0.51	10.23
1/hr,prod	-----	-----	-----	-----	-----	-----	-----	411.84

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		GC#1 ----	GC#2 ----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	35.4	34.9
CARBON MONOXIDE CONVERSION	(%) :	12.0	12.1
CARBON DIOXIDE CONVERSION	(%) :	0.0	-0.1
RATIO H2 CONSUMED/CO CONSUMED	:	2.05	1.99
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	33.5	34.5
CARBON MONOXIDE CONVERSION	(%) :	11.7	11.9
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	33.6	33.9
CARBON MONOXIDE CONVERSION	(%) :	11.7	11.7
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC Average -----	OVERALL *
CO (+CO2) SELECTIVITY TO METHANOL (%) :	97.6	99.9
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.2

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	mmol/hr-kg cat -----	kg/1000 Na3 fresh feed -----	kg/1000 Na3 reactor feed -----
As calculated ACROSS REACTOR	25.99	409.2	85.2
As Net MeOH produced, OVERALL balance	25.54	402.2	94.7

REACTOR FEED (H2/(CO+1.5CO2)) :	0.51
REACTOR FEED ((H2-CO2)/(CO+CO2)) :	0.36
APPROACH TO METHANOL EQUILIBRIUM (des.C) :	24.70
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) :	9.92
METHANOL COLLECTED AS % OF CALCULATED :	97.8
CALCULATED METHANOL PRODUCTION RATE (Kmmol/hr) :	10.22

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 13] FRESH FEED GAS	[(1455)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	(% diff.)	(% diff.)	(% diff.)
H2	-15.70670	-1.58849	-1.13432
CO	-4.78699	0.48764	-1.24107
CO2	-9.86169	1.13242	-0.29271
H2	-320.97064	0.95350	-0.12634
CH4	n.a.	2.37386	-0.29910
H2O	-----	n.a.	n.a.
CH3OH	-----	2.50006	2.46700

OVERALL ELEMENTAL BALANCE (Kg-atoms/hr) :

	INPUTS		OUTPUTS				(IN-OUT)/IN
STREAM # STREAM NAME	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	69 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	86.6376	73.9908	2.9424	0.1353	-----	77.0685	11.0450
CO2	20.7957	19.7263	0.7845	0.3579	-----	20.8487	-0.3508
CH3OH	0.4747	0.4833	0.0192	0.0346	9.7940	10.5311	-2118.6233
OTHERS	0.4715	0.4619	0.0184	0.0019	0.1023	0.5845	-23.9687
TOTAL C	108.3795	94.6623	3.7644	0.5297	10.0963	109.0527	-0.6212
HYDROGEN:							
H2	119.7103	75.7111	3.0108	0.0561	-----	78.7880	34.1845
H2O	0.0000	0.0000	0.0000	0.0000	0.3145	0.3145	n.a.
OTHERS	3.7846	3.7805	0.1503	0.1456	40.1805	44.2569	-1069.4055
TOTAL H	123.4949	79.4916	3.1612	0.2116	40.4949	123.3593	0.1098
OXYGEN:							
TOTAL O	128.7038	113.9268	4.5305	0.8860	10.2303	129.5736	-0.6758
NITROGEN:							
TOTAL N	2.2013	2.1232	0.0844	0.0037	-----	2.2114	-0.4563
TOTAL MASS FLOW (kg/hr)	3520.2842	3075.4885	122.3033	20.7889	327.8400	3546.4207	-0.7425

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS [15-(50+62+68)]
	GC#1	GC#2
MASS BALANCE (Z) :	-0.04	0.03
ELEMENTAL BALANCE (Z) :		
CARBON	0.30	0.16
HYDROGEN	1.84	0.39
OXYGEN	0.23	0.13
NITROGEN	-0.32	-0.33
		11.23

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

```

=====
DATE : 04-DEC-90
TIME : 15:20:11
TIME INTERVAL : FROM: 0600 04-Dec
                TO: 0600 07-Dec

NUMBER OF AVERAGED HOURS : 27
RUN ID NUMBER : E7.94
FEED GAS TYPE: CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) : 173.0
OIL/SLURRY REACTOR INLET TEMP. (des.C) : 14.2
AVG. REACTOR SLURRY TEMPERATURE (des.C) : 250.2
REACTOR FREEBOARD TEMPERATURE (des.C) : 247.4
OIL/SLURRY OUTLET TEMP. (des.C) : 244.7
REACTOR FEED GAS PRESSURE (kPa) : 5529
REACTOR EFFLUENT GAS PRESSURE (kPa) : 5291
GAS SUPERFICIAL VELOCITY (cm/sec) : 15.9
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 0.0
SLURRY CONCENTRATION (wt%) : 37.4
CATALYST OXIDE IN REACTOR (kg oxide) : 793
GAS HOLD-UP (%) : 73.9
SPACE VELOCITY (1/kg-hr) : 9643
RECYCLE/FRESH FEED RATIO : 3.739
OIL/SLURRY CIRCULATION RATE (m3/hr) : 0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 139.82
PURGE GAS FLOW RATE <50> (ksmol/hr) : 5.29
HEAT TRANSFER COEFFICIENT (Watt/m2-des.C) : 591
  
```

STREAM #	1	55	15	15	32	32	62	69
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
=====	=====	=====	=====	=====	=====	=====	=====	=====
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	59.00	29.60	35.86	35.71	26.45	26.61	5.96	-----
CO	36.54	54.88	50.74	50.67	50.89	50.87	23.99	-----
CO2	3.65	14.79	12.23	12.22	13.99	13.98	63.48	-----
N2	0.14	0.77	0.62	0.62	0.71	0.71	0.33	-----
CH4	0.06	0.35	0.29	0.29	0.33	0.33	0.22	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.87
CH3OH	0.01	0.40	0.44	0.30	7.34	7.32	6.14	97.65
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.33
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.12
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.10
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.06
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.77
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.07
TOTAL :	99.40	99.80	100.19	99.90	99.70	99.83	100.08	100.00
DENS,g/cc	0.005	0.048	0.031	0.031	0.036	0.036	0.005	0.794
AV.MOL.WT	13.16	22.90	20.64	20.64	23.61	23.59	36.87	32.05
Mm3/hr	800.5	2993.1	3795.0	3793.8	3317.3	3320.0	11.3	-----
ksmol/hr	35.71	133.53	169.31	169.25	149.00	148.05	0.50	10.25
l/hr,prod	-----	-----	-----	-----	-----	-----	-----	413.63

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
		----	----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	35.1	35.2
CARBON MONOXIDE CONVERSION	(%) :	12.3	12.2
CARBON DIOXIDE CONVERSION	(%) :	0.0	-0.1
RATIO H2 CONSUMED/CO CONSUMED	:	2.02	2.04
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	33.2	34.3
CARBON MONOXIDE CONVERSION	(%) :	11.7	12.1
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	33.5	33.6
CARBON MONOXIDE CONVERSION	(%) :	11.8	11.9
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL †
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (Z) :	97.3	99.0
CO (+CO2) SELECTIVITY TO ETHANOL (Z) :	-----	0.2

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEDH SOURCE	smol/hr-ks cat	ks/1000 Na3 fresh feed	ks/1000 Na3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	25.98	409.2	94.3
As Net MeOH produced, OVERALL balance	25.59	402.9	95.0

REACTOR FEED (H2/(CO+1.5CO2)) : 0.52
 REACTOR FEED ((H2-CO2)/(CO+CO2)) : 0.37

APPROACH TO METHANOL EQUILIBRIUM (des.C) : 24.80
 APPROACH TO WATER-GAS EQUILIBRIUM (des.C) : 9.79

METHANOL COLLECTED AS % OF CALCULATED : 97.9

CALCULATED METHANOL PRODUCTION RATE (ksmol/hr) : 10.22

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1455)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	(% diff.)	(% diff.)	(% diff.)
H2	-15.74481	-1.97813	-1.51527
CO	-4.33949	0.66150	-1.35099
CO2	-9.24981	1.70049	-0.85197
N2	-383.15546	2.35510	-1.18959
CH4	n.a.	4.12107	-1.23058
H2O	-----	n.a.	n.a.
CH3OH	-----	6.53168	2.34866

OVERALL ELEMENTAL BALANCE (Kg-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	?
CARBON:							
CO	95.7692	73.2893	2.9020	0.1342	-----	76.3256	11.0105
CO2	20.6879	19.7415	0.7917	0.3550	-----	20.9792	-0.9199
CH3OH	0.5082	0.5391	0.0213	0.0343	10.0095	10.6043	-1094.7063
OTHERS	0.4705	0.4700	0.0186	0.0019	0.1025	0.5931	-25.0424
TOTAL C	107.4358	94.0399	3.7237	0.5255	10.1120	108.4011	-0.9985
HYDROGEN:							
H2	120.8707	76.3806	3.0244	0.0655	-----	79.4706	34.2515
H2O	0.0000	0.0000	0.0000	0.0000	0.3169	0.3169	n.a.
OTHERS	3.9148	4.0363	0.1598	0.1444	40.2431	44.5836	-1038.8406
TOTAL H	124.7955	80.4170	3.1843	0.2099	40.5599	124.3711	0.3321
OXYGEN:							
TOTAL O	127.6531	113.3113	4.4868	0.8789	10.2485	128.9254	-0.9967
NITROGEN:							
TOTAL N	2.1021	2.0564	0.0814	0.0037	-----	2.1415	-1.8734
TOTAL MASS FLOW (kg/hr)	3493.5613	3057.4949	121.0678	20.6216	328.4427	3527.6272	-0.9751

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]		FRESH FEED GAS
	GC#1	GC#2	[15-(50+62+68)]
MASS BALANCE (%) :	0.05	-0.04	-0.01
ELEMENTAL BALANCE (%) :			
CARBON	0.44	0.08	0.14
HYDROGEN	1.78	0.90	-4.04
OXYGEN	0.35	0.06	0.32
NITROGEN	0.12	-0.69	11.74

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

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=====
DATE : 06-DEC-99
TIME : 15:23:15
TIME INTERVAL : FROM: 0600 07-Dec
                TO: 0600 08-Dec

NUMBER OF AVERAGED HOURS : 10
RUN ID NUMBER : E7.95
FEED GAS TYPE: CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 173.6
OIL/SLURRY REACTOR INLET TEMP. (deg.C) : 17.9
AVG. REACTOR SLURRY TEMPERATURE (deg.C) : 250.5
REACTOR FREEBOARD TEMPERATURE (deg.C) : 247.5
OIL/SLURRY OUTLET TEMP. (deg.C) : 244.6
REACTOR FEED GAS PRESSURE (kPa) : 5540
REACTOR EFFLUENT GAS PRESSURE (kPa) : 5209
GAS SUPERFICIAL VELOCITY (cm/sec) : 15.5
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 0.0
SLURRY CONCENTRATION (wt%) : 37.4
CATALYST OXIDE IN REACTOR (kg oxide) : 393
GAS HOLD-UP (%) : 73.7
SPACE VELOCITY (1/kg-hr) : 9476
RECYCLE/FRESH FEED RATIO : 3.690
OIL/SLURRY CIRCULATION RATE (m3/hr) : 0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 139.09
PURGE GAS FLOW RATE <50> (ksmol/hr) : 5.55
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) : 597
  
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STREAM #	1	55	15	15	32	32	62	69
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDH PRODUC
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	58.97	28.57	35.80	35.47	26.53	26.69	5.86	-----
CO	36.62	54.68	50.54	50.67	50.63	50.70	23.99	-----
CO2	3.74	14.90	12.38	12.40	14.11	14.09	63.48	-----
N2	0.14	0.91	0.70	0.69	0.82	0.83	0.33	-----
CH4	0.04	0.28	0.23	0.23	0.26	0.26	0.22	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.88
CH3OH	0.00	0.44	0.38	0.33	7.34	7.36	6.14	97.67
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.33
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.12
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.10
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.06
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.75
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.08
TOTAL :	99.51	99.79	100.04	99.78	99.69	99.94	100.09	100.00
DENS,g/cc	0.005	0.049	0.031	0.031	0.036	0.036	0.003	0.793
AV.MOL.WT	13.20	22.93	20.67	20.74	23.62	23.59	36.87	72.04
M3/hr	913.4	2993.4	3909.4	3806.9	3338.8	3341.3	11.4	-----
ksmol/hr	36.29	133.84	169.95	169.84	148.76	149.00	0.51	10.34
l/hr,PROD	-----	-----	-----	-----	-----	-----	-----	417.90

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
		----	----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	34.6	34.4
CARBON MONOXIDE CONVERSION	(%) :	12.0	12.4
CARBON DIOXIDE CONVERSION	(%) :	0.2	0.2
RATIO H2 CONSUMED/CO CONSUMED	:	2.04	1.95
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	33.9	34.4
CARBON MONOXIDE CONVERSION	(%) :	12.0	12.0
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	33.7	34.1
CARBON MONOXIDE CONVERSION	(%) :	11.9	11.9
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL *
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (%) :	99.3	98.7
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.2

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	smol/hr-kg cat	kg/1000 Na3 fresh feed	kg/1000 Na3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	26.29	407.5	87.1
As Net MeOH produced, OVERALL balance	25.93	400.3	85.5

REACTOR FEED {H2/(CO+1.5CO2)} :	0.51
REACTOR FEED {(H2-CO2)/(CO+CO2)} :	0.37
APPROACH TO METHANOL EQUILIBRIUM (deg.C) :	23.82
APPROACH TO WATER-GAS EQUILIBRIUM (deg.C) :	9.41
METHANOL COLLECTED AS % OF CALCULATED :	97.7
CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) :	10.34

LAPORTE LPNETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 13] FRESH FEED GAS	[(1455)-153] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-18.24999	-1.15897	-0.65437
CO	-5.77103	0.31105	-1.04140
CO2	-10.68802	0.93003	-0.30016
N2	-245.00203	9.17702	-3.72934
CH4	n.a.	-0.44373	-0.22381
H2O	-----	n.a.	n.a.
CH3OH	-----	4.20954	1.63115

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

	INPUTS		OUTPUTS				(IN-OUT)/IN
STREAM #	15	55	50	62	68	TOTAL	
STREAM NAME	REACTOR FEED	RECYCLE	PURGE GAS	FLASH GAS	MeOH PRODUCT		%
CARBON:							
CO	86.0473	73.0263	3.0345	0.1352	-----	76.1959	11.4488
CO2	21.0630	19.9022	0.8270	0.3576	-----	21.0868	-0.1127
CH3OH	0.5659	0.5908	0.0245	0.0346	10.1015	10.7514	-1799.8182
OTHERS	0.3855	0.3686	0.0153	0.0019	0.1034	0.4893	-26.9904
TOTAL C	108.0618	93.8878	3.9013	0.5293	10.2049	108.5234	-0.4271
HYDROGEN:							
H2	120.4816	76.3075	3.1708	0.0660	-----	79.5443	33.9780
H2O	0.0000	0.0000	0.0000	0.0000	0.3234	0.3234	n.a.
OTHERS	3.8058	3.8375	0.1595	0.1454	40.6129	44.7552	-1075.9794
TOTAL H	124.2874	80.1450	3.3303	0.2115	40.9362	124.6230	-0.2700
OXYGEN:							
TOTAL O	128.7394	113.4214	4.7130	0.8853	10.3427	129.3625	-0.4840
NITROGEN:							
TOTAL N	2.3335	2.4412	0.1014	0.0037	-----	2.5463	-0.1192
TOTAL MASS FLOW (kg/hr)	3521.8867	3062.7161	127.2658	20.7722	331.4126	3542.1667	-0.5758

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]		FRESH FEED GAS
	GC#1	GC#2	[15-(50+62+68)]
MASS BALANCE (%) :	-0.10	0.09	-0.07
ELEMENTAL BALANCE (%) :			
CARBON	0.03	0.29	0.19
HYDROGEN	0.64	0.00	-3.70
OXYGEN	0.06	0.27	0.41
NITROGEN	-4.03	-5.20	-4.90

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY
=====

DATE :	06-DEC-89
TIME :	15:24:42
TIME INTERVAL :	FROM: 0600 09-Dec
	TO: 0600 09-Dec
NUMBER OF AVERAGED HOURS :	24
RUN ID NUMBER :	E7.96
FEED GAS TYPE:	CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) :	165.7
OIL/SLURRY REACTOR INLET TEMP. (des.C) :	16.8
AVG. REACTOR SLURRY TEMPERATURE (des.C) :	250.2
REACTOR FREEBOARD TEMPERATURE (des.C) :	247.1
OIL/SLURRY OUTLET TEMP. (des.C) :	243.6
REACTOR FEED GAS PRESSURE (kPa) :	5547
REACTOR EFFLUENT GAS PRESSURE (kPa) :	5294
GAS SUPERFICIAL VELOCITY (cm/sec) :	15.4
LIQUID SUPERFICIAL VELOCITY (cm/sec) :	0.0
SLURRY CONCENTRATION (wt%) :	37.4
CATALYST OXIDE IN REACTOR (kg oxide) :	393
GAS HOLD-UP (%) :	33.6
SPACE VELOCITY (1/kg-hr) :	9723
RECYCLE/FRESH FEED RATIO :	3.753
OIL/SLURRY CIRCULATION RATE (m3/hr) :	0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) :	140.58
PURGE GAS FLOW RATE <50> (ksmol/hr) :	5.83
HEAT TRANSFER COEFFICIENT (Watt/m2-des.C) :	575

STREAM #	1	55	15	15	32	32	62	69
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDM PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
=====	=====	=====	=====	=====	=====	=====	=====	=====
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	59.53	27.98	35.26	35.01	26.03	26.10	5.86	-----
CO	36.84	55.54	51.35	51.34	51.51	51.56	23.99	-----
CO2	7.85	14.77	12.31	12.33	14.02	14.01	63.49	-----
N2	0.14	0.72	0.58	0.59	0.67	0.67	0.33	-----
CH4	0.06	0.36	0.30	0.29	0.33	0.35	0.22	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.89
CH3OH	0.00	0.39	0.37	0.28	7.16	7.14	6.14	97.67
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.32
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.12
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.10
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.06
ALKYLENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.75
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.00
TOTAL :	99.42	99.76	100.17	99.84	99.72	99.82	100.08	100.00
DENS,g/cc	0.006	0.049	0.031	0.032	0.036	0.036	0.004	0.796
AV.MOL.WT	13.32	23.05	20.80	20.84	23.72	23.71	36.87	32.04
Mm3/hr	804.7	3020.4	3829.0	3825.1	3359.5	3360.5	11.2	-----
ksmol/hr	35.90	134.75	170.82	170.65	149.88	149.85	0.50	10.10
1/hr,prod	-----	-----	-----	-----	-----	-----	-----	406.67

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

=====

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
		----	----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	35.0	34.7
CARBON MONOXIDE CONVERSION	(%) :	11.9	11.9
CARBON DIOXIDE CONVERSION	(%) :	0.1	0.1
RATIO H2 CONSUMED/CO CONSUMED	:	2.03	1.99
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	33.4	34.3
CARBON MONOXIDE CONVERSION	(%) :	11.5	11.7
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	33.3	33.6
CARBON MONOXIDE CONVERSION	(%) :	11.4	11.4
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL *
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (%) :	97.4	99.0
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.2

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	smol/hr-kg cat	kg/1000 Nm3 fresh feed	kg/1000 Nm3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	25.82	404.5	85.1
As Net MeOH produced, OVERALL balance	25.23	395.2	83.1

REACTOR FEED (H2/(CO+1.5CO2)) : 0.50
 REACTOR FEED ((H2-CO2)/(CO+CO2)) : 0.35

APPROACH TO METHANOL EQUILIBRIUM (des.C) : 25.06
 APPROACH TO WATER-GAS EQUILIBRIUM (des.C) : 11.04

METHANOL COLLECTED AS % OF CALCULATED : 97.1

CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) : 10.16

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-15.65124	-1.75836	-0.90368
CO	-4.72545	0.51205	-1.31271
CO2	-10.77666	1.14585	-0.44339
N2	-214.32564	2.10126	-0.96873
CH4	n.a.	2.29168	-3.08913
H2O	-----	n.a.	n.a.
CH3OH	-----	9.38604	2.59540

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	87.6155	74.8408	3.2385	0.1324	-----	78.2117	10.7330
CO2	21.0340	19.8960	0.8609	0.3504	-----	21.1073	-0.3487
CH3OH	0.4776	0.5271	0.0228	0.0339	9.8674	10.4512	-2088.2241
OTHERS	0.5017	0.4905	0.0212	0.0019	0.1010	0.6147	-22.5157
TOTAL C	109.6288	95.7544	4.1434	0.5186	9.9685	110.3949	-0.6897
HYDROGEN:							
H2	119.5009	75.4148	3.2633	0.0647	-----	78.7428	34.1069
H2O	0.0000	0.0000	0.0000	0.0000	0.3191	0.3191	n.a.
OTHERS	3.9173	4.0703	0.1761	0.1425	39.6719	44.0608	-1024.7956
TOTAL H	123.4182	79.4852	3.4395	0.2072	39.9910	123.1229	0.2394
OXYGEN:							
TOTAL O	130.1611	115.1599	4.9832	0.8675	10.1042	131.1147	-0.7327
NITROGEN:							
TOTAL N	2.0000	1.9431	0.0841	0.0036	-----	2.0308	-1.5419
TOTAL MASS FLOW (kg/hr)	3556.1204	3106.2837	134.4139	20.3540	323.7286	3584.7800	-0.8059

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]		FRESH FEED GAS
	GC#1	GC#2	[15-(50+62+68)]
MASS BALANCE (%) :	-0.03	0.03	-0.07
ELEMENTAL BALANCE (%) :			
CARBON	0.32	0.17	0.00
HYDROGEN	1.56	0.39	-3.62
OXYGEN	0.28	0.16	0.22
NITROGEN	0.06	-0.57	12.11

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

```

DATE : 06-DEC-99
TIME : 15:26:39
TIME INTERVAL : FROM: 0600 09-Dec
                TO: 0600 10-Dec

NUMBER OF AVERAGED HOURS : 24
RUN ID NUMBER : E7.97
FIELD GAS TYPE: CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 161.8
OIL/SLURRY REACTOR INLET TEMP. (deg.C) : 9.3
AVG. REACTOR SLURRY TEMPERATURE (deg.C) : 250.2
REACTOR FREEBOARD TEMPERATURE (deg.C) : 247.1
OIL/SLURRY OUTLET TEMP. (deg.C) : 243.5
REACTOR FEED GAS PRESSURE (kPa) : 5549
REACTOR EFFLUENT GAS PRESSURE (kPa) : 5294
GAS SUPERFICIAL VELOCITY (cm/sec) : 15.4
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 0.0
SLURRY CONCENTRATION (wt%) : 37.3
CATALYST OXIDE IN REACTOR (kg oxide) : 393
GAS HOLD-UP (%) : 33.5
SPACE VELOCITY (1/kg-hr) : 9744
RECYCLE/FRESH FEED RATIO : 3.756
OIL/SLURRY CIRCULATION RATE (m3/hr) : 0.0
PROD. SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 140.84
PURGE GAS FLOW RATE <50> (ksmol/hr) : 5.78
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) : 575
  
```

STREAM #	1	55	15	15	32	32	62	49
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
H2	59.66	28.12	35.48	35.12	26.07	26.30	5.91	-----
CO	36.69	55.57	51.10	51.23	51.46	51.41	24.26	-----
CO2	3.99	14.88	12.38	12.42	14.09	14.10	56.72	-----
N2	0.14	0.74	0.59	0.60	0.68	0.67	0.25	-----
CH4	0.06	0.32	0.27	0.26	0.30	0.31	0.30	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.91
CH3OH	0.00	0.30	0.32	0.25	7.09	7.15	2.80	97.66
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.31
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.11
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.10
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.06
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.76
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.07
TOTAL :	99.45	99.93	100.15	99.89	99.69	99.94	100.28	100.00
DENS, g/cc	0.006	0.050	0.032	0.032	0.036	0.036	0.005	0.799
AV. MOL. WT	13.30	23.05	20.75	20.83	23.72	23.68	37.22	32.03
Mm3/hr	806.0	3027.3	3840.6	3833.5	3364.8	3368.0	10.8	-----
ksmol/hr	35.96	135.06	171.34	171.02	150.12	150.19	0.48	10.14
l/hr, prod	-----	-----	-----	-----	-----	-----	-----	406.67

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
		----	----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	35.0	34.8
CARBON MONOXIDE CONVERSION	(%) :	11.8	11.8
CARBON DIOXIDE CONVERSION	(%) :	0.1	0.4
RATIO H2 CONSUMED/CO CONSUMED	:	2.06	2.02
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	33.5	34.0
CARBON MONOXIDE CONVERSION	(%) :	11.6	11.7
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	33.1	33.5
CARBON MONOXIDE CONVERSION	(%) :	11.5	11.5
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR	OVERALL
	GC Average	%
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (%) :	98.1	99.1
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.2

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	mol/hr-kg cat	kg/1000 Nm3 fresh feed	kg/1000 Nm3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	25.92	405.3	85.2
As Net MeOH produced, OVERALL balance	25.26	395.0	83.1

REACTOR FEED (H2/(CO+1.5CO2)) :	0.50
REACTOR FEED ((H2-CO2)/(CO+CO2)) :	0.36
APPROACH TO METHANOL EQUILIBRIUM (deg.C) :	25.42
APPROACH TO WATER-GAS EQUILIBRIUM (deg.C) :	12.57
METHANOL COLLECTED AS % OF CALCULATED :	97.1
CALCULATED METHANOL PRODUCTION RATE (Kmol/hr) :	10.20

LAPORTE LPNETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<u><% diff.></u>	<u><% diff.></u>	<u><% diff.></u>
H2	-16.05564	-1.69205	-1.27457
CO	-4.75968	0.71815	-1.48903
CO2	-11.79876	1.18596	-0.74736
N2	-144.72482	1.57735	-1.65866
CH4	n.a.	1.90699	-1.71477
H2O	-----	n.a.	n.a.
CH3OH	-----	-5.38814	2.76530

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

	INPUTS		OUTPUTS				(IN-OUT)/IN
STREAM # STREAM NAME	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	69 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	87.6146	75.0531	3.2146	0.1306	-----	79.3983	10.5191
CO2	21.2358	20.0924	0.8606	0.3592	-----	21.3124	-0.3607
CH3OH	0.4328	0.4107	0.0176	0.0151	9.9037	10.3470	-2290.7969
OTHERS	0.4498	0.4362	0.0187	0.0021	0.1015	0.5584	-24.1535
TOTAL C	109.7330	95.9926	4.1114	0.5070	10.0051	110.6161	-0.8048
HYDROGEN:							
H2	120.1361	75.9512	3.2530	0.0637	-----	79.2679	34.0183
H2O	0.0000	0.0000	0.0000	0.0000	0.3297	0.3297	n.a.
OTHERS	3.5303	3.3876	0.1451	0.0681	39.8177	43.4184	-1129.8817
TOTAL H	123.6664	79.3398	3.3981	0.1317	40.1474	123.0161	0.5259
OXYGEN:							
TOTAL O	130.5190	115.6489	4.9533	0.8644	10.1455	131.6129	-0.8375
NITROGEN:							
TOTAL N	2.0625	1.9935	0.0854	0.0027	-----	2.0815	-0.9219
TOTAL MASS FLOW (kg/hr)	3562.5596	3112.4116	133.3069	20.0407	324.9487	3590.7083	-0.7901

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS
	<u>GC#1</u>	<u>GC#2</u>
	-----	-----
MASS BALANCE (Z) :	-0.05	0.04
ELEMENTAL BALANCE (Z) :		
CARBON	0.14	0.22
HYDROGEN	1.45	0.84
OXYGEN	0.14	0.25
NITROGEN	-0.18	0.72
		13.75

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

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DATE : 06-DEC-99
TIME : 15:28:03
TIME INTERVAL : FROM: 0600 10-Dec
                TO: 0600 11-Dec

NUMBER OF AVERAGED HOURS : 24
RUN ID NUMBER : E7.98
FEED GAS TYPE: CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) : 163.7
OIL/SLURRY REACTOR INLET TEMP. (des.C) : 7.1
AVG. REACTOR SLURRY TEMPERATURE (des.C) : 250.1
REACTOR FREEBOARD TEMPERATURE (des.C) : 247.2
OIL/SLURRY OUTLET TEMP. (des.C) : 244.0
REACTOR FEED GAS PRESSURE (kPa) : 5552
REACTOR EFFLUENT GAS PRESSURE (kPa) : 5294
GAS SUPERFICIAL VELOCITY (cm/sec) : 15.4
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 0.0
SLURRY CONCENTRATION (wt%) : 37.3
CATALYST OXIDE IN REACTOR (kg oxide) : 393
GAS HOLD-UP (%) : 33.3
SPACE VELOCITY (1/kg-hr) : 9732
RECYCLE/FRESH FEED RATIO : 3.724
OIL/SLURRY CIRCULATION RATE (m3/hr) : 0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 140.53
PURGE GAS FLOW RATE <50> (ksmol/hr) : 5.87
HEAT TRANSFER COEFFICIENT (Watt/m2-des.C) : 576
  
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STREAM #	1	55	15	15	32	32	62	69
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	58.68	28.51	35.69	35.43	26.44	26.57	5.92	-----
CO	36.74	55.22	50.96	50.99	51.15	51.07	24.30	-----
CO2	3.86	14.78	12.28	12.26	13.98	13.97	67.39	-----
N2	0.14	0.78	0.62	0.63	0.72	0.71	0.24	-----
CH4	0.06	0.32	0.26	0.26	0.30	0.30	0.32	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.91
CH3OH	0.00	0.32	0.33	0.26	7.16	7.15	2.09	97.63
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.07
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.31
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.11
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.09
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.06
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.78
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.09
TOTAL :	99.49	99.93	100.15	99.82	99.74	99.77	100.28	100.00
DENS,g/cc	0.006	0.050	0.031	0.032	0.036	0.036	0.005	0.798
AV.MOL.WT	13.29	22.93	20.69	20.72	23.61	23.58	37.29	32.04
m3/hr	910.6	3018.4	3831.8	3828.9	3359.7	3362.1	11.2	-----
ksmol/hr	36.16	134.66	170.95	170.82	149.99	149.93	0.50	10.15
1/hr,prod	-----	-----	-----	-----	-----	-----	-----	407.57

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	34.7	34.5
CARBON MONOXIDE CONVERSION	(%) :	12.1	12.0
CARBON DIOXIDE CONVERSION	(%) :	0.2	0.0
RATIO H2 CONSUMED/CO CONSUMED	:	2.01	2.00
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	33.3	34.0
CARBON MONOXIDE CONVERSION	(%) :	11.6	11.9
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	33.0	33.2
CARBON MONOXIDE CONVERSION	(%) :	11.5	11.5
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL *
CO (+CO2) SELECTIVITY TO METHANOL (%) :	97.4	98.8
CO (+CO2) SELECTIVITY TO ETHANOL (%) :		0.2

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	mmol/hr-kg cat	kg/1000 Na3 fresh feed	kg/1000 Na3 reactor feed
As calculated ACROSS REACTOR	25.97	403.9	95.5
As Net MeOH produced, OVERALL balance	25.27	393.0	93.2

REACTOR FEED (H2/(CO+1.5CO2)) : 0.51
 REACTOR FEED ((H2-CO2)/(CO+CO2)) : 0.37

APPROACH TO METHANOL EQUILIBRIUM (deg.C) : 25.76
 APPROACH TO WATER-GAS EQUILIBRIUM (deg.C) : 11.89

METHANOL COLLECTED AS % OF CALCULATED : 97.0

CALCULATED METHANOL PRODUCTION RATE (Kmmol/hr) : 10.22

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[1455]-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-16.93967	-1.51264	-1.20361
CO	-5.07310	0.62306	-1.40320
CO2	-11.77302	1.66300	-0.91395
N2	-175.23129	2.56912	-1.27103
CH4	n.a.	3.29353	-1.73219
H2O	-----	n.a.	n.a.
CH3OH	-----	-2.98134	3.36313

OVERALL ELEMENTAL BALANCE (kg-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	87.0973	74.3581	3.2421	0.1359	-----	77.7361	10.7480
CO2	20.9459	19.9028	0.8678	0.3768	-----	21.1474	-0.9623
CH3OH	0.4410	0.4282	0.0187	0.0117	9.9100	10.3686	-2251.0847
OTHERS	0.4390	0.4323	0.0188	0.0022	0.1015	0.5548	-26.3759
TOTAL C	108.9232	95.1215	4.1473	0.5266	10.0116	109.8069	-0.8113
HYDROGEN:							
H2	121.0323	76.7915	3.3482	0.0663	-----	80.2059	33.7318
H2O	0.0000	0.0000	0.0000	0.0000	0.3293	0.3293	n.a.
OTHERS	3.5201	3.4420	0.1501	0.0549	29.8432	43.4900	-1135.4891
TOTAL H	124.5524	80.2335	3.4982	0.1212	40.1725	124.0254	0.4231
OXYGEN:							
TOTAL O	129.4301	114.5920	4.9963	0.9014	10.1526	130.6423	-0.9366
NITROGEN:							
TOTAL N	2.1489	2.1007	0.0916	0.0026	-----	2.1949	-2.1419
TOTAL MASS FLOW (kg/hr)	3539.8877	3087.4944	134.6165	20.8565	325.2588	3568.2263	-0.8005

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS
	GC#1	GC#2
	-----	-----
MASS BALANCE (%) :	-0.02	0.01
ELEMENTAL BALANCE (%) :		
CARBON	0.37	0.12
HYDROGEN	1.36	0.48
OXYGEN	0.34	0.10
NITROGEN	-0.44	-0.86
		10.14

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

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=====
DATE :                                05-DEC-89
TIME :                                15:29:22
TIME INTERVAL :                       FROM: 0600 11-Dec
                                         TO: 0600 12-Dec

NUMBER OF AVERAGED HOURS :            24
RUN ID NUMBER :                       E7.99
FEED GAS TYPE :                       CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 162.0
OIL/SLURRY REACTOR INLET TEMP. (deg.C) : 7.5
AVG. REACTOR SLURRY TEMPERATURE (deg.C) : 249.9
REACTOR FREEBOARD TEMPERATURE (deg.C) : 246.5
OIL/SLURRY OUTLET TEMP. (deg.C) :    243.3
REACTOR FEED GAS PRESSURE (kPa) :     5549
REACTOR EFFLUENT GAS PRESSURE (kPa) :  5294
GAS SUPERFICIAL VELOCITY (cm/sec) :   15.3
LIQUID SUPERFICIAL VELOCITY (cm/sec) :  0.0
SLURRY CONCENTRATION (wt%) :          37.2
CATALYST OXIDE IN REACTOR (ks oxide) : 393
GAS HOLD-UP (%) :                     33.1
SPACE VELOCITY (1/ks-hr) :            9464
RECYCLE/FRESH FEED RATIO :            3.745
OIL/SLURRY CIRCULATION RATE (m3/hr) :  0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 139.65
PURGE GAS FLOW RATE <50> (ksmol/hr) :  5.77
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) : 574
  
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STREAM #	1	55	15	15	32	32	62	69
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	HEOH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT	=====	=====	=====	=====	=====	=====	=====	=====
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	59.58	28.45	35.61	35.33	26.37	26.51	5.92	-----
CO	36.74	55.31	51.03	51.09	51.31	51.23	24.30	-----
CO2	3.90	14.81	12.34	12.35	14.05	14.04	67.38	-----
N2	0.14	0.73	0.60	0.60	0.68	0.67	0.24	-----
CH4	0.05	0.32	0.27	0.26	0.29	0.31	0.32	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.90
CH3OH	0.00	0.32	0.32	0.26	7.11	7.12	2.09	97.61
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.31
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.12
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.09
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.06
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.78
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.10
TOTAL :	99.41	99.95	100.17	99.89	99.82	99.99	100.28	100.00
DENS,g/cc	0.006	0.050	0.032	0.032	0.036	0.036	0.005	0.798
AV.MOL.WT	13.31	22.95	20.72	20.77	23.64	23.61	37.29	32.04
Mm3/hr	801.3	3001.0	3807.5	3802.2	3338.8	3341.2	11.3	-----
ksmol/hr	35.75	133.88	169.97	169.63	148.96	148.99	0.50	10.67
l/hr,prod	-----	-----	-----	-----	-----	-----	-----	404.43

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		GC#1 ----	GC#2 ----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	34.7	34.5
CARBON MONOXIDE CONVERSION	(%) :	11.9	11.9
CARBON DIOXIDE CONVERSION	(%) :	0.2	0.1
RATIO H2 CONSUMED/CO CONSUMED	:	2.03	2.02
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	33.3	33.9
CARBON MONOXIDE CONVERSION	(%) :	11.6	11.7
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	33.0	33.3
CARBON MONOXIDE CONVERSION	(%) :	11.5	11.5
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC Average -----	OVERALL %
CO (+CO2) SELECTIVITY TO METHANOL (%) :	98.2	99.0
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.2

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEDH SOURCE	smol/hr-kg cat -----	kg/1000 Nm3 fresh feed -----	kg/1000 Nm3 reactor feed -----
As calculated ACROSS REACTOR	25.71	404.4	95.2
As Net MeOH produced, OVERALL balance	25.07	394.4	93.1

REACTOR FEED (H2/(CO+1.5CO2)) :	0.51
REACTOR FEED ((H2-CO2)/(CO+CO2)) :	0.36
APPROACH TO METHANOL EQUILIBRIUM (deg.C) :	26.04
APPROACH TO WATER-GAS EQUILIBRIUM (deg.C) :	11.27
METHANOL COLLECTED AS % OF CALCULATED :	97.2
CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) :	10.11

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-15.92388	-1.51230	-1.24446
CO	-5.00921	0.60093	-1.24175
CO2	-11.79869	1.29439	-0.60989
N2	-155.21211	2.00964	-1.94241
CH4	n.a.	2.83508	-2.74135
H2O	-----	n.a.	n.a.
CH3OH	-----	-3.55933	2.81319

OVERALL ELEMENTAL BALANCE (Kg-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	86.6655	74.0542	3.1919	0.1368	-----	77.3829	10.7109
CO2	20.9455	19.8266	0.8546	0.3793	-----	21.0404	-0.5490
CH3OH	0.4444	0.4292	0.0185	0.0117	9.8320	10.2914	-2215.5928
OTHERS	0.4376	0.4311	0.0186	0.0022	0.1007	0.5526	-26.2642
TOTAL C	108.4930	94.7411	4.0835	0.5300	9.9327	109.2873	-0.7321
HYDROGEN:							
H2	119.8647	76.1923	3.2840	0.0667	-----	79.5430	33.6394
H2O	0.0000	0.0000	0.0000	0.0000	0.3228	0.3228	n.a.
OTHERS	3.5283	3.4411	0.1483	0.0553	39.5294	43.1740	-1123.6477
TOTAL H	123.3931	79.6333	3.4323	0.1220	39.8522	123.0398	0.2962
OXYGEN:							
TOTAL O	129.0008	114.1366	4.9195	0.9073	10.0718	130.0351	-0.8018
NITROGEN:							
TOTAL N	2.0186	1.9627	0.0846	0.0027	-----	2.0500	-1.5561
TOTAL MASS FLOW (kg/hr)	3522.4604	3072.4595	132.4289	20.9919	322.7499	3548.6299	-0.7429

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]		FRESH FEED GAS
	GC#1	GC#2	[15-(50+62+68)]
MASS BALANCE (Z) :	-0.01	0.02	-0.05
ELEMENTAL BALANCE (Z) :			
CARBON	0.25	0.09	0.01
HYDROGEN	1.31	0.59	-3.44
OXYGEN	0.25	0.09	0.15
NITROGEN	0.91	0.39	10.27

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY
=====

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DATE : 06-DEC-89
TIME : 15:30:53
TIME INTERVAL : FROM: 0600 12-Dec
                TO: 0600 13-Dec

NUMBER OF AVERAGED HOURS : 24
RUN ID NUMBER : E7.100
FEED GAS TYPE: CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 154.6
OIL/SLURRY REACTOR INLET TEMP. (deg.C) : 7.1
AVG. REACTOR SLURRY TEMPERATURE (deg.C) : 249.9
REACTOR FREEBOARD TEMPERATURE (deg.C) : 246.9
OIL/SLURRY OUTLET TEMP. (deg.C) : 244.0
REACTOR FEED GAS PRESSURE (kPa) : 5548
REACTOR EFFLUENT GAS PRESSURE (kPa) : 5294
GAS SUPERFICIAL VELOCITY (cm/sec) : 15.2
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 0.0
SLURRY CONCENTRATION (wt%) : 37.2
CATALYST OXIDE IN REACTOR (kg oxide) : 393
GAS HOLD-UP (%) : 33.2
SPACE VELOCITY (1/kg-hr) : 9521
RECYCLE/FRESH FEED RATIO : 3.777
OIL/SLURRY CIRCULATION RATE (m3/hr) : 0.0
PROD. SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 139.06
PURGE GAS FLOW RATE <50> (ksmol/hr) : 5.55
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) : 576
  
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STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEOH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
=====	=====	=====	=====	=====	=====	=====	=====	=====
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	58.81	29.46	35.56	35.34	26.37	26.52	5.92	-----
CO	36.54	55.03	50.88	50.85	51.04	50.97	24.30	-----
CO2	3.91	15.06	12.56	12.56	14.24	14.29	67.38	-----
N2	0.14	0.75	0.60	0.61	0.69	0.69	0.24	-----
CH4	0.05	0.28	0.24	0.23	0.26	0.27	0.32	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.90
CH3OH	0.00	0.32	0.31	0.24	7.08	7.13	2.09	97.69
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.30
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.11
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.09
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.06
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.75
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.08
TOTAL :	99.46	99.90	100.16	99.83	99.69	99.87	100.28	100.00
DENS,g/cc	0.006	0.050	0.032	0.032	0.036	0.036	0.005	0.798
AV.MOL.WT	13.26	22.99	20.77	20.80	23.67	23.65	37.29	32.03
Nm3/hr	792.4	2992.7	3788.5	3785.0	3325.1	3326.7	11.1	-----
ksmol/hr	35.35	133.51	169.02	168.86	148.34	148.35	0.50	10.03
l/hr,prod	-----	-----	-----	-----	-----	-----	-----	402.41

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
		----	----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	34.5	34.4
CARBON MONOXIDE CONVERSION	(%) :	12.0	11.9
CARBON DIOXIDE CONVERSION	(%) :	0.2	0.4
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.02
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	33.5	33.8
CARBON MONOXIDE CONVERSION	(%) :	11.7	11.9
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	33.1	33.3
CARBON MONOXIDE CONVERSION	(%) :	11.5	11.6
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR	OVERALL
	GC Average	†
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (%) :	97.7	99.1
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.2

† Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEDH SOURCE	gmo1/hr-kg cat	kg/1000 Me3 fresh feed	kg/1000 Me3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	25.61	407.4	85.3
As Net MeOH produced, OVERALL balance	24.96	397.1	93.1

REACTOR FEED (H2/(CO+1.5CO2)) :	0.51
REACTOR FEED ((H2-CO2)/(CO+CO2)) :	0.36
APPROACH TO METHANOL EQUILIBRIUM (des.C) :	26.04
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) :	9.95
METHANOL COLLECTED AS % OF CALCULATED :	97.2
CALCULATED METHANOL PRODUCTION RATE (Ksgmo1/hr) :	10.07

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-15.34911	-1.50201	-1.25464
CO	-4.71995	0.59735	-1.23761
CO2	-11.02814	1.35601	-0.91755
N2	-187.11934	1.76582	-1.02755
CH4	n.a.	2.40731	-1.70675
H2O	-----	n.a.	n.a.
CH3OH	-----	3.21171	2.46068

OVERALL ELEMENTAL BALANCE (Kg-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	85.8729	73.4723	3.0527	0.1345	-----	76.6595	10.7291
CO2	21.2036	20.1111	0.8356	0.3729	-----	21.3196	-0.5471
CH3OH	0.4100	0.4229	0.0176	0.0115	9.7910	10.2430	-2398.2458
OTHERS	0.3867	0.3778	0.0157	0.0021	0.1003	0.4959	-29.2552
TOTAL C	107.8732	94.3842	3.9216	0.5210	9.8912	108.7180	-0.7832
HYDROGEN:							
H2	119.3457	76.0011	3.1578	0.0656	-----	79.2244	33.6177
H2O	0.0000	0.0000	0.0000	0.0000	0.3209	0.3209	n.a.
OTHERS	3.1868	3.2030	0.1331	0.0543	39.3644	42.7548	-1241.6339
TOTAL H	122.5325	79.2041	3.2909	0.1199	39.6853	122.3001	0.1997
OXYGEN:							
TOTAL O	128.6900	114.1174	4.7415	0.8919	10.0261	129.7770	-0.8446
NITROGEN:							
TOTAL N	2.0567	1.9947	0.0829	0.0026	-----	2.0802	-1.1418
TOTAL MASS FLOW (kg/hr)	3511.9170	3069.3354	127.5293	20.6366	321.1371	3538.6384	-0.7609

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS
	GC#1	GC#2
	-----	-----
MASS BALANCE (Z) :	0.00	0.01
ELEMENTAL BALANCE (Z) :		
CARBON	0.30	0.13
HYDROGEN	1.02	0.60
OXYGEN	0.28	0.17
NITROGEN	-0.54	-0.11
		13.63

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

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DATE :                                06-DEC-89
TIME :                                15:32:29
TIME INTERVAL :                       FROM: 0600 13-Dec
                                         TO:  0600 14-Dec

NUMBER OF AVERAGED HOURS :            24
RUN ID NUMBER :                       E7.101
FEED GAS TYPE:                        CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) : 167.9
OIL/SLURRY REACTOR INLET TEMP. (des.C) : 8.5
AVG. REACTOR SLURRY TEMPERATURE (des.C) : 250.1
REACTOR FREEBOARD TEMPERATURE (des.C) : 247.0
OIL/SLURRY OUTLET TEMP. (des.C) :     244.6
REACTOR FEED GAS PRESSURE (kPa) :     5550
REACTOR EFFLUENT GAS PRESSURE (kPa) :  5294
GAS SUPERFICIAL VELOCITY (cm/sec) :   15.2
LIQUID SUPERFICIAL VELOCITY (cm/sec) :  0.0
SLURRY CONCENTRATION (wt%) :          37.3
CATALYST OXIDE IN REACTOR (kg oxide) : 393
GAS HOLD-UP (%) :                     33.3
SPACE VELOCITY (1/kg-hr) :            9630
RECYCLE/FRESH FEED RATIO :            3.795
OIL/SLURRY CIRCULATION RATE (m3/hr) :  0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 139.49
PURGE GAS FLOW RATE <50> (ksmol/hr) :  5.70
HEAT TRANSFER COEFFICIENT (Watt/m2-des.C) : 574
  
```

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDN PRODUC
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	59.56	28.03	35.24	34.93	26.12	26.15	5.92	-----
CO	36.77	55.51	51.16	51.28	51.41	51.43	24.30	-----
CO2	3.90	15.04	12.52	12.54	14.25	14.22	67.38	-----
N2	0.15	0.81	0.66	0.66	0.75	0.75	0.24	-----
CH4	0.05	0.28	0.24	0.22	0.26	0.27	0.32	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.90
CH3OH	0.00	0.36	0.34	0.38	7.07	7.05	2.09	97.74
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.30
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.11
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.09
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.06
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.09
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.73
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.06
TOTAL :	99.43	100.04	100.14	99.90	99.87	99.87	100.28	100.00
DENS,g/cc	0.006	0.050	0.031	0.032	0.036	0.036	0.005	0.797
AV.MOL.WT	13.32	23.11	20.84	20.91	23.75	23.73	37.29	32.07
m3/hr	790.1	2998.7	3793.7	3788.8	3333.6	3334.5	11.2	-----
ksmol/hr	35.25	133.78	169.25	169.03	148.72	148.70	0.50	9.91
1/hr,prod	-----	-----	-----	-----	-----	-----	-----	399.14

LAPORTE LP-METHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		GC#1 ----	GC#2 ----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	34.8	34.2
CARBON MONOXIDE CONVERSION	(%) :	11.6	11.8
CARBON DIOXIDE CONVERSION	(%) :	0.2	0.0
RATIO H2 CONSUMED/CO CONSUMED	:	2.06	1.98
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	33.3	34.0
CARBON MONOXIDE CONVERSION	(%) :	11.5	11.6
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	32.9	33.3
CARBON MONOXIDE CONVERSION	(%) :	11.3	11.3
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.00

SELECTIVITIES :

		ACROSS REACTOR GC Average -----	OVERALL * -----
CO (+CO2) SELECTIVITY TO METHANOL	(%) :	99.2	99.1
CO (+CO2) SELECTIVITY TO ETHANOL	(%) :	-----	0.2

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	kmol/hr-kg cat -----	kg/1000 Nm3 fresh feed -----	kg/1000 Nm3 reactor feed -----
As calculated ACROSS REACTOR	25.37	404.7	84.4
As Net MeOH produced, OVERALL balance	24.69	393.9	82.1

REACTOR FEED $\{H_2/(CO+1.5CO_2)\}$: 0.50
 REACTOR FEED $\{(H_2-CO_2)/(CO+CO_2)\}$: 0.35

APPROACH TO METHANOL EQUILIBRIUM (deg.C) : 25.58
 APPROACH TO WATER-GAS EQUILIBRIUM (deg.C) : 9.93

METHANOL COLLECTED AS % OF CALCULATED : 97.0

CALCULATED METHANOL PRODUCTION RATE (Kmol/hr) : 9.98

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<u><% diff.></u>	<u><% diff.></u>	<u><% diff.></u>
H2	-14.77494	-1.54095	-0.72041
CO	-5.08193	0.63647	-1.44645
CO2	-10.58839	1.43894	-0.78749
N2	-293.75781	2.21280	-1.37266
CH4	n.a.	3.39254	-1.10228
H2O	-----	n.a.	n.a.
CH3OH	-----	2.48598	3.00464

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	86.6722	74.2670	3.1667	0.1352	-----	77.5689	10.5031
CO2	21.1914	20.1263	0.8587	0.3750	-----	21.3505	-0.7933
CH3OH	0.4709	0.4829	0.0206	0.0116	9.6798	10.1949	-2064.8442
OTHERS	0.3769	0.3733	0.0159	0.0022	0.0991	0.4904	-30.1076
TOTAL C	108.7115	95.2496	4.0613	0.5240	9.7789	109.6139	-0.8300
HYDROGEN:							
H2	119.0747	74.9935	3.1976	0.0659	-----	78.2570	33.7225
H2O	0.0000	0.0000	0.0000	0.0000	0.3171	0.3171	n.a.
OTHERS	3.3915	3.4248	0.1460	0.0546	38.9174	42.5429	-1154.4039
TOTAL H	121.4662	78.4183	3.3437	0.1206	39.2345	121.1170	0.2875
OXYGEN:							
TOTAL O	129.5259	115.0027	4.9036	0.8970	9.9102	130.7135	-0.9168
NITROGEN:							
TOTAL N	2.2346	2.1780	0.0929	0.0026	-----	2.2735	-1.7407
TOTAL MASS FLOW (ks/hr)	3534.0957	3091.4612	131.8161	20.7550	317.3340	3561.3665	-0.7716

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS
	GC#1	GC#2
	-----	-----
MASS BALANCE (%) :	-0.07	0.07
ELEMENTAL BALANCE (%) :		
CARBON	0.17	0.15
HYDROGEN	1.45	0.15
OXYGEN	0.17	0.13
NITROGEN	-0.20	-0.36
		10.80

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY
=====

DATE : 06-DEC-99
TIME : 15:33:49
TIME INTERVAL : FROM: 0600 14-Dec TO: 0600 15-Dec
NUMBER OF AVERAGED HOURS : 24
RUN ID NUMBER : E7.102
FEED GAS TYPE: CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 172.8
OIL/SLURRY REACTOR INLET TEMP. (deg.C) : 13.8
AVG. REACTOR SLURRY TEMPERATURE (deg.C) : 250.2
REACTOR FREEBOARD TEMPERATURE (deg.C) : 247.4
OIL/SLURRY OUTLET TEMP. (deg.C) : 244.9
REACTOR FEED GAS PRESSURE (kPa) : 5551
REACTOR EFFLUENT GAS PRESSURE (kPa) : 5294
GAS SUPERFICIAL VELOCITY (cm/sec) : 15.3
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 0.0
SLURRY CONCENTRATION (wt%) : 37.2
CATALYST OXIDE IN REACTOR (kg oxide) : 393
GAS HOLD-UP (%) : 33.2
SPACE VELOCITY (1/kg-hr) : 9667
RECYCLE/FRESH FEED RATIO : 3.759
OIL/SLURRY CIRCULATION RATE (m3/hr) : 0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 139.79
PURGE GAS FLOW RATE <50> (ksmol/hr) : 5.77
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) : 578

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MECH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
=====	=====	=====	=====	=====	=====	=====	=====	=====
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	58.95	28.71	35.76	35.55	26.66	26.74	5.92	-----
CO	36.61	54.72	50.65	50.62	50.76	50.80	24.30	-----
CO2	3.93	15.03	12.50	12.52	14.24	14.22	67.38	-----
N2	0.14	0.74	0.59	0.60	0.68	0.68	0.24	-----
CH4	0.05	0.26	0.22	0.21	0.24	0.26	0.32	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.90
CH3OH	0.01	0.47	0.41	0.37	7.26	7.24	2.09	97.74
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.30
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.11
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.09
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.06
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.73
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.06
TOTAL :	99.49	99.94	100.13	99.86	99.83	99.94	100.28	100.00
DENS,g/cc	0.005	0.049	0.031	0.031	0.036	0.036	0.005	0.792
AV.MOL.WT	13.24	22.93	20.71	20.74	23.61	23.59	37.29	32.02
Mm3/hr	799.2	3004.0	3807.5	3803.3	3340.7	3342.0	11.3	-----
ksmol/hr	35.65	134.02	169.87	169.68	149.04	149.03	0.50	9.96
1/hr:prod	-----	-----	-----	-----	-----	-----	-----	402.85

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

=====

CONVERSIONS ACROSS REACTOR :

		<u>GC#1</u>	<u>GC#2</u>
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	34.4	34.1
CARBON MONOXIDE CONVERSION	(%) :	12.0	11.9
CARBON DIOXIDE CONVERSION	(%) :	0.1	0.1
RATIO H2 CONSUMED/CO CONSUMED	:	2.03	2.01
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	33.2	33.8
CARBON MONOXIDE CONVERSION	(%) :	11.7	11.9
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	32.5	32.8
CARBON MONOXIDE CONVERSION	(%) :	11.5	11.5
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.00

SELECTIVITIES :

	<u>ACROSS REACTOR</u>	<u>OVERALL</u>
	<u>GC Average</u>	<u>%</u>
CO (+CO2) SELECTIVITY TO METHANOL (%) :	99.7	99.9
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	—	0.2

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	<u>smol/hr-kg cat</u>	<u>kg/1000 Na3 fresh feed</u>	<u>kg/1000 Na3 reactor feed</u>
As calculated ACROSS REACTOR	25.78	406.7	85.5
As Net MeOH produced, OVERALL balance	24.84	391.8	82.3

REACTOR FEED (H2/(CO+1.5CO2)) : 0.51
 REACTOR FEED {(H2-CO2)/(CO+CO2)} : 0.36

APPROACH TO METHANOL EQUILIBRIUM (des.C) : 25.48
 APPROACH TO WATER-GAS EQUILIBRIUM (des.C) : 9.01

METHANOL COLLECTED AS % OF CALCULATED : 96.0

CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) : 10.14

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-17.77322	-1.45297	-1.10469
CO	-4.99373	0.58576	-1.30202
CO2	-10.22707	1.29608	-0.84070
N2	-493.91360	2.44374	-1.65226
CH4	n.a.	4.43463	-2.89187
H2O	-----	n.a.	n.a.
CH3OH	-----	2.14283	3.79066

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	85.8896	73.3424	3.1602	0.1361	-----	76.6387	10.7707
CO2	21.2370	20.1499	0.8682	0.3774	-----	21.3955	-0.7467
CH3OH	0.6253	0.6362	0.0274	0.0117	9.7330	10.4083	-1564.4385
OTHERS	0.3512	0.3511	0.0151	0.0022	0.0996	0.4681	-33.2660
TOTAL C	108.1031	94.4795	4.0709	0.5274	9.8327	108.9106	-0.7470
HYDROGEN:							
H2	120.6516	76.9542	3.3158	0.0664	-----	80.3364	33.4146
H2O	0.0000	0.0000	0.0000	0.0000	0.3188	0.3188	n.a.
OTHERS	3.9063	3.9492	0.1702	0.0550	39.1314	43.3057	-1008.6216
TOTAL H	124.5579	80.9034	3.4860	0.1214	39.4502	123.9609	0.4793
OXYGEN:							
TOTAL O	128.9888	114.2783	4.9240	0.9029	9.9647	130.0699	-0.8381
NITROGEN:							
TOTAL N	2.0192	1.9728	0.0850	0.0026	-----	2.0604	-2.0427
TOTAL MASS FLOW (ks/hr)	3519.4714	3072.8064	132.4013	20.8904	319.0782	3545.1765	-0.7304

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]		FRESH FEED GAS
	GC#1	GC#2	[15-(50+62+68)]
MASS BALANCE (%) :	-0.01	0.01	-0.04
ELEMENTAL BALANCE (%) :			
CARBON	0.19	0.05	0.05
HYDROGEN	1.08	0.32	-2.40
OXYGEN	0.19	0.06	-0.02
NITROGEN	-0.53	-0.38	9.63

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

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DATE :                                06-DEC-89
TIME :                                15:35:15
TIME INTERVAL :                       FROM: 0600 15-Dec
                                         TO: 0600 16-Dec

NUMBER OF AVERAGED HOURS :            24
RUN ID NUMBER :                       E7.103
FEED GAS TYPE:                        CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 165.5
OIL/SLURRY REACTOR INLET TEMP. (deg.C) : 15.9
AVG. REACTOR SLURRY TEMPERATURE (deg.C) : 250.1
REACTOR FREEBOARD TEMPERATURE (deg.C) : 246.8
OIL/SLURRY OUTLET TEMP. (deg.C) :     243.7
REACTOR FEED GAS PRESSURE (kPa) :      5543
REACTOR EFFLUENT GAS PRESSURE (kPa) :   5294
GAS SUPERFICIAL VELOCITY (cm/sec) :    15.3
LIQUID SUPERFICIAL VELOCITY (cm/sec) :  0.0
SLURRY CONCENTRATION (wt%) :           37.2
CATALYST OXIDE IN REACTOR (kg oxide) :  393
GAS HOLD-UP (%) :                     33.3
SPACE VELOCITY (1/kg-hr) :             9469
RECYCLE/FRESH FEED RATIO :             3.764
OIL/SLURRY CIRCULATION RATE (m3/hr) :  0.0
PROD. SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 140.03
PURGE GAS FLOW RATE <50> (ksmol/hr) :   5.94
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) : 571
  
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STREAM #	1	55	15	15	32	32	62	48
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MECH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	59.65	28.50	35.60	35.35	26.41	26.55	5.92	-----
CO	36.78	55.41	51.20	51.21	51.50	51.38	24.30	-----
CO2	3.87	14.63	12.23	12.21	13.92	13.88	67.38	-----
N2	0.14	0.70	0.57	0.57	0.65	0.65	0.24	-----
CH4	0.05	0.29	0.25	0.23	0.28	0.28	0.32	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.91
CH3OH	0.00	0.38	0.37	0.30	7.16	7.24	2.09	97.72
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.30
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.11
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.09
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.05
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.73
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.07
TOTAL :	99.49	99.92	100.21	99.87	99.92	99.97	100.28	100.00
DENS,g/cc	0.006	0.049	0.031	0.031	0.036	0.036	0.005	0.795
AV.MOL.WT	13.30	22.91	20.71	20.74	23.62	23.59	37.29	32.02
Mm3/hr	798.5	3005.6	3806.8	3804.1	3340.2	3342.6	10.9	-----
ksmol/hr	35.62	134.09	169.83	169.71	149.02	149.06	0.49	9.92
l/hr,prod	-----	-----	-----	-----	-----	-----	-----	399.71

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		GC#1 ----	GC#2 ----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	34.5	34.4
CARBON MONOXIDE CONVERSION	(%) :	11.9	11.7
CARBON DIOXIDE CONVERSION	(%) :	0.3	-0.1
RATIO H2 CONSUMED/CO CONSUMED	:	2.02	2.03
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	33.6	33.9
CARBON MONOXIDE CONVERSION	(%) :	11.7	11.7
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	32.6	32.8
CARBON MONOXIDE CONVERSION	(%) :	11.3	11.3
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC Average -----	OVERALL *
CO (+CO2) SELECTIVITY TO METHANOL (%) :	99.9	99.0
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.2

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	smol/hr-kg cat -----	kg/1000 Me3 fresh feed -----	kg/1000 Me3 reactor feed -----
As calculated ACROSS REACTOR	25.84	407.9	85.6
As Net MeOH produced, OVERALL balance	24.72	390.3	81.9
REACTOR FEED (H2/(CO+1.5CO2)) :		0.51	
REACTOR FEED ((H2-CO2)/(CO+CO2)) :		0.36	
APPROACH TO METHANOL EQUILIBRIUM (des.C) :		25.83	
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) :		11.55	
METHANOL COLLECTED AS % OF CALCULATED :		95.4	
CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) :		10.16	

LAPORTE LPHETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1455)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-17.09015	-1.48489	-1.48108
CO	-4.89927	0.55795	-1.27014
CO2	-11.20418	1.33874	-0.56874
N2	-345.01794	2.26130	-1.15040
CH4	n.a.	3.85020	-0.49119
H2O	-----	n.a.	n.a.
CH3OH	-----	2.51705	3.97400

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

	INPUTS		OUTPUTS				(IN-OUT)/IN
STREAM # STREAM NAME	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	86.9095	74.2952	3.2909	0.1322	-----	77.7182	10.5757
CO2	20.7185	19.8210	0.8691	0.3664	-----	20.8566	-0.6666
CH3OH	0.5031	0.5161	0.0229	0.0113	9.6915	10.2417	-1935.7865
OTHERS	0.3988	0.3956	0.0175	0.0021	0.0992	0.5144	-28.9862
TOTAL C	108.5299	94.8279	4.2003	0.5170	9.7907	109.3310	-0.7381
HYDROGEN:							
H2	119.9762	76.4352	3.3856	0.0644	-----	79.8853	33.4157
H2O	0.0000	0.0000	0.0000	0.0000	0.3214	0.3214	n.a.
OTHERS	3.6076	3.6465	0.1615	0.0534	38.9644	42.8258	-1087.0885
TOTAL H	123.5839	80.0818	3.5472	0.1178	39.2858	123.0326	0.4461
OXYGEN:							
TOTAL O	128.8495	114.0533	5.0519	0.8766	9.9243	129.9062	-0.8201
NITROGEN:							
TOTAL N	1.9347	1.8826	0.0834	0.0026	-----	1.9685	-1.7484
TOTAL MASS FLOW (ks/hr)	3520.1680	3072.0786	136.0755	20.2814	317.7874	3546.2229	-0.7402

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS
	GC#1	GC#2
	-----	-----
MASS BALANCE (%) :	-0.01	0.01
ELEMENTAL BALANCE (%) :		
CARBON	0.22	-0.03
HYDROGEN	0.84	-2.60
OXYGEN	0.24	0.04
NITROGEN	0.68	11.29

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY
=====

DATE :	06-DEC-99
TIME :	15:36:57
TIME INTERVAL :	FROM: 0400 16-Dec
	TO: 0400 17-Dec
NUMBER OF AVERAGED HOURS :	22
RUN ID NUMBER :	E7.104
FEED GAS TYPE:	CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) :	163.3
OIL/SLURRY REACTOR INLET TEMP. (deg.C) :	9.5
AVG. REACTOR SLURRY TEMPERATURE (deg.C) :	249.9
REACTOR FREEBOARD TEMPERATURE (deg.C) :	247.0
OIL/SLURRY OUTLET TEMP. (deg.C) :	243.8
REACTOR FEED GAS PRESSURE (kPa) :	5545
REACTOR EFFLUENT GAS PRESSURE (kPa) :	5294
GAS SUPERFICIAL VELOCITY (cm/sec) :	15.3
LIQUID SUPERFICIAL VELOCITY (cm/sec) :	0.0
SLURRY CONCENTRATION (wt%) :	37.2
CATALYST OXIDE IN REACTOR (kg oxide) :	393
GAS HOLD-UP (%) :	33.2
SPACE VELOCITY (1/kg-hr) :	9466
RECYCLE/FRESH FEED RATIO :	3.767
OIL/SLURRY CIRCULATION RATE (m3/hr) :	0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) :	139.90
PURGE GAS FLOW RATE <50> (ksmol/hr) :	5.74
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) :	572

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDN PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<WT%>
H2	58.83	28.58	35.82	35.47	26.57	26.71	5.92	-----
CO	36.54	55.20	50.87	50.95	51.12	51.15	24.30	-----
CO2	3.91	14.76	12.31	12.31	13.99	14.01	67.38	-----
N2	0.14	0.72	0.58	0.58	0.67	0.66	0.24	-----
CH4	0.05	0.27	0.23	0.22	0.26	0.27	0.32	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.92
CH3OH	0.00	0.31	0.33	0.23	7.14	7.09	2.09	97.75
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.29
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.11
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.08
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.04
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.71
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.07
TOTAL :	99.48	99.84	100.15	99.77	99.75	99.89	100.28	100.00
DENS,g/cc	0.006	0.050	0.031	0.032	0.036	0.036	0.005	0.799
AV.MOL.WT	13.26	22.91	20.66	20.72	23.59	23.56	37.29	32.01
kg3/hr	797.8	3005.1	3907.4	3802.8	3339.7	3340.7	11.2	-----
ksmol/hr	35.59	134.06	169.86	169.65	148.95	148.97	0.50	9.99
l/hr,prod	-----	-----	-----	-----	-----	-----	-----	400.38

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

=====

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
		-----	-----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	34.6	34.2
CARBON MONOXIDE CONVERSION	(%) :	11.9	11.9
CARBON DIOXIDE CONVERSION	(%) :	0.1	0.2
RATIO H2 CONSUMED/CO CONSUMED	:	2.07	2.00
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	32.9	34.0
CARBON MONOXIDE CONVERSION	(%) :	11.6	11.9
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	32.6	32.9
CARBON MONOXIDE CONVERSION	(%) :	11.4	11.4
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL *
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (%) :	98.5	99.1
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.2

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	smol/hr-kg cat	kg/1000 Na3 fresh feed	kg/1000 Na3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	25.74	406.7	85.3
As Net MeOH produced, OVERALL balance	24.88	393.2	92.5

REACTOR FEED (H2/(CO+1.5CO2)) : 0.51

REACTOR FEED ((H2-CO2)/(CO+CO2)) : 0.37

APPROACH TO METHANOL EQUILIBRIUM (des.C) : 26.23

APPROACH TO WATER-GAS EQUILIBRIUM (des.C) : 11.78

METHANOL COLLECTED AS % OF CALCULATED : 96.4

CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) : 10.13

LAPORTE LPHETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-17.24265	-1.53323	-1.04820
CO	-4.99695	0.65422	-1.53798
CO2	-11.83835	1.34104	-0.78454
N2	-260.93439	2.49365	-1.29602
CH4	n.a.	1.58451	-0.52627
H2O	-----	n.a.	n.a.
CH3OH	-----	3.88577	4.10126

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	86.4423	74.0050	3.1676	0.1349	-----	77.3076	10.5674
CO2	20.8929	19.7839	0.8468	0.3741	-----	21.0048	-0.5355
CH3OH	0.3967	0.4127	0.0177	0.0116	9.7596	10.2016	-2471.5762
OTHERS	0.3783	0.3673	0.0157	0.0021	0.0999	0.4851	-28.2342
TOTAL C	108.1103	94.5691	4.0478	0.5227	9.8596	108.9992	-0.8222
HYDROGEN:							
H2	120.3359	76.6394	3.2804	0.0658	-----	79.9856	33.5314
H2O	0.0000	0.0000	0.0000	0.0000	0.3278	0.3278	n.a.
OTHERS	3.1001	3.1203	0.1336	0.0545	39.2384	42.5468	-1272.4132
TOTAL H	123.4360	79.7597	3.4140	0.1203	39.5662	122.8602	0.4665
OXYGEN:							
TOTAL O	128.6249	113.9856	4.8789	0.8949	9.9939	129.7533	-0.8773
NITROGEN:							
TOTAL N	1.9782	1.9305	0.0826	0.0026	-----	2.0158	-1.9014
TOTAL MASS FLOW (kg/hr)	3515.5796	3071.0193	131.4488	20.7043	319.9247	3543.0969	-0.7827

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]		FRESH FEED GAS
	GC#1	GC#2	[15-(50+62+68)]
MASS BALANCE (%) :	-0.06	0.06	-0.03
ELEMENTAL BALANCE (%) :			
CARBON	0.17	0.10	-0.09
HYDROGEN	1.63	0.16	-2.75
OXYGEN	0.16	0.13	0.16
NITROGEN	0.39	-0.60	13.21

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

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=====
DATE :                                06-DEC-89
TIME :                                15:38:27
TIME INTERVAL :                       FROM: 0700 17-Dec
                                         TO: 0600 18-Dec

NUMBER OF AVERAGED HOURS :            23
RUN ID NUMBER :                      E7.105
FEED GAS TYPE:                       CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 165.6
OIL/SLURRY REACTOR INLET TEMP. (deg.C) : 9.1
AVG. REACTOR SLURRY TEMPERATURE (deg.C) : 249.9
REACTOR FREEBOARD TEMPERATURE (deg.C) : 247.2
OIL/SLURRY OUTLET TEMP. (deg.C) :    244.2
REACTOR FEED GAS PRESSURE (kPa) :     5549
REACTOR EFFLUENT GAS PRESSURE (kPa) :  5294
GAS SUPERFICIAL VELOCITY (cm/sec) :   15.3
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 0.0
SLURRY CONCENTRATION (wt%) :          37.2
CATALYST OXIDE IN REACTOR (kg oxide) : 393
GAS HOLD-UP (%) :                    33.3
SPACE VELOCITY (1/kg-hr) :            9704
RECYCLE/FRESH FEED RATIO :            3.792
OIL/SLURRY CIRCULATION RATE (m3/hr) : 0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 140.64
PURGE GAS FLOW RATE <50> (ksmol/hr) : 5.87
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) : 574
  
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STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
=====	=====	=====	=====	=====	=====	=====	=====	=====
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	58.68	28.42	35.50	35.30	26.37	26.58	5.92	-----
CO	36.73	55.45	51.29	51.27	51.58	51.45	24.30	-----
CO2	3.93	14.68	12.26	12.29	13.95	13.90	67.38	-----
N2	0.14	0.77	0.62	0.62	0.71	0.71	0.24	-----
CH4	0.04	0.23	0.20	0.19	0.21	0.22	0.32	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.91
CH3OH	0.01	0.33	0.31	0.23	7.06	7.08	2.09	97.79
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.01
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.29
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.11
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.07
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.04
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.71
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.07
TOTAL :	99.53	99.87	100.18	99.89	99.88	99.95	100.28	100.00
DENS,g/cc	0.006	0.049	0.031	0.031	0.036	0.036	0.005	0.799
AV.MOL.WT	13.31	22.94	20.74	20.77	23.64	23.58	37.29	32.01
M3/hr	796.8	3021.0	3820.8	3817.7	3356.3	3360.3	11.1	-----
ksmol/hr	35.55	134.78	170.46	170.32	149.73	149.85	0.50	9.94
1/hr:prod	-----	-----	-----	-----	-----	-----	-----	398.34

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		GC#1 ----	GC#2 ----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	34.1	34.3
CARBON MONOXIDE CONVERSION	(%) :	11.8	11.6
CARBON DIOXIDE CONVERSION	(%) :	0.2	0.2
RATIO H2 CONSUMED/CO CONSUMED	:	2.01	2.04
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	33.3	33.9
CARBON MONOXIDE CONVERSION	(%) :	11.5	11.7
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	32.6	32.8
CARBON MONOXIDE CONVERSION	(%) :	11.3	11.3
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC Average -----	OVERALL *
CO (+CO2) SELECTIVITY TO METHANOL (%) :	99.9	99.1
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.2

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	smol/hr-kg cat -----	kg/1000 Nm3 fresh feed -----	kg/1000 Nm3 reactor feed -----
As calculated ACROSS REACTOR	25.75	407.4	85.0
As Net MeOH produced, OVERALL balance	24.77	391.9	91.8

REACTOR FEED $\{H_2/(CO+1.5CO_2)\}$: 0.51
 REACTOR FEED $\{(H_2-CO_2)/(CO+CO_2)\}$: 0.36

APPROACH TO METHANOL EQUILIBRIUM (deg.C) : 26.34
 APPROACH TO WATER-GAS EQUILIBRIUM (deg.C) : 11.65

METHANOL COLLECTED AS % OF CALCULATED : 95.9

CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) : 10.13

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-16.34989	-1.61862	-1.29725
CO	-5.06054	0.52340	-1.14733
CO2	-11.95909	1.16785	-0.63443
N2	-320.85257	3.37268	-1.70125
CH4	n.a.	2.16632	-2.41457
H2O	-----	n.a.	n.a.
CH3OH	-----	13.78123	3.57045

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	87.3249	74.7280	3.2521	0.1344	-----	78.1145	10.5473
CO2	20.9307	19.7825	0.8609	0.3726	-----	21.0159	-0.4074
CH3OH	0.3873	0.4457	0.0194	0.0115	9.7140	10.1907	-2531.0142
OTHERS	0.3185	0.3113	0.0135	0.0021	0.0994	0.4265	-33.8977
TOTAL C	108.9614	95.2675	4.1460	0.5206	9.8135	109.7476	-0.7215
HYDROGEN:							
H2	120.2359	76.6041	3.3338	0.0655	-----	80.0034	33.4613
H2O	0.0000	0.0000	0.0000	0.0000	0.3223	0.3223	n.a.
OTHERS	2.8233	3.0281	0.1318	0.0543	39.0551	42.2692	-1397.1517
TOTAL H	123.0592	79.6322	3.4655	0.1198	39.3774	122.5949	0.3773
OXYGEN:							
TOTAL O	129.5736	114.7386	4.9933	0.8912	9.9441	130.5673	-0.7669
NITROGEN:							
TOTAL N	2.1052	2.0756	0.0903	0.0026	-----	2.1685	-3.0084
TOTAL MASS FLOW (kg/hr)	3538.4048	3092.3064	134.5751	20.6197	318.3098	3565.8113	-0.7745

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]		FRESH FEED GAS
	GC#1	GC#2	[15-(50+62+68)]
MASS BALANCE (%) :	0.01	-0.02	-0.07
ELEMENTAL BALANCE (%) :			
CARBON	0.25	-0.03	-0.07
HYDROGEN	0.81	0.43	-2.81
OXYGEN	0.25	0.01	0.14
NITROGEN	-0.21	-1.29	9.84

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

```

DATE : 06-DEC-89
TIME : 15:40:02
TIME INTERVAL : FROM: 0600 19-Dec
                TO: 0600 19-Dec

NUMBER OF AVERAGED HOURS : 24
RUN ID NUMBER : E7.106
FEED GAS TYPE: CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) : 168.0
OIL/SLURRY REACTOR INLET TEMP. (des.C) : 10.9
AVG. REACTOR SLURRY TEMPERATURE (des.C) : 249.9
REACTOR FREEBOARD TEMPERATURE (des.C) : 247.4
OIL/SLURRY OUTLET TEMP. (des.C) : 244.8
REACTOR FEED GAS PRESSURE (kPa) : 5550
REACTOR EFFLUENT GAS PRESSURE (kPa) : 5294
GAS SUPERFICIAL VELOCITY (cm/sec) : 15.3
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 0.0
SLURRY CONCENTRATION (wt%) : 37.0
CATALYST OXIDE IN REACTOR (ks oxide) : 393
GAS HOLD-UP (%) : 32.6
SPACE VELOCITY (1/ks-hr) : 9674
RECYCLE/FRESH FEED RATIO : 3.765
OIL/SLURRY CIRCULATION RATE (m3/hr) : 0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 140.29
PURGE GAS FLOW RATE <50> (ksmol/hr) : 6.14
HEAT TRANSFER COEFFICIENT (Watt/m2-des.C) : 576
  
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STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEOH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
	<MOL%	<MOL%	<MOL%	<MOL%	<MOL%	<MOL%	<MOL%	<WT%
H2	58.38	28.28	35.32	35.14	26.30	26.37	5.92	-----
CO	36.93	55.75	51.48	51.47	51.77	51.79	24.30	-----
CO2	3.94	14.52	12.18	12.15	13.83	13.78	67.38	-----
N2	0.15	0.75	0.61	0.61	0.69	0.69	0.24	-----
CH4	0.04	0.22	0.19	0.18	0.21	0.22	0.32	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.91
CH3OH	0.01	0.33	0.35	0.24	7.05	7.07	2.09	97.79
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.01
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.29
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.11
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.07
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.04
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.71
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.07
TOTAL :	99.45	99.85	100.12	99.79	99.86	99.93	100.28	100.00
DENS,g/cc	0.006	0.049	0.031	0.031	0.036	0.036	0.005	0.798
AV.MOL.WT	13.38	22.95	20.77	20.79	23.64	23.62	37.29	32.01
m3/hr	798.7	3007.1	3807.2	3805.8	3346.7	3348.3	11.1	-----
ksmol/hr	35.63	134.16	169.85	169.79	149.31	149.31	0.50	9.86
1/hr,prod	-----	-----	-----	-----	-----	-----	-----	395.44

LAFORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
<u>CALCULATED BY GAS COMPOSITION</u>			
HYDROGEN CONVERSION (Z) :		34.3	34.2
CARBON MONOXIDE CONVERSION (Z) :		11.5	11.5
CARBON DIOXIDE CONVERSION (Z) :		0.4	-0.1
RATIO H2 CONSUMED/CO CONSUMED :		2.04	2.02
<u>CALCULATED BY METHANOL IN EXIT GAS</u>			
HYDROGEN CONVERSION (Z) :		33.2	33.9
CARBON MONOXIDE CONVERSION (Z) :		11.4	11.6
<u>CALCULATED BY OVERALL BALANCE</u>			
HYDROGEN CONVERSION (Z) :		32.6	32.8
CARBON MONOXIDE CONVERSION (Z) :		11.2	11.2
RATIO H2 CONSUMED/CO CONSUMED :		2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL %
CO (+CO2) SELECTIVITY TO METHANOL (Z) :	99.4	99.2
CO (+CO2) SELECTIVITY TO ETHANOL (Z) :		0.2

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEDH SOURCE	smol/hr-ks cat	ks/1000 Ma3 fresh feed	ks/1000 Ma3 reactor feed
As calculated ACROSS REACTOR	25.54	403.2	84.6
As Net MeOH produced, OVERALL balance	24.56	387.7	81.4

REACTOR FEED (H2/(CO+1.5CO2)) :	0.50
REACTOR FEED ((H2-CO2)/(CO+CO2)) :	0.36
APPROACH TO METHANOL EQUILIBRIUM (des.C) :	26.26
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) :	12.19
METHANOL COLLECTED AS % OF CALCULATED :	95.8
CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) :	10.05

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT MATERIAL BALANCE SUMMARY

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-16.12877	-1.57479	-1.12905
CO	-5.05665	0.63270	-1.34110
CO2	-11.10519	1.23396	-0.44847
N2	-327.68805	2.15871	-1.52477
CH4	n.a.	3.36153	-2.28720
H2O	-----	n.a.	n.a.
CH3OH	-----	8.14425	4.05994

OVERALL ELEMENTAL BALANCE (Kg-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	87.3951	74.7928	3.4209	0.1344	-----	78.3481	10.3519
CO2	20.6242	19.4783	0.8909	0.3726	-----	20.7418	-0.5702
CH3OH	0.4079	0.4419	0.0202	0.0115	9.6308	10.1045	-2377.1262
OTHERS	0.3039	0.2992	0.0137	0.0021	0.0986	0.4136	-36.0824
TOTAL C	108.7311	95.0122	4.3457	0.5206	9.7294	109.6079	-0.8064
HYDROGEN:							
H2	119.3272	75.8714	3.4702	0.0655	-----	79.4072	33.4543
H2O	0.0000	0.0000	0.0000	0.0000	0.3195	0.3195	n.a.
OTHERS	2.8473	2.9644	0.1356	0.0543	38.7293	41.8747	-1370.6649
TOTAL H	122.1745	78.8359	3.6058	0.1199	39.0399	121.6014	0.4691
OXYGEN:							
TOTAL O	129.0514	114.1914	5.2229	0.8912	9.8588	130.1644	-0.8624
NITROGEN:							
TOTAL N	2.0714	2.0124	0.0920	0.0026	-----	2.1070	-1.7185
TOTAL MASS FLOW (kg/hr)	3529.2187	3079.5842	140.8557	20.6197	315.5817	3556.6414	-0.7770

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]		FRESH FEED GAS
	GC#1	GC#2	[15-(50+62+68)]
MASS BALANCE (%) :	0.01	-0.01	-0.07
ELEMENTAL BALANCE (%) :			
CARBON	0.18	-0.06	-0.11
HYDROGEN	1.07	0.24	-2.61
OXYGEN	0.22	-0.07	-0.03
NITROGEN	-0.72	-0.19	9.65

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

```

DATE : 06-DEC-89
TIME : 15:41:21
TIME INTERVAL : FROM: 0600 19-Dec
                TO: 0800 20-Dec

NUMBER OF AVERAGED HOURS : 21
RUN ID NUMBER : E7.107
FEED GAS TYPE: CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 167.1
OIL/SLURRY REACTOR INLET TEMP. (deg.C) : 14.9
AVG. REACTOR SLURRY TEMPERATURE (deg.C) : 250.0
REACTOR FREEBOARD TEMPERATURE (deg.C) : 247.1
OIL/SLURRY OUTLET TEMP. (deg.C) : 244.5
REACTOR FEED GAS PRESSURE (kPa) : 5549
REACTOR EFFLUENT GAS PRESSURE (kPa) : 5291
GAS SUPERFICIAL VELOCITY (cm/sec) : 15.4
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 0.0
SLURRY CONCENTRATION (wt%) : 37.2
CATALYST OXIDE IN REACTOR (kg oxide) : 393
GAS HOLD-UP (%) : 33.2
SPACE VELOCITY (1/kg-hr) : 9724
RECYCLE/FRESH FEED RATIO : 3.772
OIL/SLURRY CIRCULATION RATE (m3/hr) : 0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 141.00
PURGE GAS FLOW RATE <50> (ksmol/hr) : 6.17
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) : 572
  
```

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
=====	=====	=====	=====	=====	=====	=====	=====	=====
	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<WT%>
H2	59.62	28.63	35.53	35.40	26.58	26.68	5.92	-----
CO	36.85	55.28	51.22	51.08	51.42	51.35	24.30	-----
CO2	3.92	14.71	12.27	12.28	13.90	13.91	67.38	-----
N2	0.14	0.67	0.55	0.55	0.63	0.62	0.24	-----
CH4	0.05	0.25	0.21	0.19	0.22	0.24	0.32	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.91
CH3OH	0.01	0.45	0.40	0.37	7.09	7.15	2.00	97.79
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.01
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.29
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.11
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.07
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.04
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.71
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.07
TOTAL :	99.59	99.99	100.18	99.88	99.84	99.95	100.28	100.00
DENS, g/cc	0.005	0.049	0.031	0.031	0.036	0.036	0.005	0.793
AV. MOL. WT	13.34	22.90	20.74	20.75	23.57	23.56	37.29	32.01
kg3/hr	801.3	3022.3	3822.0	3823.6	3363.7	3364.9	10.9	-----
ksmol/hr	35.75	134.83	170.51	170.58	150.07	150.05	0.49	9.85
l/hr,prod	-----	-----	-----	-----	-----	-----	-----	397.69

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

	GC#1	GC#2
	----	----
CALCULATED BY GAS COMPOSITION		
HYDROGEN CONVERSION (Z) :	33.9	34.0
CARBON MONOXIDE CONVERSION (Z) :	11.7	11.4
CARBON DIOXIDE CONVERSION (Z) :	0.1	0.4
RATIO H2 CONSUMED/CO CONSUMED :	2.00	2.06
CALCULATED BY METHANOL IN EXIT GAS		
HYDROGEN CONVERSION (Z) :	33.1	33.1
CARBON MONOXIDE CONVERSION (Z) :	11.5	11.5
CALCULATED BY OVERALL BALANCE		
HYDROGEN CONVERSION (Z) :	32.3	32.4
CARBON MONOXIDE CONVERSION (Z) :	11.2	11.2
RATIO H2 CONSUMED/CO CONSUMED :	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL *
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (Z) :	98.6	99.0
CO (+CO2) SELECTIVITY TO ETHANOL (Z) :	-----	0.2

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	kmol/hr-kg cat	kg/1000 Nm3 fresh feed	kg/1000 Nm3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	25.49	400.8	84.0
As Net MeOH produced, OVERALL balance	24.58	386.4	81.0

REACTOR FEED (H2/(CO+1.5CO2)) : 0.51
 REACTOR FEED ((H2-CO2)/(CO+CO2)) : 0.37

APPROACH TO METHANOL EQUILIBRIUM (deg.C) : 24.38
 APPROACH TO WATER-GAS EQUILIBRIUM (deg.C) : 10.30

METHANOL COLLECTED AS % OF CALCULATED : 96.0

CALCULATED METHANOL PRODUCTION RATE (Kmol/hr) : 10.02

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-17.68487	-1.40167	-1.29251
CO	-5.35098	0.65229	-1.18774
CO2	-10.93035	1.38857	-1.16804
N2	-574.86157	1.32938	-1.46464
CH4	n.a.	4.37681	-3.28204
H2O	-----	n.a.	n.a.
CH3OH	-----	-1.66852	3.39060

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	87.1391	74.5380	3.4107	0.1318	-----	78.0806	10.3955
CO2	20.9408	19.8329	0.9075	0.3655	-----	21.1059	-0.7883
CH3OH	0.6265	0.6116	0.0280	0.0113	9.6248	10.2757	-1540.1174
OTHERS	0.3326	0.3303	0.0151	0.0021	0.0985	0.4461	-34.1062
TOTAL C	109.0391	95.3128	4.3613	0.5108	9.7233	109.9082	-0.7971
HYDROGEN:							
H2	120.7901	77.2091	3.5329	0.0643	-----	80.8063	33.1019
H2O	0.0000	0.0000	0.0000	0.0000	0.3193	0.3193	n.a.
OTHERS	3.8366	3.7677	0.1724	0.0533	38.6962	42.6897	-1012.6846
TOTAL H	124.6267	80.9769	3.7053	0.1175	39.0156	123.8153	0.6511
OXYGEN:							
TOTAL O	129.6473	114.8153	5.2537	0.8744	9.8527	130.7961	-0.8861
NITROGEN:							
TOTAL N	1.8901	1.8176	0.0832	0.0026	-----	1.9033	-0.7004
TOTAL MASS FLOW (ks/hr)	3538.7532	3087.8525	141.2930	20.2307	315.3852	3564.7615	-0.7350

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS
	GC#1	GC#2
	-----	-----
MASS BALANCE (%) :	-0.02	0.03
ELEMENTAL BALANCE (%) :		
CARBON	0.22	0.04
HYDROGEN	0.75	0.77
OXYGEN	0.21	0.09
NITROGEN	0.76	0.75
		12.48

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY
=====

DATE : 04-DEC-89
TIME : 15:43:00
TIME INTERVAL : FROM: 1000 20-Dec TO: 1600 20-Dec
NUMBER OF AVERAGED HOURS : 4
RUN ID NUMBER : E7.108A
FEED GAS TYPE: CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) : 127.5
OIL/SLURRY REACTOR INLET TEMP. (des.C) : 18.4
AVG. REACTOR SLURRY TEMPERATURE (des.C) : 249.0
REACTOR FREEBOARD TEMPERATURE (des.C) : 230.8
OIL/SLURRY OUTLET TEMP. (des.C) : 223.5
REACTOR FEED GAS PRESSURE (kPa) : 5333
REACTOR EFFLUENT GAS PRESSURE (kPa) : 5289
GAS SUPERFICIAL VELOCITY (cm/sec) : 3.2
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 0.0
SLURRY CONCENTRATION (wt%) : 36.7
CATALYST OXIDE IN REACTOR (ks oxide) : 393
GAS HOLD-UP (%) : 13.1
SPACE VELOCITY (1/ks-hr) : 2012
RECYCLE/FRESH FEED RATIO : 0.997
OIL/SLURRY CIRCULATION RATE (m3/hr) : 0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 25.63
PURGE GAS FLOW RATE <50> (ksmol/hr) : 0.01
HEAT TRANSFER COEFFICIENT (Watt/m2-des.C) : 295

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
=====	=====	=====	=====	=====	=====	=====	=====	=====
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	48.13	23.86	35.62	35.16	21.33	21.36	5.92	-----
CO	44.77	58.92	52.15	52.32	52.31	52.40	24.30	-----
CO2	7.20	16.21	11.97	11.94	14.99	14.97	67.38	-----
N2	0.14	0.34	0.24	0.23	0.29	0.30	0.24	-----
CH4	0.04	0.13	0.09	0.09	0.11	0.12	0.32	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.91
CH3OH	0.02	0.46	0.29	0.18	10.59	10.61	2.09	97.78
DME	0.00	0.01	0.00	0.00	0.03	0.00	0.04	0.01
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.29
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.11
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.07
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.04
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.71
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.08
TOTAL :	100.29	99.93	100.36	99.93	99.65	99.77	100.28	100.00
DENS,g/cc	0.006	0.049	0.033	0.033	0.040	0.040	0.005	0.793
AV.MOL.WT	16.68	24.40	20.69	20.77	25.27	25.25	37.29	32.01
m3/hr	396.3	394.9	792.1	791.2	649.4	649.7	3.5	-----
ksmol/hr	17.68	17.62	35.34	35.30	28.97	28.97	0.16	2.91
1/hr,PROD	-----	-----	-----	-----	-----	-----	-----	117.67

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

=====

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
		----	----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	50.8	50.2
CARBON MONOXIDE CONVERSION	(%) :	17.6	17.9
CARBON DIOXIDE CONVERSION	(%) :	-2.6	-3.0
RATIO H2 CONSUMED/CO CONSUMED	:	1.97	1.99
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	47.3	49.4
CARBON MONOXIDE CONVERSION	(%) :	16.1	16.3
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	46.2	46.8
CARBON MONOXIDE CONVERSION	(%) :	15.8	15.9
RATIO H2 CONSUMED/CO CONSUMED	:	1.99	1.99

SELECTIVITIES :

	ACROSS REACTOR	OVERALL
	GC Average	%
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (%) :	94.6	96.0
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.2

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	smol/hr-ks cat	ks/1000 Nm3 fresh feed	ks/1000 Nm3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	7.60	241.7	121.1
As Net MeOH produced, OVERALL balance	7.34	233.5	117.0

REACTOR FEED (H2/(CO+1.5CO2)) : 0.50

REACTOR FEED ((H2-CO2)/(CO+CO2)) : 0.36

APPROACH TO METHANOL EQUILIBRIUM (deg.C) : 7.81

APPROACH TO WATER-GAS EQUILIBRIUM (deg.C) : 50.47

METHANOL COLLECTED AS % OF CALCULATED : 95.3

CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) : 2.99

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-24.25113	2.37865	0.89611
CO	-23.16340	-0.94080	0.08706
CO2	-24.38152	-2.12165	1.61062
N2	-441.78391	1.61136	-4.35514
CH4	n.a.	1.05237	-5.96011
H2O	-----	n.a.	n.a.
CH3OH	-----	22.86985	3.27572

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	
CARBON:							
CO	18.4678	10.3811	4.7179	0.0428	-----	15.1418	18.0097
CO2	4.2157	2.8559	1.2979	0.1186	-----	4.2723	-1.3440
CH3OH	0.0648	0.0810	0.0368	0.0037	2.8474	2.9689	-4491.4150
OTHERS	0.0307	0.0268	0.0122	0.0007	0.0291	0.0688	-123.9736
TOTAL C	22.7790	13.3448	6.0647	0.1657	2.8765	22.4518	1.4363
HYDROGEN:							
H2	24.8218	8.4096	3.8218	0.0209	-----	12.2523	50.6391
H2O	0.0000	0.0000	0.0000	0.0000	0.0943	0.0943	n.a.
OTHERS	0.3820	0.4276	0.1944	0.0173	11.4479	12.0871	-3063.7590
TOTAL H	25.2039	8.8372	4.0162	0.0381	11.5421	24.4337	3.0559
OXYGEN:							
TOTAL O	26.9639	16.1757	7.3513	0.2837	2.9148	26.7254	0.9846
NITROGEN:							
TOTAL N	0.1652	0.1188	0.0540	0.0008	-----	0.1736	-5.0578
TOTAL MASS FLOW (ks/hr)	733.0767	429.8165	195.3362	6.5631	93.3155	725.0314	1.0975

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]		FRESH FEED GAS
	GC#1	GC#2	[15-(50+62+68)]
MASS BALANCE (%) :	-0.13	0.12	-0.11
ELEMENTAL BALANCE (%) :			
CARBON	0.67	0.73	0.98
HYDROGEN	3.43	1.55	8.59
OXYGEN	0.17	0.18	-0.84
NITROGEN	-0.92	-0.67	-11.50

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

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=====
DATE :                                06-DEC-89
TIME :                                15:44:22
TIME INTERVAL :                       FROM: 1700 20-Dec
                                         TO:  0700 21-Dec

NUMBER OF AVERAGED HOURS :            14
RUN ID NUMBER :                       E7.108B
FEED GAS TYPE:                        CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 167.6
OIL/SLURRY REACTOR INLET TEMP. (deg.C) : 20.3
AVG. REACTOR SLURRY TEMPERATURE (deg.C) : 250.1
REACTOR FREEBOARD TEMPERATURE (deg.C) : 247.5
OIL/SLURRY OUTLET TEMP. (deg.C) :     245.0
REACTOR FEED GAS PRESSURE (kPa) :      5540
REACTOR EFFLUENT GAS PRESSURE (kPa) :    5289
GAS SUPERFICIAL VELOCITY (cm/sec) :     15.3
LIQUID SUPERFICIAL VELOCITY (cm/sec) :    0.0
SLURRY CONCENTRATION (wt%) :            37.1
CATALYST OXIDE IN REACTOR (kg oxide) :   393
GAS HOLD-UP (%) :                      32.9
SPACE VELOCITY (1/kg-hr) :              9692
RECYCLE/FRESH FEED RATIO :              3.750
OIL/SLURRY CIRCULATION RATE (m3/hr) :    0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 140.48
PURGE GAS FLOW RATE <50> (ksmol/hr) :    6.24
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) : 555
  
```

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEOH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT	=====	=====	=====	=====	=====	=====	=====	=====
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	58.68	28.95	35.92	35.62	26.86	27.02	5.92	-----
CO	36.91	55.13	50.99	51.03	51.24	51.20	24.30	-----
CO2	3.87	14.57	12.16	12.19	13.80	13.81	67.38	-----
N2	0.12	0.56	0.46	0.45	0.52	0.51	0.24	-----
CH4	0.05	0.23	0.20	0.19	0.22	0.22	0.32	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.89
CH3OH	0.02	0.47	0.49	0.37	7.18	7.14	2.09	97.72
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.01
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.30
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.10
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.07
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.04
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.78
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.09
TOTAL :	99.66	99.92	100.21	99.84	99.83	99.91	100.28	100.00
DENS,g/cc	0.005	0.048	0.031	0.031	0.036	0.036	0.005	0.791
AV.MOL.WT	13.32	22.79	20.62	20.67	23.49	23.45	37.29	32.03
M3/hr	802.4	3008.9	3813.2	3811.2	3352.4	3355.1	11.0	-----
ksmol/hr	35.80	134.24	170.12	170.03	149.56	149.62	0.49	9.82
l/hr,prod	-----	-----	-----	-----	-----	-----	-----	397.69

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		GC#1 ----	GC#2 ----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	33.8	33.7
CARBON MONOXIDE CONVERSION	(%) :	11.6	11.7
CARBON DIOXIDE CONVERSION	(%) :	0.1	0.4
RATIO H2 CONSUMED/CO CONSUMED	:	2.05	2.02
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	32.2	33.4
CARBON MONOXIDE CONVERSION	(%) :	11.4	11.7
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	31.9	32.2
CARBON MONOXIDE CONVERSION	(%) :	11.2	11.2
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC Average -----	OVERALL %
CO (+CO2) SELECTIVITY TO METHANOL (%) :	99.3	98.8
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.2

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	smol/hr-ks cat -----	ks/1000 Nm3 fresh feed -----	ks/1000 Nm3 reactor feed -----
As calculated ACROSS REACTOR	25.37	398.4	83.9
As Net MeOH produced, OVERALL balance	24.50	384.8	81.0

REACTOR FEED {H2/(CO+1.5CO2)} : 0.51
 REACTOR FEED {(H2-CO2)/(CO+CO2)} : 0.37

APPROACH TO METHANOL EQUILIBRIUM (des.C) : 26.39
 APPROACH TO WATER-GAS EQUILIBRIUM (des.C) : 9.15

METHANOL COLLECTED AS % OF CALCULATED : 96.2

CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) : 9.99

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-18.84673	-1.15229	-1.34349
CO	-5.31909	0.52548	-1.22300
CO2	-11.07943	1.11113	-0.94653
N2	-582.06458	3.17099	-0.17592
CH4	n.a.	4.33397	-0.88988
H2O	-----	n.a.	n.a.
CH3OH	-----	1.20592	4.38810

OVERALL ELEMENTAL BALANCE (Kg-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	86.7591	74.0037	3.4413	0.1324	-----	77.5774	10.5829
CO2	20.7180	19.5638	0.9098	0.3671	-----	20.8406	-0.5913
CH3OH	0.6352	0.6372	0.0296	0.0114	9.5939	10.2721	-1517.1885
OTHERS	0.3163	0.3141	0.0146	0.0021	0.0982	0.4290	-35.6626
TOTAL C	108.4285	94.5188	4.3953	0.5129	9.6921	109.1191	-0.6369
HYDROGEN:							
H2	121.1253	77.7342	3.6148	0.0645	-----	81.4135	32.7857
H2O	0.0000	0.0000	0.0000	0.0000	0.3098	0.3098	n.a.
OTHERS	3.8057	3.8053	0.1770	0.0535	38.5719	42.6076	-1019.5626
TOTAL H	124.9311	81.5395	3.7917	0.1180	39.8817	124.3309	0.4804
OXYGEN:							
TOTAL O	128.8303	113.7684	5.2905	0.8780	9.8208	129.7577	-0.7198
NITROGEN:							
TOTAL N	1.5371	1.5008	0.0698	0.0026	-----	1.5731	-2.3467
TOTAL MASS FLOW (kg/hr)	3515.0120	3059.8066	142.2871	20.3152	314.5898	3536.9985	-0.6255

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]		FRESH FEED GAS
	GC#1	GC#2	[15-(50+62+68)]
MASS BALANCE (%) :	-0.05	0.05	-0.05
ELEMENTAL BALANCE (%) :			
CARBON	0.25	0.07	0.16
HYDROGEN	1.54	0.25	-1.64
OXYGEN	0.22	0.12	0.03
NITROGEN	0.82	-2.17	16.47

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY
=====

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DATE :                                06-DEC-89
TIME :                                15:46:08
TIME INTERVAL :                       FROM: 0900 21-Dec
                                         TO:  1600 21-Dec
NUMBER OF AVERAGED HOURS :            7
RUN ID NUMBER :                       E7.109A
FEED GAS TYPE:                        CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) : 123.5
OIL/SLURRY REACTOR INLET TEMP. (des.C) : 19.6
AVG. REACTOR SLURRY TEMPERATURE (des.C) : 249.8
REACTOR FREEBOARD TEMPERATURE (des.C) : 231.1
OIL/SLURRY OUTLET TEMP. (des.C) :     222.8
REACTOR FEED GAS PRESSURE (kPa) :     5328
REACTOR EFFLUENT GAS PRESSURE (kPa) :  5289
GAS SUPERFICIAL VELOCITY (cm/sec) :    2.8
LIQUID SUPERFICIAL VELOCITY (cm/sec) :  0.0
SLURRY CONCENTRATION (wt%) :           36.3
CATALYST OXIDE IN REACTOR (kg oxide) :  393
GAS HOLD-UP (%) :                     11.8
SPACE VELOCITY (1/kg-hr) :             1776
RECYCLE/FRESH FEED RATIO :             0.766
OIL/SLURRY CIRCULATION RATE (m3/hr) :  0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 22.04
PURGE GAS FLOW RATE <50> (ksmol/hr) :   8.52
HEAT TRANSFER COEFFICIENT (Watt/m2-des.C) : 310
  
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STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT	=====	=====	=====	=====	=====	=====	=====	=====
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	46.31	24.13	36.11	35.72	21.48	21.45	5.92	-----
CO	46.13	58.80	51.93	52.08	51.95	52.10	24.30	-----
CO2	7.65	16.03	11.58	11.59	14.69	14.79	67.38	-----
N2	0.17	0.35	0.25	0.24	0.31	0.30	0.24	-----
CH4	0.04	0.11	0.08	0.06	0.10	0.10	0.32	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.95
CH3OH	0.00	0.45	0.26	0.16	11.02	11.05	2.09	97.72
DME	0.00	0.01	0.00	0.00	0.02	0.00	0.04	0.01
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.29
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.10
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.07
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.03
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.71
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.12
TOTAL :	100.30	99.89	100.22	99.85	99.57	99.80	100.28	100.00
DENS,g/cc	0.007	0.048	0.033	0.033	0.040	0.040	0.005	0.792
AV.MOL.WT	17.22	24.30	20.49	20.56	25.20	25.22	37.29	32.01
M3/hr	395.3	303.1	699.0	698.6	569.0	568.7	4.1	-----
ksmol/hr	17.64	13.52	31.18	31.17	25.38	25.36	0.18	2.79
1/hr,prod	-----	-----	-----	-----	-----	-----	-----	112.95

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

	GC#1	GC#2
CALCULATED BY GAS COMPOSITION		
HYDROGEN CONVERSION (%) :	51.7	51.0
CARBON MONOXIDE CONVERSION (%) :	18.4	18.8
CARBON DIOXIDE CONVERSION (%) :	-4.0	-3.3
RATIO H2 CONSUMED/CO CONSUMED :	1.95	1.97
CALCULATED BY METHANOL IN EXIT GAS		
HYDROGEN CONVERSION (%) :	48.3	49.4
CARBON MONOXIDE CONVERSION (%) :	16.8	16.9
CALCULATED BY OVERALL BALANCE		
HYDROGEN CONVERSION (%) :	49.5	50.1
CARBON MONOXIDE CONVERSION (%) :	17.3	17.2
RATIO H2 CONSUMED/CO CONSUMED :	1.99	1.99

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL *
CO (+CO2) SELECTIVITY TO METHANOL (%) :	94.9	94.6
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.2

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	smol/hr-ks cat	ks/1000 Na3 fresh feed	ks/1000 Na3 reactor feed
As calculated ACROSS REACTOR	6.96	221.6	125.4
As Net MeOH produced, OVERALL balance	7.05	224.5	127.1

REACTOR FEED (H2/(CO+1.5CO2)) :	0.51
REACTOR FEED ((H2-CO2)/(CO+CO2)) :	0.38
APPROACH TO METHANOL EQUILIBRIUM (deg.C) :	6.31
APPROACH TO WATER-GAS EQUILIBRIUM (deg.C) :	59.73
METHANOL COLLECTED AS % OF CALCULATED :	99.8
CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) :	2.74

Abstract

STREAM #	[PURE GASES - 1]	[(1+55)-15]	[32 - (50+55+42+68)]
STREAM LOCATIONS	FRESH FEED GAS	REACTOR FEED	REACTOR EFFLUENT
COMPONENT :			
	<% diff.>	<% diff.>	<% diff.>
H2	-29.74727	2.62509	2.21918
CO	-25.88202	-0.88321	1.34517
CO2	-28.39066	-2.64639	1.58894
N2	-483.47192	2.20907	3.47627
CH4	n.a.	5.61267	5.58963
H2O	-----	n.a.	n.a.
CH3OH	-----	20.76312	-1.26517

STREAM # STREAM NAME	INPUTS	OUTPUTS					(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	16.2335	7.9519	5.0082	0.0491	-----	13.0092	19.8620
CO2	3.6112	2.1691	1.3655	0.1360	-----	3.6697	-1.6200
CH3OH	0.0487	0.0615	0.0387	0.0042	2.7282	2.8327	-5711.9189
OTHERS	0.0199	0.0187	0.0118	0.0008	0.0279	0.0591	-196.4984
TOTAL C	19.9133	10.2092	6.4242	0.1900	2.7562	19.5707	1.7208
HYDROGEN:							
H2	22.2686	6.5269	4.1107	0.0239	-----	10.6615	52.1231
H2O	0.0000	0.0000	0.0000	0.0000	0.0942	0.0942	n.a.
OTHERS	0.2747	0.3166	0.1994	0.0198	10.9687	11.5046	-4087.3447
TOTAL H	22.5433	6.8435	4.3101	0.0437	11.0629	22.2603	1.2556
OXYGEN:							
TOTAL O	23.5045	12.3517	7.7793	0.3253	2.7947	23.2510	1.0786
NITROGEN:							
TOTAL N	0.1490	0.0941	0.0593	0.0010	-----	0.1544	-3.6081
TOTAL MASS FLOW (kg/hr)	640.8854	328.6840	207.0096	7.5273	89.6629	632.6838	1.2797

	REACTOR FEED GAS	[15 - 32]	FRESH FEED GAS
	GC#1	GC#2	[15-(50+62+68)]
MASS BALANCE (%) :	-0.17	0.18	-0.03
ELEMENTAL BALANCE (%) :			
CARBON	0.55	0.83	1.33
HYDROGEN	3.23	1.40	5.84
OXYGEN	-0.14	0.25	-0.55
NITROGEN	3.63	-7.34	-3.45

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

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DATE :                                06-DEC-89
TIME :                                15:47:23
TIME INTERVAL :                       FROM: 1700 21-Dec
                                         TO: 0700 22-Dec

NUMBER OF AVERAGED HOURS :            14
RUN ID NUMBER :                       E7.1098
FEED GAS TYPE:                        CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) : 167.1
OIL/SLURRY REACTOR INLET TEMP. (des.C) : 20.1
AVG. REACTOR SLURRY TEMPERATURE (des.C) : 250.2
REACTOR FREEBOARD TEMPERATURE (des.C) : 247.7
OIL/SLURRY OUTLET TEMP. (des.C) :     245.1
REACTOR FEED GAS PRESSURE (kPa) :      5538
REACTOR EFFLUENT GAS PRESSURE (kPa) :   5289
GAS SUPERFICIAL VELOCITY (cm/sec) :    15.3
LIQUID SUPERFICIAL VELOCITY (cm/sec) :   0.0
SLURRY CONCENTRATION (wt%) :           37.0
CATALYST OXIDE IN REACTOR (ks oxide) :  393
GAS HOLD-UP (%) :                     32.6
SPACE VELOCITY (1/ks-hr) :            9688
RECYCLE/FRESH FEED RATIO :             3.694
OIL/SLURRY CIRCULATION RATE (m3/hr) :   0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 140.57
PURGE GAS FLOW RATE <50> (ksmol/hr) :   6.82
HEAT TRANSFER COEFFICIENT (Watt/m2-des.C) : 554
  
```

STREAM 3	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDM PRODUC
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT	=====	=====	=====	=====	=====	=====	=====	=====
	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<WT%>
H2	57.99	28.68	35.54	35.38	24.73	26.81	5.92	-----
CO	37.35	55.81	51.49	51.69	51.85	51.91	24.30	-----
CO2	3.90	13.97	11.64	11.71	13.31	13.24	47.38	-----
N2	0.15	0.66	0.54	0.54	0.61	0.61	0.24	-----
CH4	0.05	0.24	0.22	0.20	0.23	0.23	0.32	-----
iC20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.92
CH3OH	0.00	0.45	0.41	0.35	7.14	7.13	2.09	97.74
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.01
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.29
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.11
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.07
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.03
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.70
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.13
TOTAL :	99.44	99.81	99.85	99.87	99.87	99.93	100.28	100.00
DENS,g/cc	0.006	0.048	0.031	0.031	0.036	0.036	0.005	0.783
AV.MOL.WT	13.47	22.76	20.61	20.66	23.44	23.42	37.29	32.02
Mm3/hr	911.6	2998.0	3816.0	3809.5	3356.9	3358.9	10.5	-----
ksmol/hr	36.21	133.75	170.24	169.95	149.76	149.78	0.47	9.79
1/hr,prod	-----	-----	-----	-----	-----	-----	-----	395.22

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		GC#1 ----	GC#2 ----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	33.6	33.4
CARBON MONOXIDE CONVERSION	(%) :	11.3	11.6
CARBON DIOXIDE CONVERSION	(%) :	-0.1	-0.2
RATIO H2 CONSUMED/CO CONSUMED	:	2.06	1.97
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	33.0	33.6
CARBON MONOXIDE CONVERSION	(%) :	11.4	11.5
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	32.1	32.3
CARBON MONOXIDE CONVERSION	(%) :	11.1	11.0
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC Average -----	OVERALL *
CO (+CO2) SELECTIVITY TO METHANOL (Z) :	100.4	99.1
CO (+CO2) SELECTIVITY TO ETHANOL (Z) :	-----	0.2

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	smol/hr-kg cat -----	kg/1000 Nm3 fresh feed -----	kg/1000 Nm3 reactor feed -----
As calculated ACROSS REACTOR	25.54	396.4	84.5
As Net MeOH produced, OVERALL balance	24.42	379.1	80.8

REACTOR FEED (H2/(CO+1.5CO2)) :	0.51
REACTOR FEED ((H2-CO2)/(CO+CO2)) :	0.37
APPROACH TO METHANOL EQUILIBRIUM (deg.C) :	26.47
APPROACH TO WATER-GAS EQUILIBRIUM (deg.C) :	13.22
METHANOL COLLECTED AS % OF CALCULATED :	95.2
CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) :	10.04

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-17.80346	-1.30623	-0.79965
CO	-5.04979	0.36373	-1.19321
CO2	-10.21963	0.94774	-0.25192
N2	-458.76093	2.71492	-1.70621
CH4	n.a.	2.33697	-1.41519
H2O	-----	n.a.	n.a.
CH3OH	-----	-0.02743	4.60423

OVERALL ELEMENTAL BALANCE (Kg-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	87.8474	74.6438	3.8083	0.1272	-----	78.5793	10.5503
CO2	19.9016	18.6807	0.9531	0.3527	-----	19.9964	-0.4263
CH3OH	0.5985	0.5983	0.0305	0.0109	9.5607	10.2005	-1604.3131
OTHERS	0.3365	0.3250	0.0166	0.0020	0.0979	0.4415	-31.1997
TOTAL C	108.6841	94.2478	4.8085	0.4928	9.6586	109.2077	-0.4818
HYDROGEN:							
H2	120.2695	76.7289	3.9147	0.0620	-----	80.7056	32.8960
H2O	0.0000	0.0000	0.0000	0.0000	0.3198	0.3198	n.a.
OTHERS	3.7401	3.6934	0.1884	0.0514	38.4387	42.3719	-1032.9144
TOTAL H	124.0096	80.4223	4.1031	0.1134	38.7584	123.3973	0.4937
OXYGEN:							
TOTAL O	128.2491	112.6034	5.7450	0.8437	9.7981	129.9903	-0.5701
NITROGEN:							
TOTAL N	1.8185	1.7628	0.0899	0.0025	-----	1.8552	-2.0186
TOTAL MASS FLOW (kg/hr)	3511.0762	3043.9849	155.3031	19.5202	313.4263	3532.2344	-0.6026

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS
	GC#1	GC#2
	-----	-----
MASS BALANCE (%) :	-0.01	0.00
ELEMENTAL BALANCE (%) :		
CARBON	-0.11	0.06
HYDROGEN	0.62	-0.15
OXYGEN	-0.13	0.02
NITROGEN	1.40	-0.31
		[15-(50+62+68)]

		-0.09
		-0.03
		-2.15
		-0.18
		13.19

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES : ANALYTICAL SUMMARY

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DATE : 06-DEC-89
TIME : 15:49:01
TIME INTERVAL : FROM: 0900 22-Dec
                TO: 1200 22-Dec
                4
NUMBER OF AVERAGED HOURS :
RUN ID NUMBER : E7.110A
FEED GAS TYPE: CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 118.2
OIL/SLURRY REACTOR INLET TEMP. (deg.C) : 18.8
AVG. REACTOR SLURRY TEMPERATURE (deg.C) : 249.8
REACTOR FREEBOARD TEMPERATURE (deg.C) : 231.6
OIL/SLURRY OUTLET TEMP. (deg.C) : 223.2
REACTOR FEED GAS PRESSURE (kPa) : 5331
REACTOR EFFLUENT GAS PRESSURE (kPa) : 5289
GAS SUPERFICIAL VELOCITY (cm/sec) : 3.0
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 0.0
SLURRY CONCENTRATION (wt%) : 36.5
CATALYST OXIDE IN REACTOR (kg oxide) : 393
GAS HOLD-UP (%): 12.4
SPACE VELOCITY (1/kg-hr) : 1880
RECYCLE/FRESH FEED RATIO : 0.860
OIL/SLURRY CIRCULATION RATE (m3/hr) : 0.0
PROB. SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 23.66
PURGE GAS FLOW RATE <50> (ksmol/hr) : 8.41
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) : 314
  
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STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEOH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	46.58	24.37	35.77	35.69	21.43	21.60	5.92	-----
CO	45.92	58.84	52.26	52.28	52.42	52.05	24.30	-----
CO2	7.50	15.74	11.57	11.55	14.66	14.47	57.38	-----
N2	0.16	0.43	0.28	0.29	0.35	0.37	0.24	-----
CH4	0.04	0.18	0.11	0.12	0.14	0.16	0.32	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.92
CH3OH	0.00	0.40	0.30	0.20	10.80	10.97	2.09	97.74
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.01
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.29
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.11
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.07
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.03
ALKA+ENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.70
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.13
TOTAL :	100.20	99.97	100.29	100.12	99.80	99.62	100.28	100.00
DENS, g/cc	0.007	0.048	0.033	0.033	0.040	0.039	0.004	0.795
AV. MOL. WT	17.12	24.18	20.58	20.58	25.20	25.12	37.29	32.02
Mm3/hr	397.6	341.8	738.2	739.4	603.9	604.8	4.2	-----
ksmol/hr	17.74	15.25	32.93	32.99	26.94	26.97	0.19	2.90
l/hr, prod	-----	-----	-----	-----	-----	-----	-----	116.77

LAPORTE LPHETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

=====

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
		-----	-----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	50.5	51.0
CARBON MONOXIDE CONVERSION	(%) :	18.4	18.1
CARBON DIOXIDE CONVERSION	(%) :	-2.5	-3.6
RATIO H2 CONSUMED/CO CONSUMED	:	1.88	1.92
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	48.6	48.3
CARBON MONOXIDE CONVERSION	(%) :	16.6	16.5
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	49.1	49.1
CARBON MONOXIDE CONVERSION	(%) :	16.8	16.8
RATIO H2 CONSUMED/CO CONSUMED	:	1.99	1.99

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL *
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (%) :	94.2	95.3
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.2

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	saol/hr-ks cat	ks/1000 Na3 fresh feed	ks/1000 Na3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	7.25	229.9	123.6
As Net MeOH produced, OVERALL balance	7.30	231.3	124.4

REACTOR FEED (H2/(CO+1.5CO2)) : 0.51

REACTOR FEED ((H2-CO2)/(CO+CO2)) : 0.38

APPROACH TO METHANOL EQUILIBRIUM (des.C) : 6.74

APPROACH TO WATER-GAS EQUILIBRIUM (des.C) : 56.74

METHANOL COLLECTED AS % OF CALCULATED : 99.3

CALCULATED METHANOL PRODUCTION RATE (Ksaol/hr) : 2.85

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-27.83502	1.72232	-0.08995
CO	-24.34553	-0.73513	1.06526
CO2	-26.25290	-2.12226	2.10342
N2	-311.89066	-3.60013	-7.28805
CH4	n.a.	-9.50003	-8.28382
H2O	-----	n.a.	n.a.
CH3OH	-----	-7.01025	-0.77622

OVERALL ELEMENTAL BALANCE (Kg-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	17.2447	8.9739	4.9464	0.0510	-----	13.9713	18.9822
CO2	3.8098	2.4008	1.3233	0.1415	-----	3.8657	-1.4682
CH3OH	0.0657	0.0614	0.0338	0.0044	2.8319	2.9315	-4363.6377
OTHERS	0.0379	0.0284	0.0156	0.0008	0.0290	0.0738	-94.5534
TOTAL C	21.1581	11.4644	6.3192	0.1977	2.8609	20.8422	1.4927
HYDROGEN:							
H2	23.5460	7.4342	4.0977	0.0249	-----	11.5568	50.9183
H2O	0.0000	0.0000	0.0000	0.0000	0.0947	0.0947	n.a.
OTHERS	0.4144	0.3574	0.1970	0.0206	11.3855	11.9606	-2785.9539
TOTAL H	23.9605	7.7916	4.2947	0.0455	11.4802	23.6121	1.4540
OXYGEN:							
TOTAL O	24.9299	13.8377	7.6273	0.3385	2.8992	24.7027	0.9111
NITROGEN:							
TOTAL N	0.1933	0.1305	0.0720	0.0010	-----	0.2035	-5.2660
TOTAL MASS FLOW (kg/hr)	678.8557	368.7661	203.2638	7.8318	92.8368	672.6984	0.9070

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS
	GC#1	[15-(50+62+68)]
MASS BALANCE (%) :	0.00	-0.10
ELEMENTAL BALANCE (%) :		
CARBON	0.97	1.11
HYDROGEN	1.82	4.44
OXYGEN	0.46	-0.56
NITROGEN	-8.95	-30.15

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

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=====
DATE :                                06-DEC-99
TIME :                                15:50:24
TIME INTERVAL :                       FROM: 1400 22-Dec
                                         TO: 1600 22-Dec

NUMBER OF AVERAGED HOURS :            2
RUN ID NUMBER :                       E7.1108
FEED GAS TYPE:                        CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 150.8
OIL/SLURRY REACTOR INLET TEMP. (deg.C) : 19.5
AVG. REACTOR SLURRY TEMPERATURE (deg.C) : 250.1
REACTOR FREEBOARD TEMPERATURE (deg.C) : 239.8
OIL/SLURRY OUTLET TEMP. (deg.C) :     235.3
REACTOR FEED GAS PRESSURE (kPa) :      5381
REACTOR EFFLUENT GAS PRESSURE (kPa) :   5289
GAS SUPERFICIAL VELOCITY (cm/sec) :     7.8
LIQUID SUPERFICIAL VELOCITY (cm/sec) :   0.0
SLURRY CONCENTRATION (wt%) :            36.6
CATALYST OXIDE IN REACTOR (kg oxide) :   393
GAS HOLD-UP (%) :                      23.5
SPACE VELOCITY (1/kg-hr) :              4930
RECYCLE/FRESH FEED RATIO :              2.422
OIL/SLURRY CIRCULATION RATE (m3/hr) :    0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 68.15
PURGE GAS FLOW RATE <50> (ksmol/hr) :    6.94
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) : 432
  
```

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDM PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT	=====	=====	=====	=====	=====	=====	=====	=====
	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<WTX>
H2	55.17	24.64	33.80	33.94	22.59	22.68	5.92	-----
CO	39.31	58.21	52.76	52.40	53.13	53.04	24.30	-----
CO2	5.05	15.57	12.53	12.68	14.70	14.52	67.38	-----
N2	0.19	0.64	0.50	0.52	0.60	0.58	0.24	-----
CH4	0.05	0.19	0.16	0.14	0.18	0.18	0.32	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.91
CH3OH	0.00	0.56	0.41	0.32	8.52	8.55	2.09	97.68
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.01
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.31
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.11
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.09
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.06
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.70
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.12
TOTAL :	99.78	99.81	100.16	100.02	99.72	99.56	100.29	100.00
DENS,g/cc	0.005	0.049	0.032	0.032	0.039	0.039	0.005	0.790
AV.MOL.WT	14.44	24.08	21.23	21.21	24.80	24.75	37.29	32.03
Mm3/hr	566.5	1372.1	1945.4	1938.6	1662.4	1664.1	5.9	-----
ksmol/hr	25.27	61.21	86.79	86.49	74.16	74.21	0.26	5.84
l/hr,prod	-----	-----	-----	-----	-----	-----	-----	236.91

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		GC#1 ----	GC#2 ----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	42.6	42.9
CARBON MONOXIDE CONVERSION	(%) :	14.0	13.1
CARBON DIOXIDE CONVERSION	(%) :	0.8	0.6
RATIO H2 CONSUMED/CO CONSUMED	:	1.95	2.13
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	40.9	41.1
CARBON MONOXIDE CONVERSION	(%) :	13.1	13.3
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	39.6	39.6
CARBON MONOXIDE CONVERSION	(%) :	12.7	12.9
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC Average -----	OVERALL %
CO (+CO2) SELECTIVITY TO METHANOL (%) :	96.4	99.9
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.2

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	smol/hr-kg cat -----	kg/1000 Me3 fresh feed -----	kg/1000 Me3 reactor feed -----
As calculated ACROSS REACTOR	15.30	340.3	99.4
As Net MeOH produced, OVERALL balance	14.63	325.3	95.1

REACTOR FEED (H2/(CO+1.5CO2)) : 0.48
REACTOR FEED ((H2-CO2)/(CO+CO2)) : 0.33

APPROACH TO METHANOL EQUILIBRIUM (des.C) : 14.77
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) : 30.74

METHANOL COLLECTED AS % OF CALCULATED : 94.8

CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) : 6.02

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-26.20399	-1.12867	-0.32055
CO	-11.53152	0.53690	-0.85995
CO2	-15.17234	-1.50322	0.84759
N2	n.a.	-2.95926	1.84296
CH4	n.a.	0.66049	2.16658
H2O	-----	n.a.	n.a.
CH3OH	-----	18.29825	3.51431

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	45.3226	35.6315	4.0391	0.0718	-----	39.7423	12.3123
CO2	10.9700	9.5302	1.0803	0.1990	-----	10.8095	1.4627
CH3OH	0.2805	0.3434	0.0389	0.0062	5.7058	6.0943	-2072.4534
OTHERS	0.1254	0.1139	0.0129	0.0011	0.0584	0.1863	-48.5824
TOTAL C	56.6985	45.6189	5.1713	0.2780	5.7643	56.8325	-0.2363
HYDROGEN:							
H2	58.7073	30.1670	3.4197	0.0350	-----	33.6216	42.7301
H2O	0.0000	0.0000	0.0000	0.0000	0.1887	0.1887	n.a.
OTHERS	1.6237	1.8288	0.2073	0.0290	22.9402	25.0053	-1440.0000
TOTAL H	60.3310	31.9958	3.6270	0.0640	23.1289	59.8156	2.5119
OXYGEN:							
TOTAL O	67.5431	55.0353	6.2387	0.4759	5.8426	67.5925	-0.0731
NITROGEN:							
TOTAL N	0.9081	0.7860	0.0891	0.0014	-----	0.8765	3.4850
TOTAL MASS FLOW (ks/hr)	1834.1281	1473.9469	167.0847	11.0118	187.1669	1839.2103	-0.2771

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]		FRESH FEED GAS
	GC#1	GC#2	[15-(50+62+68)]
MASS BALANCE (%) :	0.28	-0.29	-0.07
ELEMENTAL BALANCE (%) :			
CARBON	0.89	-0.09	0.11
HYDROGEN	1.70	1.71	3.99
OXYGEN	0.87	0.03	-0.53
NITROGEN	1.22	1.67	5.78

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY
=====

DATE :	04-DEC-89
TIME :	15:51:46
TIME INTERVAL :	FROM: 1700 22-Dec
	TO: 0600 23-Dec
NUMBER OF AVERAGED HOURS :	13
RUN ID NUMBER :	E7.110C
FEED GAS TYPE:	CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) :	171.0
OIL/SLURRY REACTOR INLET TEMP. (deg.C) :	20.7
AVG. REACTOR SLURRY TEMPERATURE (deg.C) :	250.0
REACTOR FREEBOARD TEMPERATURE (deg.C) :	247.2
OIL/SLURRY OUTLET TEMP. (deg.C) :	244.4
REACTOR FEED GAS PRESSURE (kPa) :	5538
REACTOR EFFLUENT GAS PRESSURE (kPa) :	5289
GAS SUPERFICIAL VELOCITY (cm/sec) :	15.3
LIQUID SUPERFICIAL VELOCITY (cm/sec) :	0.0
SLURRY CONCENTRATION (wt%) :	27.1
CATALYST OXIDE IN REACTOR (kg oxide) :	393
GAS HOLD-UP (Z) :	32.8
SPACE VELOCITY (1/kg-hr) :	9687
RECYCLE/FRESH FEED RATIO :	3.696
OIL/SLURRY CIRCULATION RATE (m3/hr) :	0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) :	140.58
PURGE GAS FLOW RATE <50> (ksmol/hr) :	6.83
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) :	552

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT	=====	=====	=====	=====	=====	=====	=====	=====
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	58.08	29.69	35.82	35.56	26.82	26.95	5.92	-----
CO	37.35	55.47	51.32	51.33	51.55	51.55	24.30	-----
CO2	3.91	14.07	11.80	11.74	13.32	13.34	67.38	-----
N2	0.17	0.76	0.63	0.63	0.72	0.72	0.24	-----
CH4	0.05	0.26	0.22	0.21	0.24	0.25	0.32	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.91
CH3OH	0.00	0.47	0.43	0.34	7.13	7.09	2.09	97.68
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.01
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.31
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.11
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.09
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.06
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.09
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.70
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.12
TOTAL :	99.57	99.73	100.22	99.82	99.78	99.89	100.28	100.00
DENS,g/cc	0.005	0.048	0.031	0.031	0.036	0.036	0.005	0.791
AV.MOL.WT	13.47	22.77	20.59	20.61	23.42	23.39	37.29	32.03
Mm3/hr	811.2	2998.1	3808.2	3809.3	3351.5	3353.5	10.5	-----
ksmol/hr	36.19	133.75	169.89	169.94	149.52	149.54	0.47	9.76
1/hr,prod	-----	-----	-----	-----	-----	-----	-----	195.44

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

=====

CONVERSIONS ACROSS REACTOR :

	GC#1	GC#2
	----	----
CALCULATED BY GAS COMPOSITION		
HYDROGEN CONVERSION (Z) :	33.7	33.6
CARBON MONOXIDE CONVERSION (Z) :	11.6	11.7
CARBON DIOXIDE CONVERSION (Z) :	0.4	0.2
RATIO H2 CONSUMED/CO CONSUMED :	2.04	2.00
CALCULATED BY METHANOL IN EXIT GAS		
HYDROGEN CONVERSION (Z) :	32.5	33.4
CARBON MONOXIDE CONVERSION (Z) :	11.3	11.5
CALCULATED BY OVERALL BALANCE		
HYDROGEN CONVERSION (Z) :	31.8	32.1
CARBON MONOXIDE CONVERSION (Z) :	11.1	11.1
RATIO H2 CONSUMED/CO CONSUMED :	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL *
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (Z) :	98.1	99.7
CO (+CO2) SELECTIVITY TO ETHANOL (Z) :	-----	0.2

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEDH SOURCE	smol/hr-kg cat	kg/1000 Na3 fresh feed	kg/1000 Na3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	25.38	394.2	83.9
As Net MeOH produced, OVERALL balance	24.36	378.4	80.6

REACTOR FEED $\{H_2/(CO+1.5CO_2)\}$: 0.52

REACTOR FEED $\{(H_2-CO_2)/(CO+CO_2)\}$: 0.38

APPROACH TO METHANOL EQUILIBRIUM (des.C) : 26.75

APPROACH TO WATER-GAS EQUILIBRIUM (des.C) : 12.01

METHANOL COLLECTED AS % OF CALCULATED : 95.6

CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) : 9.98

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-18.80795	-1.73667	-0.65557
CO	-5.31852	0.54438	-1.34734
CO2	-10.81206	1.42440	-1.09963
N2	-679.12915	0.36179	0.78373
CH4	n.a.	1.46276	-2.39011
H2O	-----	n.a.	n.a.
CH3OH	-----	7.03697	4.29157

OVERALL ELEMENTAL BALANCE (Kg-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	87.2368	74.1955	3.7893	0.1271	-----	78.1119	10.4600
CO2	19.9530	18.8244	0.9614	0.3524	-----	20.1382	-0.9281
CH3OH	0.5856	0.6299	0.0322	0.0109	9.5362	10.2092	-1643.3621
OTHERS	0.3586	0.3451	0.0176	0.0020	0.0976	0.4624	-28.9472
TOTAL C	108.1340	93.9949	4.8005	0.4924	9.6338	108.9217	-0.7284
HYDROGEN:							
H2	120.8566	76.7528	3.9199	0.0620	-----	80.7347	33.1979
H2O	0.0000	0.0000	0.0000	0.0000	0.3153	0.3153	n.a.
OTHERS	3.7767	3.9001	0.1992	0.0513	38.3401	42.4907	-1025.0635
TOTAL H	124.6333	80.6529	4.1191	0.1133	38.6554	123.5407	0.8767
OXYGEN:							
TOTAL O	127.7284	112.4742	5.7443	0.8429	9.7647	128.8262	-0.8595
NITROGEN:							
TOTAL N	2.1481	2.0357	0.1040	0.0025	-----	2.1422	0.2756
TOTAL MASS FLOW (kg/hr)	3502.8638	3045.2881	155.5297	19.5033	312.8134	3533.1345	-0.8642

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]		FRESH FEED GAS
	GC#1	GC#2	[15-(50+62+68)]
MASS BALANCE (%) :	-0.04	0.05	-0.06
ELEMENTAL BALANCE (%) :			
CARBON	0.26	0.11	0.19
HYDROGEN	1.25	0.27	-1.83
OXYGEN	0.29	0.12	0.01
NITROGEN	0.55	-0.51	11.42

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY
=====

DATE :	06-DEC-90
TIME :	15:54:55
TIME INTERVAL :	FROM: 0600 23-Dec
	TO: 0600 24-Dec
NUMBER OF AVERAGED HOURS :	24
RUN ID NUMBER :	E7.111
FEED GAS TYPE:	CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) :	169.7
OIL/SLURRY REACTOR INLET TEMP. (des.C) :	16.5
AVG. REACTOR SLURRY TEMPERATURE (des.C) :	250.0
REACTOR FREEBOARD TEMPERATURE (des.C) :	247.4
OIL/SLURRY OUTLET TEMP. (des.C) :	244.7
REACTOR FEED GAS PRESSURE (kPa) :	5542
REACTOR EFFLUENT GAS PRESSURE (kPa) :	5289
GAS SUPERFICIAL VELOCITY (cm/sec) :	15.3
LIQUID SUPERFICIAL VELOCITY (cm/sec) :	0.0
SLURRY CONCENTRATION (wt%):	37.0
CATALYST OXIDE IN REACTOR (ks oxide) :	393
GAS HOLD-UP (%) :	32.6
SPACE VELOCITY (1/ks-hr) :	9709
RECYCLE/FRESH FEED RATIO :	3.747
OIL/SLURRY CIRCULATION RATE (m3/hr) :	0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) :	141.12
PURGE GAS FLOW RATE <50> (ksmol/hr) :	6.67
HEAT TRANSFER COEFFICIENT (Watt/m2-des.C) :	553

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDM PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<WTX>
H2	58.12	28.57	35.54	35.28	26.63	26.74	5.92	-----
CO	37.29	55.78	51.60	51.68	51.93	51.91	24.30	-----
CO2	3.97	14.14	11.87	11.89	13.44	13.44	67.38	-----
N2	0.14	0.63	0.52	0.52	0.59	0.59	0.24	-----
CH4	0.05	0.26	0.23	0.21	0.24	0.25	0.32	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.89
CH3OH	0.04	0.40	0.46	0.31	7.00	7.00	2.09	97.74
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.01
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.30
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.11
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.08
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.05
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.73
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.10
TOTAL :	99.61	99.79	100.21	99.88	99.83	99.93	100.28	100.00
DENS,g/cc	0.006	0.049	0.031	0.031	0.036	0.036	0.005	0.794
AV.MOL.WT	13.48	22.81	20.67	20.71	23.48	23.46	37.29	32.03
Mm3/hr	804.2	3013.6	3820.2	3817.7	3365.9	3367.6	10.9	-----
ksmol/hr	35.88	134.45	170.43	170.32	150.17	150.17	0.48	0.72
l/hr,prod	-----	-----	-----	-----	-----	-----	-----	392.30

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

=====

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
		----	----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	33.7	33.5
CARBON MONOXIDE CONVERSION	(%) :	11.3	11.4
CARBON DIOXIDE CONVERSION	(%) :	0.1	0.3
RATIO H2 CONSUMED/CO CONSUMED	:	2.05	2.00
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	32.2	33.3
CARBON MONOXIDE CONVERSION	(%) :	11.1	11.4
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	31.8	32.1
CARBON MONOXIDE CONVERSION	(%) :	11.0	10.9
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL *
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (%) :	99.3	98.9
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.2

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	smol/hr-kg cat	kg/1000 Nm3 fresh feed	kg/1000 Nm3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	25.10	393.2	82.8
As Net MeOH produced, OVERALL balance	24.26	380.1	80.1

REACTOR FEED (H2/(CO+1.5CO2)) :	0.51
REACTOR FEED ((H2-CO2)/(CO+CO2)) :	0.37
APPROACH TO METHANOL EQUILIBRIUM (deg.C) :	27.02
APPROACH TO WATER-GAS EQUILIBRIUM (deg.C) :	10.34
METHANOL COLLECTED AS % OF CALCULATED :	96.3
CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) :	9.97

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-17.34808	-1.39711	-0.90965
CO	-5.20407	0.40157	-1.11656
CO2	-10.51046	0.94311	-0.69771
N2	-367.69165	1.61820	-0.98056
CH4	n.a.	2.55596	-2.63793
H2O	-----	n.a.	n.a.
CH3OH	-----	5.05420	4.21345

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	88.0221	74.9993	3.7223	0.1314	-----	78.8530	10.4168
CO2	20.2440	19.0106	0.9435	0.3643	-----	20.3185	-0.3679
CH3OH	0.5222	0.5360	0.0266	0.0113	9.5017	10.0755	-1829.4535
OTHERS	0.3611	0.3522	0.0175	0.0021	0.0972	0.4691	-29.9098
TOTAL C	109.1494	94.8982	4.7099	0.5091	9.5989	109.7161	-0.5192
HYDROGEN:							
H2	120.1764	76.8197	3.8127	0.0641	-----	80.6964	32.8517
H2O	0.0000	0.0000	0.0000	0.0000	0.3064	0.3064	n.a.
OTHERS	3.5331	3.5530	0.1763	0.0531	38.2011	41.9835	-1088.2980
TOTAL H	123.7095	80.3727	3.9890	0.1171	38.5075	122.9954	0.5945
OXYGEN:							
TOTAL O	129.0323	113.5566	5.6360	0.8715	9.7248	129.7888	-0.5863
NITROGEN:							
TOTAL N	1.7679	1.6994	0.0843	0.0026	-----	1.7863	-1.0402
TOTAL MASS FLOW (ks/hr)	3527.6277	3066.9790	152.2191	20.1630	311.5035	3550.8647	-0.6587

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS
	GC#1	[15-(50+62+68)]
MASS BALANCE (%) :	-0.05	-0.07
ELEMENTAL BALANCE (%) :		
CARBON	0.23	0.12
HYDROGEN	1.52	-1.87
OXYGEN	0.20	0.07
NITROGEN	-0.09	10.95

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

```

DATE : 06-DEC-89
TIME : 15:53:32
TIME INTERVAL : FROM: 0600 24-Dec
                TO: 0600 25-Dec

NUMBER OF AVERAGED HOURS : 24
RUN ID NUMBER : E7.112
FEED GAS TYPE: CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 167.5
OIL/SLURRY REACTOR INLET TEMP. (deg.C) : 17.9
AVG. REACTOR SLURRY TEMPERATURE (deg.C) : 249.9
REACTOR FREEBOARD TEMPERATURE (deg.C) : 247.1
OIL/SLURRY OUTLET TEMP. (deg.C) : 244.2
REACTOR FEED GAS PRESSURE (kPa) : 5539
REACTOR EFFLUENT GAS PRESSURE (kPa) : 5289
GAS SUPERFICIAL VELOCITY (cm/sec) : 15.3
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 0.0
SLURRY CONCENTRATION (wt%) : 37.0
CATALYST OXIDE IN REACTOR (kg oxide) : 393
GAS HOLD-UP (%) : 32.6
SPACE VELOCITY (1/kg-hr) : 9711
RECYCLE/FRESH FEED RATIO : 3.789
OIL/SLURRY CIRCULATION RATE (m3/hr) : 0.0
PROD. SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 141.32
PURGE GAS FLOW RATE <50> (ksmol/hr) : 6.53
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) : 547
  
```

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEOH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	59.06	28.33	35.16	35.02	26.33	26.52	5.92	-----
CO	37.26	55.76	51.71	51.69	52.07	51.96	24.30	-----
CO2	4.12	14.43	12.13	12.12	13.73	13.76	67.38	-----
N2	0.14	0.65	0.53	0.54	0.61	0.60	0.24	-----
CH4	0.06	0.29	0.25	0.24	0.27	0.28	0.32	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.87
CH3OH	0.01	0.38	0.38	0.25	6.89	6.91	2.09	97.78
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.01
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.29
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.11
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.07
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.04
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.75
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.08
TOTAL :	99.64	99.84	100.16	99.86	99.91	100.03	100.28	100.00
DENS, g/cc	0.006	0.049	0.031	0.031	0.036	0.036	0.005	0.797
AV. MOL. WT	13.52	22.92	20.81	20.81	23.60	23.57	37.29	32.03
Mm3/hr	797.4	3021.3	3819.2	3818.7	3368.4	3371.1	11.1	-----
ksmol/hr	35.57	134.79	170.39	170.36	150.28	150.33	0.50	9.70
1/hr, prod	-----	-----	-----	-----	-----	-----	-----	399.83

LAPORTE LPHETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

=====

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
		-----	-----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	33.4	33.7
CARBON MONOXIDE CONVERSION	(%) :	11.3	11.1
CARBON DIOXIDE CONVERSION	(%) :	-0.1	0.1
RATIO H ₂ CONSUMED/CO CONSUMED	:	2.01	2.05
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	32.5	33.3
CARBON MONOXIDE CONVERSION	(%) :	11.0	11.3
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	32.1	32.3
CARBON MONOXIDE CONVERSION	(%) :	10.9	10.9
RATIO H ₂ CONSUMED/CO CONSUMED	:	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR	OVERALL
	GC Average	*
	-----	-----
CO (+CO ₂) SELECTIVITY TO METHANOL (%) :	99.5	98.8
CO (+CO ₂) SELECTIVITY TO ETHANOL (%) :	-----	0.2

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	kmol/hr-kg cat	kg/1000 Na3 fresh feed	kg/1000 Na3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	25.01	395.1	82.5
As Net MeOH produced, OVERALL balance	24.21	382.5	79.9

REACTOR FEED (H₂/(CO+1.5CO₂)) : 0.50

REACTOR FEED ((H₂-CO₂)/(CO+CO₂)) : 0.36

APPROACH TO METHANOL EQUILIBRIUM (deg.C) : 26.99

APPROACH TO WATER-GAS EQUILIBRIUM (deg.C) : 8.64

METHANOL COLLECTED AS % OF CALCULATED : 96.4

CALCULATED METHANOL PRODUCTION RATE (Kmol/hr) : 9.93

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT MATERIAL BALANCE SUMMARY

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-17.09105	-1.40542	-1.25258
CO	-5.54466	0.39149	-0.96578
CO2	-11.36740	1.26284	-0.61292
N2	-395.52078	2.09815	-1.12884
CH4	n.a.	1.61812	-0.64170
H2O	-----	n.a.	n.a.
CH3OH	-----	16.01918	3.22091

OVERALL ELEMENTAL BALANCE (Kg-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	88.0691	75.1590	3.6385	0.1347	-----	78.9322	10.3747
CO2	20.6497	19.4489	0.9415	0.3735	-----	20.7639	-0.5530
CH3OH	0.4289	0.5086	0.0246	0.0116	9.4816	10.0264	-2237.5002
OTHERS	0.4072	0.3936	0.0191	0.0021	0.0970	0.5118	-25.6966
TOTAL C	109.5549	95.5100	4.6238	0.5219	9.5786	110.2343	-0.6201
HYDROGEN:							
H2	119.3256	76.3640	3.6969	0.0657	-----	80.1265	32.8505
H2O	0.0000	0.0000	0.0000	0.0000	0.3001	0.3001	n.a.
OTHERS	3.3444	3.6088	0.1747	0.0544	38.1204	41.9583	-1154.5792
TOTAL H	122.6700	79.9728	3.8716	0.1201	38.4205	122.3850	0.2324
OXYGEN:							
TOTAL O	129.7975	114.5653	5.5462	0.8934	9.7009	130.7059	-0.6999
NITROGEN:							
TOTAL N	1.8229	1.7631	0.0854	0.0026	-----	1.8510	-1.5436
TOTAL MASS FLOW (kg/hr)	3545.5942	3089.3994	149.5609	20.6705	310.7116	3570.3323	-0.6977

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]		FRESH FEED GAS
	GC#1	GC#2	[15-(50+62+68)]
MASS BALANCE (%) :	0.03	-0.03	0.00
ELEMENTAL BALANCE (%) :			
CARBON	0.19	-0.10	0.13
HYDROGEN	0.89	0.36	-2.45
OXYGEN	0.14	-0.07	0.30
NITROGEN	0.33	-0.41	11.05

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY
=====

DATE :	06-DEC-89
TIME :	15:56:17
TIME INTERVAL :	FROM: 0600 25-Dec
	TO: 0600 26-Dec
NUMBER OF AVERAGED HOURS :	7
RUN ID NUMBER :	E7.113
FEED GAS TYPE:	CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) :	166.0
OIL/SLURRY REACTOR INLET TEMP. (deg.C) :	15.1
AVG. REACTOR SLURRY TEMPERATURE (deg.C) :	249.9
REACTOR FREEBOARD TEMPERATURE (deg.C) :	247.3
OIL/SLURRY OUTLET TEMP. (deg.C) :	244.4
REACTOR FEED GAS PRESSURE (kPa) :	5541
REACTOR EFFLUENT GAS PRESSURE (kPa) :	5289
GAS SUPERFICIAL VELOCITY (cm/sec) :	15.3
LIQUID SUPERFICIAL VELOCITY (cm/sec) :	0.0
SLURRY CONCENTRATION (wt%) :	37.1
CATALYST OXIDE IN REACTOR (kg oxide) :	393
GAS HOLD-UP (Z) :	32.8
SPACE VELOCITY (1/kg-hr) :	9713
RECYCLE/FRESH FEED RATIO :	3.828
OIL/SLURRY CIRCULATION RATE (m3/hr) :	0.0
PROD. SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) :	141.45
PURGE GAS FLOW RATE <50> (ksmol/hr) :	6.35
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) :	548

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDM PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT	=====	=====	=====	=====	=====	=====	=====	=====
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	58.24	28.33	35.36	35.12	26.44	26.66	5.92	-----
CO	36.99	55.42	51.38	51.35	51.62	51.53	24.30	-----
CO2	4.16	14.70	12.36	12.37	13.98	13.94	67.38	-----
N2	0.16	0.74	0.61	0.61	0.69	0.69	0.24	-----
CH4	0.05	0.28	0.24	0.22	0.26	0.26	0.32	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.87
CH3OH	0.00	0.32	0.38	0.24	6.88	6.94	2.09	97.79
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.01
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.29
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.11
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.07
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.04
ALKALINES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.75
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.08
TOTAL :	99.59	99.79	100.34	99.91	99.87	100.02	100.28	100.00
DENS, g/cc	0.006	0.049	0.031	0.031	0.036	0.036	0.005	0.798
AV. MOL. WT	13.47	22.96	20.80	20.83	23.61	23.56	37.29	32.03
M3/hr	791.1	3028.4	3822.3	3819.3	3370.5	3374.1	11.0	-----
ksmol/hr	35.29	135.11	170.52	170.39	150.37	150.46	0.49	9.67
l/hr, prod	-----	-----	-----	-----	-----	-----	-----	388.03

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		GC#1 ----	GC#2 ----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(Z) :	33.4	33.5
CARBON MONOXIDE CONVERSION	(Z) :	11.5	11.3
CARBON DIOXIDE CONVERSION	(Z) :	0.5	0.3
RATIO H2 CONSUMED/CO CONSUMED	:	2.01	2.03
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(Z) :	32.5	33.2
CARBON MONOXIDE CONVERSION	(Z) :	11.2	11.4
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(Z) :	31.8	32.0
CARBON MONOXIDE CONVERSION	(Z) :	10.9	10.9
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC Average -----	OVERALL %
CO (+CO2) SELECTIVITY TO METHANOL (Z) :	98.2	99.1
CO (+CO2) SELECTIVITY TO ETHANOL (Z) :	-----	0.2

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	kmol/hr-kg cat -----	kg/1000 Na3 fresh feed -----	kg/1000 Na3 reactor feed -----
As calculated ACROSS REACTOR	25.09	399.7	82.8
As Net MeOH produced, OVERALL balance	24.11	384.1	79.5

REACTOR FEED $\langle \text{H}_2 / (\text{CO} + 1.5\text{CO}_2) \rangle$:	0.50
REACTOR FEED $\langle (\text{H}_2 - \text{CO}_2) / (\text{CO} + \text{CO}_2) \rangle$:	0.36
APPROACH TO METHANOL EQUILIBRIUM (deg.C) :	27.05
APPROACH TO WATER-GAS EQUILIBRIUM (deg.C) :	6.50
METHANOL COLLECTED AS % OF CALCULATED :	95.8
CALCULATED METHANOL PRODUCTION RATE (Kmol/hr) :	9.87

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

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COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-16.87622	-1.71539	-0.86071
CO	-4.99084	0.49797	-1.17752
CO2	-11.18643	1.14638	-0.69661
N2	-369.83112	2.01700	-0.72998
CH4	n.a.	2.98013	-1.50233
H2O	-----	n.a.	n.a.
CH3OH	-----	3.96429	4.18460

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	87.4967	74.8808	3.5168	0.1329	-----	78.5305	10.2475
CO2	21.0844	19.8618	0.9328	0.3686	-----	21.1632	-0.3738
CH3OH	0.4159	0.4331	0.0203	0.0114	9.4497	9.9146	-2283.7866
OTHERS	0.3783	0.3715	0.0174	0.0021	0.0967	0.4878	-28.9520
TOTAL C	109.3754	95.5472	4.4874	0.5150	9.5464	110.0961	-0.6589
HYDROGEN:							
H2	119.6737	76.5507	3.5952	0.0648	-----	80.2107	32.9755
H2O	0.0000	0.0000	0.0000	0.0000	0.2991	0.2991	n.a.
OTHERS	3.1768	3.2185	0.1512	0.0537	37.9923	41.4157	-1303.7101
TOTAL H	122.8505	79.7692	3.7464	0.1185	38.2914	121.9255	0.7530
OXYGEN:							
TOTAL O	130.0815	115.0375	5.4028	0.8817	9.6684	130.9903	-0.6987
NITROGEN:							
TOTAL N	2.0652	1.9969	0.0938	0.0026	-----	2.0932	-1.3587
TOTAL MASS FLOW (ks/hr)	3549.6248	3102.1526	145.6938	20.3998	309.6679	3577.9143	-0.7970

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]		FRESH FEED GAS
	GC#1	GC#2	[15-(50+62+68)]
MASS BALANCE (%) :	0.02	-0.02	-0.06
ELEMENTAL BALANCE (%) :			
CARBON	0.33	0.01	-0.06
HYDROGEN	0.98	0.32	-2.37
OXYGEN	0.34	0.06	0.22
NITROGEN	0.17	-0.63	13.04

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

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DATE : 06-DEC-89
TIME : 15:57:48
TIME INTERVAL : FROM: 0600 26-Dec
                TO: 0600 27-Dec

NUMBER OF AVERAGED HOURS : 24
RUN ID NUMBER : E7.114
FEED GAS TYPE: CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 166.1
OIL/SLURRY REACTOR INLET TEMP. (deg.C) : 15.1
AVG. REACTOR SLURRY TEMPERATURE (deg.C) : 250.0
REACTOR FREEBOARD TEMPERATURE (deg.C) : 247.3
OIL/SLURRY OUTLET TEMP. (deg.C) : 244.2
REACTOR FEED GAS PRESSURE (kPa) : 5541
REACTOR EFFLUENT GAS PRESSURE (kPa) : 5289
GAS SUPERFICIAL VELOCITY (cm/sec) : 15.3
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 0.0
SLURRY CONCENTRATION (wt%) : 37.1
CATALYST OXIDE IN REACTOR (kg oxide) : 393
GAS HOLD-UP (%) : 33.0
SPACE VELOCITY (1/kg-hr) : 9670
RECYCLE/FRESH FEED RATIO : 3.772
OIL/SLURRY CIRCULATION RATE (m3/hr) : 0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 140.75
PURGE GAS FLOW RATE <50> (ksmol/hr) : 6.66
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) : 562
  
```

STREAM #	1	55	15	15	32	32	62	69
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEOH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	59.02	28.34	35.28	35.12	26.50	26.63	5.92	-----
CO	37.27	55.40	51.37	51.37	51.66	51.60	24.30	-----
CO2	4.10	14.55	12.23	12.23	13.82	13.24	67.39	-----
N2	0.16	0.75	0.61	0.61	0.70	0.69	0.24	-----
CH4	0.05	0.23	0.20	0.19	0.22	0.23	0.32	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.87
CH3OH	0.01	0.45	0.40	0.34	6.92	6.40	2.09	97.79
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.01
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.29
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.11
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.07
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.04
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.75
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.08
TOTAL :	99.61	99.72	100.10	99.97	99.82	98.80	100.29	100.00
DENS,g/cc	0.006	0.049	0.031	0.031	0.036	0.035	0.005	0.799
AV.MOL.WT	13.47	22.95	20.90	20.77	23.52	23.09	37.29	32.03
Ma3/hr	796.8	3005.6	3902.5	3902.5	3375.4	3407.0	11.0	-----
ksmol/hr	35.55	134.09	169.64	169.64	150.59	151.93	0.49	9.57
1/hr,prod	-----	-----	-----	-----	-----	-----	-----	393.99

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

=====

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
		-----	-----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	32.4	33.0
CARBON MONOXIDE CONVERSION	(%) :	10.0	10.7
CARBON DIOXIDE CONVERSION	(%) :	3.0	-0.3
RATIO H2 CONSUMED/CO CONSUMED	:	2.23	2.10
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	30.2	33.1
CARBON MONOXIDE CONVERSION	(%) :	10.4	11.3
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	31.7	31.9
CARBON MONOXIDE CONVERSION	(%) :	10.9	10.9
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR	OVERALL
	GC Average	*
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (%) :	101.4	98.4
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.2

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	smol/hr-kg cat	kg/1000 Nm3 fresh feed	kg/1000 Nm3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	24.02	379.9	79.6
As Net MeOH produced, OVERALL balance	23.89	377.7	79.1

REACTOR FEED (H2/(CO+1.5CO2)) : 0.50

REACTOR FEED ((H2-CO2)/(CO+CO2)) : 0.36

APPROACH TO METHANOL EQUILIBRIUM (des.C) : 26.96

APPROACH TO WATER-GAS EQUILIBRIUM (des.C) : 6.29

METHANOL COLLECTED AS % OF CALCULATED : 99.0

CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) : 9.45

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-17.29738	-1.63271	-0.04375
CO	-6.56158	0.44714	-0.41260
CO2	-10.48429	1.03320	-0.17716
N2	-392.28204	1.63334	-0.30725
CH4	n.a.	2.42256	0.42958
H2O	-----	n.a.	n.a.
CH3OH	-----	4.05351	4.17914

OVERALL ELEMENTAL BALANCE (kg-atoms/hr) :

	INPUTS		OUTPUTS				(IN-OUT)/IN
STREAM #	15	55	50	62	68	TOTAL	
STREAM NAME	REACTOR FEED	RECYCLE	PURGE GAS	FLASH GAS	MeOH PRODUCT		%
CARBON:							
CO	87.1454	74.2877	3.6916	0.1329	-----	79.1122	10.3657
CO2	20.7524	19.5112	0.9696	0.3696	-----	20.8494	-0.4673
CH3OH	0.5760	0.5982	0.0297	0.0114	9.3513	9.9906	-1634.4916
OTHERS	0.3206	0.3097	0.0154	0.0021	0.0957	0.4229	-31.9081
TOTAL C	108.7944	94.7068	4.7063	0.5150	9.4470	109.3751	-0.5337
HYDROGEN:							
H2	119.1706	76.0067	3.7770	0.0648	-----	79.8485	32.9965
H2O	0.0000	0.0000	0.0000	0.0000	0.2960	0.2960	n.a.
OTHERS	3.5965	3.6318	0.1805	0.0537	37.5966	41.4625	-1056.0757
TOTAL H	122.7571	79.6385	3.9575	0.1185	37.8926	121.6070	0.9369
OXYGEN:							
TOTAL O	129.2262	113.9083	5.6604	0.8817	9.5676	130.0180	-0.6127
NITROGEN:							
TOTAL N	2.0799	2.0006	0.0994	0.0026	-----	2.1026	-1.0952
TOTAL MASS FLOW							
(kg/hr)	3522.9692	3064.0544	152.2616	20.3998	306.4422	3543.1582	-0.5731

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]		FRESH FEED GAS
	GC#1	GC#2	[15-(50+62+68)]
MASS BALANCE (%) :	0.54	-0.54	-0.06
ELEMENTAL BALANCE (%) :			
CARBON	0.26	-0.52	0.41
HYDROGEN	2.07	-0.06	-1.54
OXYGEN	0.71	-0.48	0.35
NITROGEN	-2.00	-0.79	10.34

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES : ANALYTICAL SUMMARY

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DATE :                                06-DEC-99
TIME :                                15:59:23
TIME INTERVAL :                       FROM: 0600 27-Dec
                                         TO: 0600 28-Dec

NUMBER OF AVERAGED HOURS :            24
RUN ID NUMBER :                       E7.115
FEED GAS TYPE :                       CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) : 172.1
OIL/SLURRY REACTOR INLET TEMP. (des.C) : 15.1
AVG. REACTOR SLURRY TEMPERATURE (des.C) : 250.0
REACTOR FREEBOARD TEMPERATURE (des.C) : 247.3
OIL/SLURRY OUTLET TEMP. (des.C) :     243.9
REACTOR FEED GAS PRESSURE (kPa) :     5541
REACTOR EFFLUENT GAS PRESSURE (kPa) :  5299
GAS SUPERFICIAL VELOCITY (cm/sec) :   15.3
LIQUID SUPERFICIAL VELOCITY (cm/sec) :  0.0
SLURRY CONCENTRATION (wt%) :          37.1
CATALYST OXIDE IN REACTOR (kg oxide) : 393
GAS HOLD-UP (%) :                     32.8
SPACE VELOCITY (1/kg-hr) :            9691
RECYCLE/FRESH FEED RATIO :            4.069
OIL/SLURRY CIRCULATION RATE (m3/hr) :  0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 143.94
PURGE GAS FLOW RATE <50> (ksmol/hr) :  7.48
HEAT TRANSFER COEFFICIENT (Watt/m2-des.C) : 506
  
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STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
=====	=====	=====	=====	=====	=====	=====	=====	=====
	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<WT%>
H2	59.05	28.46	35.29	35.03	26.45	17.63	5.92	-----
CO	41.41	56.00	51.85	51.93	52.22	23.98	24.30	-----
CO2	4.46	14.11	11.91	11.96	13.37	5.91	67.38	-----
N2	0.18	0.66	0.54	0.54	0.61	0.31	0.24	-----
CH4	0.37	0.22	0.19	0.18	0.21	0.09	0.32	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.87
CH3OH	0.02	0.43	0.40	0.33	6.87	3.06	2.09	97.78
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.01
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.29
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.11
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.07
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.04
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.75
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.08
TOTAL :	105.50	99.90	100.18	99.87	99.74	50.98	100.28	100.00
DENS,g/cc	0.006	0.049	0.031	0.031	0.036	0.016	0.005	0.798
AV.MOL.WT	14.87	22.80	20.77	20.74	23.44	10.70	37.29	32.03
Na3/hr	751.8	3058.8	3810.7	3810.7	3371.2	4989.6	11.0	-----
ksmol/hr	33.54	136.46	170.01	170.01	150.40	222.50	0.49	9.62
l/hr,prod	-----	-----	-----	-----	-----	-----	-----	396.24

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
		----	----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	34.6	33.2
CARBON MONOXIDE CONVERSION	(%) :	39.5	11.0
CARBON DIOXIDE CONVERSION	(%) :	35.0	0.3
RATIO H2 CONSUMED/CO CONSUMED	:	0.60	2.03
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	20.5	32.9
CARBON MONOXIDE CONVERSION	(%) :	7.0	11.1
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	31.8	32.1
CARBON MONOXIDE CONVERSION	(%) :	10.8	10.9
RATIO H2 CONSUMED/CO CONSUMED	:	2.09	2.00

SELECTIVITIES :

	ACROSS REACTOR GC #2	OVERALL *
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (%) :	99.7	99.0
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.2

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	gmol/hr-kg cat	kg/1000 Na3 fresh feed	kg/1000 Na3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR, GC#2	24.86	416.5	92.2
As Net MeOH produced, OVERALL balance	24.03	402.8	79.5

REACTOR FEED {H2/(CO+1.5CO2)} :	0.50
REACTOR FEED {(H2-CO2)/(CO+CO2)} :	0.36
APPROACH TO METHANOL EQUILIBRIUM (deg.C) :	27.35
APPROACH TO WATER-GAS EQUILIBRIUM (deg.C) :	9.52
METHANOL COLLECTED AS % OF CALCULATED, GC#2 :	96.2
CALCULATED METHANOL PRODUCTION RATE, GC#2 (Kgmol/hr) :	9.77

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	% diff.>	% diff.>	% diff.>
H2	-12.62960	-1.52858	-3.06029
CO	-11.72313	2.24220	-2.90394
CO2	-13.44985	2.80721	-2.79536
N2	-400.56458	4.04041	-3.48066
CH4	n.a.	29.63660	-4.07953
H2O	-----	n.a.	n.a.
CH3OH	-----	5.45495	2.88212

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

	IMPUTS		OUTPUTS				(IN-OUT)/IN
STREAM #	15	55	50	62	68	TOTAL	
STREAM NAME	REACTOR FEED	RECYCLE	PURGE GAS	FLASH GAS	MeOH PRODUCT		%
CARBON:							
CO	88.2856	76.4196	4.1862	0.1329	-----	80.7387	8.5483
CO2	20.1678	19.2533	1.0547	0.3686	-----	20.6766	-2.5229
CH3OH	0.5665	0.5918	0.0324	0.0114	9.4060	10.0416	-1672.6213
OTHERS	0.3043	0.3070	0.0168	0.0021	0.0962	0.4222	-39.7433
TOTAL C	109.3241	96.5717	5.2901	0.5150	9.5022	111.8791	-2.3370
HYDROGEN:							
H2	119.0889	77.6846	4.2555	0.0648	-----	82.0049	31.1398
H2O	0.0000	0.0000	0.0000	0.0000	0.2977	0.2977	n.a.
UTHERS	3.4832	3.5953	0.1969	0.0537	37.8164	41.6624	-1096.1049
TOTAL H	122.5720	81.2799	4.4524	0.1185	38.1142	123.9650	-1.1364
OXYGEN:							
TOTAL O	129.1876	115.5180	6.3279	0.8817	9.6236	132.3512	-2.4489
NITROGEN:							
TOTAL N	1.8497	1.8095	0.0991	0.0026	-----	1.9112	-3.3259
TOTAL MASS FLOW							
(kg/hr)	3525.4045	3111.3135	170.4337	20.3998	308.2342	3610.3813	-2.4104

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]		FRESH FEED GAS
	GC#1	GC#2	[15 - (50+62+68)]
MASS BALANCE (%) :	32.55	0.00	-0.05
ELEMENTAL BALANCE (%) :			
CARBON	32.77	0.02	1.38
HYDROGEN	14.06	0.32	-6.33
OXYGEN	33.10	0.06	0.35
NITROGEN	25.07	0.15	13.86

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY
=====

DATE :	04-DEC-89
TIME :	14:00:59
TIME INTERVAL :	FROM: 0600 29-Dec TO: 0900 29-Dec
NUMBER OF AVERAGED HOURS :	26
RUN ID NUMBER :	E7.116
FEED GAS TYPE:	CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) :	163.3
OIL/SLURRY REACTOR INLET TEMP. (deg.C) :	15.1
AVG. REACTOR SLURRY TEMPERATURE (deg.C) :	250.0
REACTOR FREEBOARD TEMPERATURE (deg.C) :	247.3
OIL/SLURRY OUTLET TEMP. (deg.C) :	242.5
REACTOR FEED GAS PRESSURE (kPa) :	5541
REACTOR EFFLUENT GAS PRESSURE (kPa) :	5289
GAS SUPERFICIAL VELOCITY (cm/sec) :	15.3
LIQUID SUPERFICIAL VELOCITY (cm/sec) :	0.0
SLURRY CONCENTRATION (wt%) :	36.9
CATALYST OXIDE IN REACTOR (kg oxide) :	293
GAS HOLD-UP (%) :	32.4
SPACE VELOCITY (1/kg-hr) :	9753
RECYCLE/FRESH FEED RATIO :	3.954
OIL/SLURRY CIRCULATION RATE (m3/hr) :	0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) :	142.48
PURGE GAS FLOW RATE <50> (ksmol/hr) :	6.63
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) :	579

STREAM #	1	55	15	15	32	32	62	69
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT	=====	=====	=====	=====	=====	=====	=====	=====
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	57.74	29.57	35.29	35.16	26.56	11.10	5.92	-----
CO	37.51	55.79	51.60	51.64	51.89	4.03	24.30	-----
CO2	4.19	14.37	12.10	12.06	13.65	0.44	47.38	-----
N2	0.14	0.61	0.49	0.50	0.56	0.05	0.24	-----
CH4	0.05	0.24	0.20	0.19	0.22	0.00	0.32	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.87
CH3OH	0.00	0.35	0.36	0.38	6.81	0.00	2.09	97.78
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.01
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.29
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.11
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.07
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.04
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.75
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.08
TOTAL :	99.64	99.93	100.05	99.83	99.70	15.62	100.29	100.00
DENS,g/cc	0.006	0.049	0.031	0.031	0.036	0.002	0.005	0.799
AV.MOL.WT	13.56	22.85	20.76	20.72	23.44	1.56	37.29	32.03
Nm3/hr	790.1	3045.0	3835.1	3835.1	3390.4	13150.5	11.0	-----
ksmol/hr	35.25	135.85	171.09	171.09	151.26	586.42	0.49	9.57
1/hr,Prod	-----	-----	-----	-----	-----	-----	-----	293.99

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

CONVERSIONS ACROSS REACTOR :

	GC#1	GC#2
CALCULATED BY GAS COMPOSITION		
HYDROGEN CONVERSION (%) :	-7.9	33.2
CARBON MONOXIDE CONVERSION (%) :	73.2	11.2
CARBON DIOXIDE CONVERSION (%) :	87.6	-0.1
RATIO H2 CONSUMED/CO CONSUMED :	-0.07	2.02
CALCULATED BY METHANOL IN EXIT GAS		
HYDROGEN CONVERSION (%) :	-2.0	32.7
CARBON MONOXIDE CONVERSION (%) :	-0.7	11.1
CALCULATED BY OVERALL BALANCE		
HYDROGEN CONVERSION (%) :	31.4	31.6
CARBON MONOXIDE CONVERSION (%) :	10.7	10.7
RATIO H2 CONSUMED/CO CONSUMED :	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC #2	OVERALL *
CO (+CO2) SELECTIVITY TO METHANOL (%) :	99.7	98.3
CO (+CO2) SELECTIVITY TO ETHANOL (%) :		0.2

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	smol/hr-kg cat	kg/1000 Nm3 fresh feed	kg/1000 Nm3 reactor feed
As calculated ACROSS REACTOR, GC#2	24.98	398.4	92.1
As Net MeOH produced, OVERALL balance	23.87	380.7	79.4

REACTOR FEED $\{H_2/(CO+1.5CO_2)\}$: 0.50
 REACTOR FEED $\{(H_2-CO_2)/(CO+CO_2)\}$: 0.36

APPROACH TO METHANOL EQUILIBRIUM (des.C) : 27.64
 APPROACH TO WATER-GAS EQUILIBRIUM (des.C) : 6.99

METHANOL COLLECTED AS % OF CALCULATED, GC#2 : 95.2

CALCULATED METHANOL PRODUCTION RATE, GC#2 (Ksmol/hr) : 9.82

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-15.74019	-1.66657	-1.40039
CO	-6.34454	0.73085	-1.44265
CO2	-11.95209	1.74947	-0.94090
N2	-321.40924	1.80350	-1.18153
CH4	n.a.	3.03033	-0.56563
H2O	-----	n.a.	n.a.
CH3OH	-----	-0.38292	4.27173

OVERALL ELEMENTAL BALANCE (Kg-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	88.3547	75.7830	3.6994	0.1329	-----	79.6154	9.8912
CO2	20.6322	19.5224	0.9530	0.3686	-----	20.9440	-1.0264
CH3OH	0.4789	0.4767	0.0233	0.0114	9.3513	9.8627	-1959.6041
OTHERS	0.3319	0.3247	0.0158	0.0021	0.0957	0.4383	-32.0532
TOTAL C	109.7978	96.1068	4.6916	0.5150	9.4470	110.7604	-0.8769
HYDROGEN:							
H2	120.2997	77.6224	3.7892	0.0648	-----	81.4764	32.2721
H2O	0.0000	0.0000	0.0000	0.0000	0.2960	0.2960	n.a.
OTHERS	3.2431	3.2054	0.1565	0.0537	37.5966	41.0122	-1164.5826
TOTAL H	123.5429	80.8278	3.9457	0.1185	37.9926	122.7846	0.6138
OXYGEN:							
TOTAL O	130.0981	115.3046	5.6287	0.8817	9.5676	131.3826	-0.9874
NITROGEN:							
TOTAL N	1.7144	1.6465	0.0804	0.0026	-----	1.7294	-0.8776
TOTAL MASS FLOW (kg/hr)	3545.2422	3103.5374	151.5029	20.3998	306.4422	3581.8821	-1.0335

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS
	GC#1	GC#2
	-----	-----
MASS BALANCE (%) :	74.27	0.00
ELEMENTAL BALANCE (%) :		
CARBON	76.16	0.02
HYDROGEN	-4.61	0.50
OXYGEN	77.92	0.01
NITROGEN	67.94	0.30
		16.54

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

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DATE : 06-DEC-99
TIME : 16:02:24
TIME INTERVAL : FROM: 0000 30-Dec
                TO: 0600 30-Dec

NUMBER OF AVERAGED HOURS : 6
RUN ID NUMBER : E7.117
FEED GAS TYPE: CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) : 148.2
OIL/SLURRY REACTOR INLET TEMP. (des.C) : 7.3
AVG. REACTOR SLURRY TEMPERATURE (des.C) : 250.3
REACTOR FREEBOARD TEMPERATURE (des.C) : 246.6
OIL/SLURRY OUTLET TEMP. (des.C) : 243.2
REACTOR FEED GAS PRESSURE (kPa) : 5577
REACTOR EFFLUENT GAS PRESSURE (kPa) : 5289
GAS SUPERFICIAL VELOCITY (cm/sec) : 15.3
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 0.0
SLURRY CONCENTRATION (wt%) : 39.1
CATALYST OXIDE IN REACTOR (kg oxide) : 425
GAS HOLD-UP (%) : 33.0
SPACE VELOCITY (1/kg-hr) : 8970
RECYCLE/FRESH FEED RATIO : 3.472
OIL/SLURRY CIRCULATION RATE (m3/hr) : 0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 136.27
PURGE GAS FLOW RATE <50> (ksmol/hr) : 4.07
HEAT TRANSFER COEFFICIENT (Watt/m2-des.C) : 592
  
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STREAM #	1	55	15	15	32	32	62	69
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEOH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT	=====	=====	=====	=====	=====	=====	=====	=====
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	60.10	25.63	34.41	34.22	23.41	23.51	6.13	-----
CO	36.31	56.79	51.81	51.67	51.94	51.93	25.59	-----
CO2	2.76	15.21	12.16	12.19	14.20	14.25	45.29	-----
N2	0.13	1.33	1.01	1.06	1.18	1.22	0.20	-----
CH4	0.05	0.43	0.34	0.33	0.39	0.39	0.22	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.85
CH3OH	0.00	0.36	0.39	0.28	8.31	8.31	2.90	97.79
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.01
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.28
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.11
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.07
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.04
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.76
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.00
TOTAL :	99.36	99.76	100.12	99.76	99.44	99.63	100.28	100.00
DENS,g/cc	0.006	0.051	0.032	0.032	0.037	0.037	0.005	0.735
AV.MOL.WT	12.72	23.73	20.99	21.01	24.47	24.45	36.95	22.90
Mm3/hr	853.6	2963.4	3819.1	3817.0	3277.9	3278.7	12.2	-----
ksmol/hr	38.08	132.21	170.38	170.29	146.24	146.21	0.55	15.97
l/hr,prod	-----	-----	-----	-----	-----	-----	-----	460.12

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

CONVERSIONS ACROSS REACTOR :

	GC#1	GC#2
CALCULATED BY GAS COMPOSITION		
HYDROGEN CONVERSION (%) :	41.3	41.3
CARBON MONOXIDE CONVERSION (%) :	13.9	13.7
CARBON DIOXIDE CONVERSION (%) :	-0.6	0.0
RATIO H2 CONSUMED/CO CONSUMED :	1.97	2.00
CALCULATED BY METHANOL IN EXIT GAS		
HYDROGEN CONVERSION (%) :	39.3	40.1
CARBON MONOXIDE CONVERSION (%) :	13.0	13.3
CALCULATED BY OVERALL BALANCE		
HYDROGEN CONVERSION (%) :	54.0	54.3
CARBON MONOXIDE CONVERSION (%) :	17.9	18.0
RATIO H2 CONSUMED/CO CONSUMED :	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL *
CO (+CO2) SELECTIVITY TO METHANOL (%) :	95.7	98.2
CO (+CO2) SELECTIVITY TO ETHANOL (%) :		0.2

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	kmol/hr-kg cat	kg/1000 Nm3 fresh feed	kg/1000 Nm3 reactor feed
As calculated ACROSS REACTOR	27.24	435.1	97.3
As Net MeOH produced, OVERALL balance	26.31	420.3	94.0
REACTOR FEED (H2/(CO+1.5CO2)) :		0.49	
REACTOR FEED ((H2-CO2)/(CO+CO2)) :		0.34	
APPROACH TO METHANOL EQUILIBRIUM (des.C) :		15.45	
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) :		23.93	
METHANOL COLLECTED AS % OF CALCULATED :		94.3	
CALCULATED METHANOL PRODUCTION RATE (Kmol/hr) :		11.59	

LAPORTE LPHETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1455)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<u><% diff.></u>	<u><% diff.></u>	<u><% diff.></u>
H2	-18.27059	-2.65858	-2.12248
CO	-3.84497	1.03783	-2.10363
CO2	-6.96065	1.88501	-1.72119
N2	-87.83715	0.02909	-5.11472
CH4	n.a.	3.67078	-1.93492
H2O	-----	n.a.	n.a.
CH3OH	-----	0.37392	-32.70818

OVERALL ELEMENTAL BALANCE (Kg-atoms/hr) :

	INPUTS		OUTPUTS				(IN-OUT)/IN
STREAM # STREAM NAME	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	87.9900	75.0866	2.3106	0.1552	-----	77.5524	11.8623
CO2	20.7667	20.1139	0.6189	0.3959	-----	21.1289	-1.7433
CH3OH	0.4788	0.4806	0.0148	0.0170	15.6185	16.1309	-3269.1550
OTHERS	0.5671	0.5685	0.0175	0.0020	0.1597	0.7477	-31.8531
TOTAL C	109.8026	96.2496	2.9618	0.5701	15.7782	115.5597	-5.2431
HYDROGEN:							
H2	116.5560	67.7611	2.0851	0.0743	-----	69.9206	40.0112
H2O	0.0000	0.0000	0.0000	0.0000	0.4824	0.4824	n.a.
OTHERS	4.1834	4.1963	0.1291	0.0752	62.7933	67.1929	-1506.2159
TOTAL H	120.7394	71.9573	2.2143	0.1495	63.2757	137.5969	-13.9519
OXYGEN:							
TOTAL O	130.0023	115.7950	3.5632	0.9644	15.9744	136.2970	-4.8419
NITROGEN:							
TOTAL N	3.6135	3.5140	0.1091	0.0024	-----	3.6246	-0.3061
TOTAL MASS FLOW (kg/hr)	3578.4536	3137.1267	96.5355	22.4071	365.8126	3621.8916	-1.2136

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS
	<u>GC#1</u>	<u>GC#2</u>
	<u>-----</u>	<u>-----</u>
MASS BALANCE (%) :	-0.02	0.02
ELEMENTAL BALANCE (%) :		
CARBON	0.62	0.31
HYDROGEN	1.99	1.12
OXYGEN	0.43	0.27
NITROGEN	-3.85	4.57

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

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DATE :                                06-DEC-89
TIME :                                16:03:46
TIME INTERVAL :                       FROM: 0600 30-Dec
                                         TO: 0600 31-Dec

NUMBER OF AVERAGED HOURS :            22
RUN ID NUMBER :                       E7.119
FEED GAS TYPE:                        CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) : 170.2
OIL/SLURRY REACTOR INLET TEMP. (des.C) : 10.7
AVG. REACTOR SLURRY TEMPERATURE (des.C) : 250.0
REACTOR FREEBOARD TEMPERATURE (des.C) : 246.2
OIL/SLURRY OUTLET TEMP. (des.C) :     243.2
REACTOR FEED GAS PRESSURE (kPa) :      5551
REACTOR EFFLUENT GAS PRESSURE (kPa) :   5297
GAS SUPERFICIAL VELOCITY (cm/sec) :    15.2
LIQUID SUPERFICIAL VELOCITY (cm/sec) :   0.0
SLURRY CONCENTRATION (wt%) :           39.4
CATALYST OXIDE IN REACTOR (kg oxide) :  425
GAS HOLD-UP (%) :                      33.9
SPACE VELOCITY (1/kg-hr) :             8902
RECYCLE/FRESH FEED RATIO :             3.560
OIL/SLURRY CIRCULATION RATE (m3/hr) :   0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 135.26
PURGE GAS FLOW RATE <50> (ksmol/hr) :   3.33
HEAT TRANSFER COEFFICIENT (Watt/m2-des.C) : 579
  
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STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDH PRODUCT
ON-LINE SC#	1	2	1	2	2	1		
COMPONENT	=====	=====	=====	=====	=====	=====	=====	=====
	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<WTX>
H2	60.90	25.26	34.03	33.99	23.06	23.16	6.13	-----
CO	35.76	56.88	51.71	51.66	52.21	52.05	25.59	-----
CO2	2.66	15.54	12.60	12.49	14.62	14.71	65.29	-----
N2	0.13	1.13	0.89	0.89	1.04	1.04	0.20	-----
CH4	0.06	0.45	0.36	0.36	0.42	0.42	0.22	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.70
CH3OH	0.00	0.45	0.51	0.33	8.26	7.96	2.80	97.31
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.03
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.51
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.20
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.15
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.09
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.96
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.06
TOTAL :	99.51	99.72	100.10	99.72	99.60	99.34	100.28	100.00
DENS,g/cc	0.005	0.051	0.032	0.032	0.037	0.037	0.005	0.792
AV.MOL.WT	12.52	23.87	21.16	21.12	24.63	24.59	36.95	31.33
Nm3/hr	830.7	2957.2	3784.4	3788.0	3251.4	3253.8	12.1	-----
ksmol/hr	37.06	131.93	168.83	168.99	145.05	145.10	0.54	11.57
1/hr,prod	-----	-----	-----	-----	-----	-----	-----	457.87

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

=====

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
		----	----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	41.5	41.8
CARBON MONOXIDE CONVERSION	(%) :	13.5	13.3
CARBON DIOXIDE CONVERSION	(%) :	-0.4	-0.5
RATIO H2 CONSUMED/CO CONSUMED	:	2.03	2.07
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	37.2	39.8
CARBON MONOXIDE CONVERSION	(%) :	12.2	13.1
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	40.2	40.2
CARBON MONOXIDE CONVERSION	(%) :	13.1	13.1
RATIO H2 CONSUMED/CO CONSUMED	:	2.01	2.01

SELECTIVITIES :

	ACROSS REACTOR	OVERALL
	GC Average	%
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (%) :	95.5	97.9
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.4

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	kmol/hr-kg cat	kg/1000 Ma3 fresh feed	kg/1000 Ma3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	25.98	426.4	93.5
As Net MeOH produced, OVERALL balance	25.96	426.1	93.4

REACTOR FEED $\{H_2/(CO+1.5CO_2)\}$: 0.48

REACTOR FEED $\{(H_2-CO_2)/(CO+CO_2)\}$: 0.33

APPROACH TO METHANOL EQUILIBRIUM (des.C) : 16.23

APPROACH TO WATER-GAS EQUILIBRIUM (des.C) : 11.19

METHANOL COLLECTED AS % OF CALCULATED : 99.6

CALCULATED METHANOL PRODUCTION RATE (Kmol/hr) : 11.06

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1455)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	(% diff.)	(% diff.)	(% diff.)
H2	-19.55955	-2.73092	-2.29054
CO	-5.07572	1.10521	-1.78920
CO2	-7.52398	1.78250	-0.99229
N2	-197.06699	2.60291	-1.46487
CH4	n.a.	3.23364	-1.51914
H2O	-----	n.a.	n.a.
CH3OH	-----	5.25613	0.42324

OVERALL ELEMENTAL BALANCE (Kg-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	69 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	87.3095	75.0345	1.8967	0.1530	-----	77.0842	11.7117
CO2	21.1075	20.5044	0.5193	0.3903	-----	21.4130	-1.4474
CH3OH	0.5653	0.5951	0.0150	0.0168	11.3049	11.9318	-2010.8734
OTHERS	0.6016	0.5976	0.0151	0.0019	0.1157	0.7304	-21.4101
TOTAL C	109.5839	96.7316	2.4451	0.5620	11.4206	111.1593	-1.4377
HYDROGEN:							
H2	114.8490	66.6583	1.6849	0.0733	-----	69.4165	40.4291
H2O	0.0000	0.0000	0.0000	0.0000	0.2885	0.2885	n.a.
OTHERS	4.6675	4.7711	0.1206	0.0741	45.7992	50.7640	-997.6049
TOTAL H	119.5165	71.4294	1.8055	0.1474	46.0866	119.4690	0.0397
OXYGEN:							
TOTAL O	130.0897	116.6384	2.9483	0.9507	11.5749	132.1122	-1.5547
NITROGEN:							
TOTAL N	3.0081	2.9921	0.0756	0.0024	-----	3.0702	-2.0627
TOTAL MASS FLOW (kg/hr)	3569.0039	3149.6680	79.6149	22.0887	362.6535	3614.0249	-1.2614

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]		FRESH FEED GAS
	GC#1	GC#2	[15-(50+62+68)]
MASS BALANCE (%) :	0.07	-0.08	-0.05
ELEMENTAL BALANCE (%) :			
CARBON	0.89	0.06	-1.16
HYDROGEN	4.04	1.91	-6.19
OXYGEN	0.69	-0.02	-1.64
NITROGEN	-0.71	-0.59	19.04

LAPORTE LOMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY
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DATE :	06-DEC-99
TIME :	16:05:58
TIME INTERVAL :	FROM: 0600 31-Dec
	TO: 0600 01-Jan
NUMBER OF AVERAGED HOURS :	24
RUN ID NUMBER :	E7.119
FEED GAS TYPE:	CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) :	170.9
OIL/SLURRY REACTOR INLET TEMP. (deg.C) :	13.6
AVG. REACTOR SLURRY TEMPERATURE (deg.C) :	250.1
REACTOR FREEBOARD TEMPERATURE (deg.C) :	246.5
OIL/SLURRY OUTLET TEMP. (deg.C) :	243.7
REACTOR FEED GAS PRESSURE (kPa) :	5551
REACTOR EFFLUENT GAS PRESSURE (kPa) :	5287
GAS SUPERFICIAL VELOCITY (cm/sec) :	15.3
LIQUID SUPERFICIAL VELOCITY (cm/sec) :	0.0
SLURRY CONCENTRATION (wt%) :	39.5
CATALYST OXIDE IN REACTOR (kg oxide) :	425
GAS HOLD-UP (%) :	34.1
SPACE VELOCITY (1/kg-hr) :	8961
RECYCLE/FRESH FEED RATIO :	3.600
OIL/SLURRY CIRCULATION RATE (m3/hr) :	0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) :	136.14
PURGE GAS FLOW RATE <50> (ksmol/hr) :	3.01
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) :	580

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEOH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT	=====	=====	=====	=====	=====	=====	=====	=====
	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<WT%>
H2	61.22	25.67	34.24	34.03	23.48	23.52	6.13	-----
CO	35.43	56.15	51.21	51.22	51.44	51.37	25.59	-----
CO2	2.59	15.60	12.54	12.54	14.63	14.65	45.29	-----
N2	0.14	1.35	1.07	1.06	1.24	1.24	0.20	-----
CH4	0.06	0.58	0.45	0.45	0.53	0.53	0.22	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.64
CH3OH	0.01	0.42	0.44	0.32	8.30	8.30	2.80	97.14
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.03
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.58
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.22
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.18
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.10
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	1.02
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.06
TOTAL :	99.45	99.77	99.96	99.62	99.61	99.61	100.28	100.00
DENS,g/cc	0.005	0.051	0.032	0.032	0.037	0.037	0.005	0.794
AV.MOL.WT	12.42	23.76	21.07	21.09	24.51	24.50	36.95	32.20
Nm3/hr	829.0	2984.1	3815.7	3813.2	3281.9	3282.5	12.9	-----
ksmol/hr	36.98	133.13	170.23	170.12	146.41	146.39	0.57	11.32
1/hr:PROD	-----	-----	-----	-----	-----	-----	-----	459.22

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
		----	----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	40.9	40.6
CARBON MONOXIDE CONVERSION	(%) :	13.7	13.6
CARBON DIOXIDE CONVERSION	(%) :	-0.5	-0.5
RATIO H2 CONSUMED/CO CONSUMED	:	1.99	1.99
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	39.1	40.1
CARBON MONOXIDE CONVERSION	(%) :	13.1	13.3
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	38.7	39.0
CARBON MONOXIDE CONVERSION	(%) :	12.8	12.9
RATIO H2 CONSUMED/CO CONSUMED	:	2.01	2.01

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL %
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (%) :	97.5	97.9
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.4

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	mol/hr-ks cat	kg/1000 Me3 fresh feed	kg/1000 Me3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	27.03	444.6	96.7
As Net MeOH produced, OVERALL balance	25.06	428.6	93.2

REACTOR FEED $\{H_2/(CO+1.5CO_2)\}$: 0.49
 REACTOR FEED $\{(H_2-CO_2)/(CO+CO_2)\}$: 0.34

APPROACH TO METHANOL EQUILIBRIUM (des.C) : 15.54
 APPROACH TO WATER-GAS EQUILIBRIUM (des.C) : 3.90

METHANOL COLLECTED AS % OF CALCULATED : 96.1

CALCULATED METHANOL PRODUCTION RATE (Kmol/hr) : 11.50

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-18.80672	-1.89685	-1.76644
CO	-4.69998	0.82398	-1.71415
CO2	-6.70449	1.85258	-1.07877
N2	-290.80304	2.54786	-1.70833
CH4	n.a.	2.45358	-1.80763
H2O	-----	n.a.	n.a.
CH3OH	-----	2.20499	4.17628

OVERALL ELEMENTAL BALANCE (kg-atoms/hr) :

	INPUTS		OUTPUTS				(IN-OUT)/IN
STREAM # STREAM NAME	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	87.1328	74.7520	1.6881	0.1631	-----	75.6032	12.0845
CO2	21.3260	20.7721	0.4691	0.4161	-----	21.6573	-1.5536
CH3OH	0.5496	0.5591	0.0126	0.0179	11.0569	11.6464	-2018.9561
OTHERS	0.7689	0.7668	0.0173	0.0021	0.1132	0.8994	-16.9720
TOTAL C	109.7773	96.8501	2.1871	0.5991	11.1701	110.8064	-0.9374
HYDROGEN:							
H2	115.7857	68.3459	1.5434	0.0781	-----	69.9674	39.5717
H2O	0.0000	0.0000	0.0000	0.0000	0.2607	0.2607	n.a.
OTHERS	5.2743	5.3036	0.1198	0.0790	44.7937	50.2961	-853.6145
TOTAL H	121.0600	73.6494	1.6632	0.1571	45.0544	120.5242	0.4426
OXYGEN:							
TOTAL O	130.3344	116.8554	2.6389	1.0134	11.3231	131.8309	-1.1492
NITROGEN:							
TOTAL N	3.6031	3.5945	0.0812	0.0025	-----	3.6782	-2.0842
TOTAL MASS FLOW (kg/hr)	3588.6396	3163.8152	71.4470	23.5467	364.6393	3623.4482	-0.9700

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS
	GC#1	[15-(50+62+68)]
MASS BALANCE (%) :	-0.01	-0.09
ELEMENTAL BALANCE (%) :		
CARBON	0.42	0.92
HYDROGEN	1.68	-3.29
OXYGEN	0.28	0.30
NITROGEN	-0.48	18.59

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES : ANALYTICAL SUMMARY

```

DATE : 07-DEC-90
TIME : 07:59:11
TIME INTERVAL : FROM: 0600 01-Jan
                TO: 0600 02-Jan

NUMBER OF AVERAGED HOURS : 24
RUN ID NUMBER : E7.120
FEED GAS TYPE: CO-RICH GAS
PEACTOR FEED GAS INLET TEMP. (des.C) : 170.0
OIL/SLURRY REACTOR INLET TEMP. (des.C) : 13.7
AVG. PEACTOR SLURRY TEMPERATURE (des.C) : 250.3
PEACTOR FREEBOARD TEMPERATURE (des.C) : 246.9
OIL/SLURRY OUTLET TEMP. (des.C) : 243.9
PEACTOR FEED GAS PRESSURE (kPa) : 5544
PEACTOR EFFLUENT GAS PRESSURE (kPa) : 5283
GAS SUPERFICIAL VELOCITY (cm/sec) : 15.4
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 0.0
SLURRY CONCENTRATION (wt%) : 39.3
CATALYST OXIDE IN REACTOR (kg oxide) : 425
GAS HOLD-UP (%) : 33.4
SPACE VELOCITY (1/kg-hr) : 8990
RECYCLE/FRESH FEED RATIO : 3.533
OIL/SLURRY CIRCULATION RATE (m3/hr) : 0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 136.22
PURGE GAS FLOW RATE <50> (ksmol/hr) : 3.35
HEAT TRANSFER COEFFICIENT (Watt/m2-des.C) : 582
  
```

STREAM #	1	55	15	15	32	32	62	69
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEOH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
=====	=====	=====	=====	=====	=====	=====	=====	=====
<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	61.12	26.14	34.54	34.44	23.90	23.99	6.13	-----
CO	35.53	55.89	51.09	50.97	51.18	51.10	25.59	-----
CO2	2.59	15.04	12.09	12.08	14.09	14.10	65.29	-----
N2	0.19	1.72	1.37	1.36	1.58	1.60	0.20	-----
CH4	0.06	0.58	0.46	0.45	0.53	0.53	0.22	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.64
CH3OH	0.00	0.38	0.39	0.29	9.30	8.26	2.80	97.16
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.03
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.59
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.22
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.19
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.10
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	1.02
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.06
TOTAL :	99.49	99.75	99.92	99.59	99.57	99.57	100.29	100.00
DENS:g/cc	0.005	0.050	0.031	0.031	0.037	0.037	0.005	0.795
AV.MOL.WT	12.45	23.55	20.91	20.91	24.31	24.28	36.95	32.20
Mm3/hr	842.9	2978.2	3821.0	3821.1	3288.3	3289.7	12.5	-----
ksmol/hr	37.60	132.87	170.47	170.47	146.70	146.70	0.56	11.79
1/hr,prod	-----	-----	-----	-----	-----	-----	-----	461.46

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
		----	----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	40.2	40.3
CARBON MONOXIDE CONVERSION	(%) :	13.9	13.6
CARBON DIOXIDE CONVERSION	(%) :	-0.5	-0.4
RATIO H2 CONSUMED/CO CONSUMED	:	1.96	2.00
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	38.9	39.8
CARBON MONOXIDE CONVERSION	(%) :	13.2	13.4
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	38.5	39.7
CARBON MONOXIDE CONVERSION	(%) :	12.9	13.0
RATIO H2 CONSUMED/CO CONSUMED	:	2.01	2.01

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL *
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (%) :	97.5	97.9
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.4

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	kmol/hr-kg cat	kg/1000 Mm3 fresh feed	kg/1000 Mm3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	27.19	439.9	97.0
As Net MeOH produced, OVERALL balance	26.22	424.1	93.5
REACTOR FEED $\langle H_2/(CO+1.5CO_2) \rangle$:		0.50	
REACTOR FEED $\langle (H_2-CO_2)/(CO+CO_2) \rangle$:		0.35	
APPROACH TO METHANOL EQUILIBRIUM (deg.C) :		17.03	
APPROACH TO WATER-GAS EQUILIBRIUM (deg.C) :		4.77	
METHANOL COLLECTED AS % OF CALCULATED :		96.2	
CALCULATED METHANOL PRODUCTION RATE (Kmol/hr) :		11.57	

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<u><% diff.></u>	<u><% diff.></u>	<u><% diff.></u>
H2	-19.42033	-1.72218	-1.64344
CO	-4.63454	0.82893	-1.51432
CO2	-7.01445	1.77274	-1.10041
N2	-535.59088	1.57046	-1.25077
CH4	n.a.	3.52182	-1.61204
H2O	-----	n.a.	n.a.
CH3OH	-----	2.99144	1.22346

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

	INPUTS		OUTPUTS			(IN-OUT)/IN	
STREAM #	15	55	50	62	69	TOTAL	
STREAM NAME	REACTOR FEED	RECYCLE	PURGE GAS	FLASH GAS	MeOH PRODUCT		%
CARBON:							
CO	86.8944	74.2585	1.8724	0.1581	-----	76.2890	12.2049
CO2	20.5861	19.9830	0.5039	0.4033	-----	20.8902	-1.4769
CH3OH	0.4880	0.5030	0.0127	0.0173	11.1250	11.6580	-2289.0291
OTHERS	0.7654	0.7693	0.0194	0.0020	0.1139	0.9046	-18.1864
TOTAL C	108.7339	95.5137	2.4084	0.5807	11.2389	109.7417	-0.9269
HYDROGEN:							
H2	117.4070	69.4514	1.7512	0.0757	-----	71.2783	39.2896
H2O	0.0000	0.0000	0.0000	0.0000	0.2623	0.2623	n.a.
OTHERS	5.0136	5.0893	0.1283	0.0766	45.0695	50.3637	-904.5442
TOTAL H	122.4206	74.5407	1.8796	0.1523	45.3318	121.9043	0.4219
OXYGEN:							
TOTAL O	128.5546	114.7274	2.8929	0.9824	11.3928	129.9955	-1.1209
NITROGEN:							
TOTAL N	4.6402	4.5759	0.1154	0.0025	-----	4.6937	-1.1528
TOTAL MASS FLOW (kg/hr)	3564.8975	3128.9792	78.8976	22.8261	366.8838	3597.5869	-0.9170

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]		FRESH FEED GAS
	GC#1	GC#2	[15-(50+62+68)]
MASS BALANCE (%) :	0.02	-0.02	-0.09
ELEMENTAL BALANCE (%) :			
CARBON	0.49	0.04	0.93
HYDROGEN	1.23	0.41	-2.92
OXYGEN	0.3	-0.02	0.29
NITROGEN	-0.58	0.10	14.84

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES : ANALYTICAL SUMMARY

DATE : 07-DEC-89
TIME : 09:00:34
TIME INTERVAL : FROM: 0600 02-Jan
TO: 0600 03-Jan
NUMBER OF AVERAGED HOURS : 24
RUN ID NUMBER : E7.121
FEED GAS TYPE: CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 173.7
OIL/SLURRY REACTOR INLET TEMP. (deg.C) : 17.0
AVG. REACTOR SLURRY TEMPERATURE (deg.C) : 250.4
REACTOR FREEBOARD TEMPERATURE (deg.C) : 246.6
OIL/SLURRY OUTLET TEMP. (deg.C) : 244.0
REACTOR FEED GAS PRESSURE (kPa) : 5544
REACTOR EFFLUENT GAS PRESSURE (kPa) : 5286
GAS SUPERFICIAL VELOCITY (cm/sec) : 15.1
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 0.0
SLURRY CONCENTRATION (wt%) : 39.2
CATALYST OXIDE IN REACTOR (kg oxide) : 425
GAS HOLD-UP (%) : 33.3
SPACE VELOCITY (1/kg-hr) : 2844
RECYCLE/FRESH FEED RATIO : 3.409
OIL/SLURRY CIRCULATION RATE (m3/hr) : 0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 134.53
PURGE GAS FLOW RATE <50> (ksmol/hr) : 4.72
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) : 579

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
=====	=====	=====	=====	=====	=====	=====	=====	=====
	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<WTX>
H2	59.76	25.74	34.44	34.23	23.57	23.67	6.13	-----
CO	36.42	56.62	51.55	51.58	51.91	51.78	25.59	-----
CO2	3.07	15.37	12.34	12.33	14.42	14.39	65.29	-----
N2	0.16	1.16	0.92	0.91	1.05	1.07	0.20	-----
CH4	0.06	0.40	0.33	0.31	0.37	0.37	0.22	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.64
CH3OH	0.04	0.48	0.47	0.35	8.29	8.23	2.80	97.16
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.03
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.58
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.22
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.18
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.10
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	1.02
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.06
TOTAL :	99.51	99.77	100.05	99.71	99.62	99.51	100.28	100.00
DENS,g/cc	0.005	0.050	0.031	0.031	0.037	0.037	0.005	0.791
AV.MOL.WT	12.89	23.73	21.01	21.03	24.47	24.43	36.95	32.20
Mm3/hr	853.4	2909.7	3766.0	3763.3	3235.7	3239.2	12.4	-----
ksmol/hr	38.07	129.81	168.01	167.89	144.35	144.40	0.55	11.06
1/hr,prod	-----	-----	-----	-----	-----	-----	-----	450.46

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
		----	----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	40.9	40.8
CARBON MONOXIDE CONVERSION	(%) :	13.6	13.5
CARBON DIOXIDE CONVERSION	(%) :	-0.3	-0.6
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.01
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	38.4	39.6
CARBON MONOXIDE CONVERSION	(%) :	12.9	13.1
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	38.1	38.4
CARBON MONOXIDE CONVERSION	(%) :	12.6	12.7
RATIO H2 CONSUMED/CO CONSUMED	:	2.01	2.01

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL %
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (%) :	96.5	97.9
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.4

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	kmol/hr-kg cat	kg/1000 Nm3 fresh feed	kg/1000 Nm3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	26.41	422.0	95.7
As Net MeOH produced, OVERALL balance	25.49	407.2	92.3

REACTOR FEED (H2/(CO+1.5CO2)) :	0.49
REACTOR FEED ((H2-CO2)/(CO+CO2)) :	0.34
APPROACH TO METHANOL EQUILIBRIUM (deg.C) :	16.60
APPROACH TO WATER-GAS EQUILIBRIUM (deg.C) :	4.11
METHANOL COLLECTED AS % OF CALCULATED :	96.1
CALCULATED METHANOL PRODUCTION RATE (Kmol/hr) :	11.24

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

=====

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	(% diff.)	(% diff.)	(% diff.)
H2	-19.67909	-2.31444	-1.97094
CO	-4.46240	0.89109	-1.96541
CO2	-9.17444	1.94861	-1.21674
N2	-799.76373	1.78926	-2.38906
CH4	n.a.	3.25271	-2.33518
H2O	-----	n.a.	n.a.
CH3OH	-----	9.05170	4.14462

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

	INPUTS		OUTPUTS				(IN-OUT)/IN
STREAM #	15	55	50	62	69	TOTAL	
STREAM NAME	REACTOR FEED	RECYCLE	PURGE GAS	FLASH GAS	MeOH PRODUCT		%
CARBON:							
CO	86.5897	73.5035	2.6703	0.1570	-----	74.3309	11.8477
CO2	20.7060	19.9482	0.7247	0.4007	-----	21.0736	-1.7754
CH3OH	0.5870	0.6291	0.0229	0.0172	10.8050	11.4742	-1854.6766
OTHERS	0.5255	0.5218	0.0190	0.0020	0.1107	0.6534	-24.3474
TOTAL C	108.4082	94.6026	3.4368	0.5769	10.9157	109.5321	-1.0367
HYDROGEN:							
H2	114.9314	66.8221	2.4276	0.0752	-----	69.3249	39.6815
H2O	0.0000	0.0000	0.0000	0.0000	0.2548	0.2548	n.a.
OTHERS	4.4500	4.6036	0.1672	0.0761	43.7735	49.6204	-992.5952
TOTAL H	119.3814	71.4257	2.5948	0.1513	44.0282	119.2001	0.9996
OXYGEN:							
TOTAL O	128.5887	114.0290	4.1426	0.9759	11.0652	130.2128	-1.2630
NITROGEN:							
TOTAL N	3.0690	3.0039	0.1091	0.0024	-----	3.1154	-1.5111
TOTAL MASS FLOW							
(kg/hr)	3531.5852	3080.7000	111.9195	22.6753	356.3338	3571.6287	-1.1339

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]		FRESH FEED GAS
	GC#1	GC#2	[15-(50+62+68)]
MASS BALANCE (Z) :	0.01	-0.01	-0.05
ELEMENTAL BALANCE (Z) :			
CARBON	0.62	0.14	0.95
HYDROGEN	2.49	1.11	-2.44
OXYGEN	0.46	0.03	0.22
NITROGEN	-0.30	0.85	2.85

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

```

DATE : 07-DEC-90
TIME : 09:10:58
TIME INTERVAL : FROM: 0600 03-Jan
                TO: 0600 04-Jan

NUMBER OF AVERAGED HOURS : 24
RUN ID NUMBER : E7.122
FEED GAS TYPE: CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 168.6
OIL/SLURRY REACTOR INLET TEMP. (deg.C) : 20.8
AVG. REACTOR SLURRY TEMPERATURE (deg.C) : 250.2
REACTOR FREEBOARD TEMPERATURE (deg.C) : 246.3
OIL/SLURRY OUTLET TEMP. (deg.C) : 243.5
REACTOR FEED GAS PRESSURE (kPa) : 5539
REACTOR EFFLUENT GAS PRESSURE (kPa) : 5287
GAS SUPERFICIAL VELOCITY (cm/sec) : 15.3
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 0.0
SLURRY CONCENTRATION (wt%) : 39.3
CATALYST OXIDE IN REACTOR (kg oxide) : 425
GAS HOLD-UP (%) : 33.4
SPACE VELOCITY (1/kg-hr) : 8940
RECYCLE/FRESH FEED RATIO : 3.400
OIL/SLURRY CIRCULATION RATE (m3/hr) : 0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 136.03
PURGE GAS FLOW RATE <50> (ksmol/hr) : 4.88
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) : 576
  
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STREAM #	1	55	15	15	32	32	62	69
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEOH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
=====	=====	=====	=====	=====	=====	=====	=====	=====
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	59.61	25.94	34.60	34.35	23.77	23.89	6.13	-----
CO	26.44	56.40	51.47	51.38	51.71	51.64	25.59	-----
CO2	3.29	15.59	12.60	12.55	14.66	14.66	45.29	-----
N2	0.16	1.07	0.85	0.85	0.98	0.99	0.20	-----
CH4	0.05	0.40	0.32	0.31	0.37	0.36	0.22	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.68
CH3OH	0.00	0.43	0.38	0.29	8.19	9.22	2.80	97.18
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.03
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.54
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.20
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.16
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.10
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	1.01
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.10
TOTAL :	99.56	99.83	100.21	99.73	99.69	99.76	100.28	100.00
DENS,g/cc	0.005	0.051	0.032	0.032	0.037	0.037	0.005	0.794
AV.MOL.WT	12.97	23.72	21.02	21.04	24.45	24.43	26.95	32.19
Mm3/hr	864.7	2939.6	3806.1	3804.3	3273.3	3274.8	12.8	-----
ksmol/hr	38.58	131.15	169.80	169.72	146.03	146.04	0.57	11.22
1/hr:prod	-----	-----	-----	-----	-----	-----	-----	454.95

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

=====

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
		----	----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	40.6	40.5
CARBON MONOXIDE CONVERSION	(%) :	13.7	13.4
CARBON DIOXIDE CONVERSION	(%) :	-0.2	-0.5
RATIO H2 CONSUMED/CO CONSUMED	:	1.99	2.02
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	38.7	39.3
CARBON MONOXIDE CONVERSION	(%) :	13.0	13.2
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	39.1	39.4
CARBON MONOXIDE CONVERSION	(%) :	12.7	12.7
RATIO H2 CONSUMED/CO CONSUMED	:	2.01	2.01

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL 1
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (%) :	97.1	97.9
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.4

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

METH SOURCE	kgol/hr-kg cat	kg/1000 Nm3 fresh feed	kg/1000 Nm3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	26.83	423.0	94.1
As Net MeOH produced, OVERALL balance	25.84	407.5	92.6

REACTOR FEED (H2/(CO+1.5CO2)) : 0.49

REACTOR FEED ((H2-CO2)/(CO+CO2)) : 0.34

APPROACH TO METHANOL EQUILIBRIUM (deg.C) : 17.39

APPROACH TO WATER-GAS EQUILIBRIUM (deg.C) : 6.19

METHANOL COLLECTED AS % OF CALCULATED : 96.0

CALCULATED METHANOL PRODUCTION RATE (Ksgol/hr) : 11.41

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	(% diff.)	(% diff.)	(% diff.)
H2	-19.13399	-2.26292	-1.74951
CO	-4.73984	0.92464	-1.80354
CO2	-9.68778	1.89068	-0.98587
N2	-547.97199	2.45537	-2.07010
CH4	n.a.	3.15818	-1.04728
H2O	-----	n.a.	n.a.
CH3OH	-----	12.29892	3.36464

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

	INPUTS		OUTPUTS				(IN-OUT)/IN
STREAM # STREAM NAME	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	87.2023	73.9601	2.7542	0.1620	-----	76.8764	11.8413
CO2	21.3033	20.4431	0.7613	0.4134	-----	21.6178	-1.4765
CH3OH	0.4988	0.5687	0.0212	0.0177	10.9564	11.5641	-2218.4219
OTHERS	0.5227	0.5193	0.0193	0.0021	0.1122	0.6530	-24.9101
TOTAL C	109.5271	95.4913	3.5560	0.5952	11.0687	110.7112	-1.0912
HYDROGEN:							
H2	116.6148	68.0415	2.5338	0.0776	-----	70.6529	39.4124
H2O	0.0000	0.0000	0.0000	0.0000	0.2735	0.2735	n.a.
OTHERS	4.0861	4.3523	0.1621	0.0785	44.3869	48.9798	-1098.6865
TOTAL H	120.7009	72.3938	2.6959	0.1561	44.6604	119.9062	0.6584
OXYGEN:							
TOTAL O	130.3076	115.4151	4.2980	1.0069	11.2221	131.9421	-1.2543
NITROGEN:							
TOTAL N	2.8683	2.8170	0.1049	0.0025	-----	2.9245	-1.9597
TOTAL MASS FLOW (kg/hr)	3570.5742	3110.2710	115.8243	23.3959	361.2513	3610.7427	-1.1250

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS
	GC#1	[15-(50+62+68)]
	GC#2	
MASS BALANCE (Z) :	0.01	0.00
ELEMENTAL BALANCE (Z) :		
CARBON	0.52	0.10
HYDROGEN	1.87	1.04
OXYGEN	0.40	0.01
NITROGEN	-0.35	0.11
		-0.04
		0.83
		-3.12
		0.42
		12.99

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

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DATE : 07-DEC-99
TIME : 09:12:21
TIME INTERVAL : FROM: 0600 04-Jan
                TO: 0600 05-Jan

NUMBER OF AVERAGED HOURS : 24
RUN ID NUMBER : E7.123
FEED GAS TYPE: CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 164.4
OIL/SLURRY REACTOR INLET TEMP. (deg.C) : 15.0
AVG. REACTOR SLURRY TEMPERATURE (deg.C) : 250.0
REACTOR FREEBOARD TEMPERATURE (deg.C) : 246.7
OIL/SLURRY OUTLET TEMP. (deg.C) : 243.6
REACTOR FEED GAS PRESSURE (kPa) : 5539
REACTOR EFFLUENT GAS PRESSURE (kPa) : 5287
GAS SUPERFICIAL VELOCITY (cm/sec) : 15.4
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 0.0
SLURRY CONCENTRATION (wt%) : 39.1
CATALYST OXIDE IN REACTOR (kg oxide) : 425
GAS HOLD-UP (%) : 33.1
SPACE VELOCITY (1/kg-hr) : 9997
RECYCLE/FRESH FEED RATIO : 3.413
OIL/SLURRY CIRCULATION RATE (m3/hr) : 0.0
PROD. SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 136.69
PURGE GAS FLOW RATE <50> (ksmol/hr) : 4.73
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) : 577
  
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STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEOH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
=====	=====	=====	=====	=====	=====	=====	=====	=====
	<MOL%	<MOL%	<MOL%	<MOL%	<MOL%	<MOL%	<MOL%	<WT%
H2	59.81	26.21	34.74	34.53	24.04	24.12	5.19	-----
CO	36.20	55.87	51.03	51.04	51.15	51.14	23.67	-----
CO2	3.28	15.64	12.63	12.62	14.69	14.68	66.94	-----
N2	0.17	1.17	0.94	0.92	1.08	1.09	0.34	-----
CH4	0.06	0.40	0.33	0.31	0.37	0.37	0.32	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.68
CH3OH	0.01	0.36	0.39	0.27	8.20	9.18	3.73	97.33
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.47
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.18
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.14
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.09
ALKANES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.98
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.10
TOTAL :	99.55	99.65	100.05	99.69	99.52	99.59	100.24	100.00
DENS,g/cc	0.005	0.051	0.032	0.032	0.037	0.037	0.005	0.796
AV.MOL.WT	12.91	23.64	20.98	21.00	24.38	24.36	37.49	32.17
Mm3/hr	866.5	2957.5	3825.5	3824.0	3293.4	3294.8	12.5	-----
ksmol/hr	38.66	131.95	170.67	170.60	146.93	146.92	0.56	11.32
l/hr,prod	-----	-----	-----	-----	-----	-----	-----	457.42

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
		----	----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	40.2	40.0
CARBON MONOXIDE CONVERSION	(%) :	13.7	13.7
CARBON DIOXIDE CONVERSION	(%) :	-0.1	-0.3
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	1.99
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	38.3	39.3
CARBON MONOXIDE CONVERSION	(%) :	13.0	13.3
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	38.0	38.2
CARBON MONOXIDE CONVERSION	(%) :	12.9	12.9
RATIO H2 CONSUMED/CO CONSUMED	:	2.01	2.01

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL *
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (%) :	96.6	99.1
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.3

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	smol/hr-kg cat	kg/1000 Nm3 fresh feed	kg/1000 Nm3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	26.96	424.2	96.1
As Net MeOH produced, OVERALL balance	26.09	410.5	93.0

REACTOR FEED (H2/(CO+1.5CO2)) :	0.49
REACTOR FEED ((H2-CO2)/(CO+CO2)) :	0.34
APPROACH TO METHANOL EQUILIBRIUM (des.C) :	17.95
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) :	4.53
METHANOL COLLECTED AS % OF CALCULATED :	96.4
CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) :	11.47

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

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COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 13 FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-19.04949	-2.08372	-1.50419
CO	-4.57888	0.72535	-1.80669
CO2	-9.67964	1.71919	-0.97274
N2	-510.77722	2.18457	-1.46343
CH4	n.a.	4.26944	-1.66605
H2O	-----	n.a.	n.a.
CH3OH	-----	4.01976	3.88238

OVERALL ELEMENTAL BALANCE (Kg-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	87.0753	73.7165	2.6444	0.1480	-----	76.5088	12.1348
CO2	21.5249	20.6323	0.7401	0.4184	-----	21.7908	-1.2356
CH3OH	0.4644	0.4796	0.0172	0.0233	11.0610	11.5812	-2393.6372
OTHERS	0.5340	0.5331	0.0191	0.0027	0.1132	0.6681	-25.1072
TOTAL C	109.5985	95.3614	3.4209	0.5924	11.1742	110.5488	-0.8671
HYDROGEN:							
H2	117.8109	69.1630	2.4811	0.0648	-----	71.7029	39.1322
H2O	0.0000	0.0000	0.0000	0.0000	0.2733	0.2733	n.a.
OTHERS	3.9936	4.0507	0.1453	0.1034	44.6967	48.9961	-1126.8511
TOTAL H	121.8046	73.2138	2.6264	0.1682	44.9700	120.9783	0.6783
OXYGEN:							
TOTAL O	130.5894	115.4606	4.1419	1.0084	11.3178	131.9287	-1.0256
NITROGEN:							
TOTAL N	3.1527	3.0902	0.1109	0.0042	-----	3.2052	-1.6643
TOTAL MASS FLOW (kg/hr)	3582.4717	3119.7119	111.9121	23.4305	364.1276	3619.1821	-1.0247

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS
	GC#1	[15-(50+62+68)]
MASS BALANCE (%) :	-0.02	-0.07
ELEMENTAL BALANCE (%) :		
CARBON	0.50	0.69
HYDROGEN	1.93	-3.03
OXYGEN	0.39	0.42
NITROGEN	-0.19	13.49

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

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DATE : 07-DEC-90
TIME : 09:14:27
TIME INTERVAL : FROM: 0600 05-Jan
                TO: 0600 06-Jan

NUMBER OF AVERAGED HOURS : 24
RUN ID NUMBER : E7.124
FEED GAS TYPE: CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) : 166.6
OIL/SLURRY REACTOR INLET TEMP. (des.C) : 19.1
AVG. REACTOR SLURRY TEMPERATURE (des.C) : 250.4
REACTOR FREEBOARD TEMPERATURE (des.C) : 246.4
OIL/SLURRY OUTLET TEMP. (des.C) : 243.4
REACTOR FEED GAS PRESSURE (kPa) : 5541
REACTOR EFFLUENT GAS PRESSURE (kPa) : 5287
GAS SUPERFICIAL VELOCITY (cm/sec) : 15.4
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 0.0
SLURRY CONCENTRATION (wt%) : 39.1
CATALYST OXIDE IN REACTOR (kg oxide) : 425
GAS HOLD-UP (%) : 33.0
SPACE VELOCITY (1/kg-hr) : 8992
RECYCLE/FRESH FEED RATIO : 3.373
OIL/SLURRY CIRCULATION RATE (m3/hr) : 0.0
PROD. SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 136.77
PURGE GAS FLOW RATE <50> (ksmol/hr) : 5.10
HEAT TRANSFER COEFFICIENT (Watt/m2-des.C) : 574
  
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STREAM #	1	55	15	15	32	32	62	69
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEOH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
=====	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	59.62	26.52	35.01	34.79	24.30	24.46	4.93	-----
CO	36.38	55.90	50.96	51.04	51.21	51.11	23.18	-----
CO2	3.27	15.54	12.52	12.53	14.58	14.57	67.37	-----
N2	0.15	1.01	0.80	0.80	0.93	0.93	0.37	-----
CH4	0.05	0.37	0.29	0.29	0.34	0.33	0.35	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66
CH3OH	0.00	0.49	0.45	0.35	8.29	8.25	3.97	97.38
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.46
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.17
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.14
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.09
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.97
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.10
TOTAL :	99.46	99.82	100.03	99.79	99.63	99.65	100.23	100.00
DENS,g/cc	0.005	0.050	0.032	0.032	0.037	0.037	0.005	0.791
AV.MOL.WT	12.95	23.56	20.89	20.93	24.31	24.26	37.63	32.17
Nm3/hr	875.0	2951.3	3929.9	3826.3	3294.7	3297.4	12.4	-----
ksmol/hr	39.03	131.67	170.86	170.70	146.98	147.04	0.56	11.25
l/hr,prod	-----	-----	-----	-----	-----	-----	-----	457.65

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

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CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
		-----	-----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	39.9	39.8
CARBON MONOXIDE CONVERSION	(%) :	13.6	13.6
CARBON DIOXIDE CONVERSION	(%) :	-0.2	-0.2
RATIO H2 CONSUMED/CO CONSUMED	:	2.01	2.00
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	38.0	39.0
CARBON MONOXIDE CONVERSION	(%) :	13.1	13.3
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	37.5	37.7
CARBON MONOXIDE CONVERSION	(%) :	12.8	12.8
RATIO H2 CONSUMED/CO CONSUMED	:	2.01	2.01

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL *
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (%) :	97.0	98.1
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.3

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	kmol/hr-kg cat	kg/1000 Me3 fresh feed	kg/1000 Me3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	26.96	420.2	96.1
As Net MeOH produced, OVERALL balance	25.98	404.8	92.6

REACTOR FEED (H2/(CO+1.5CO2)) : 0.50

REACTOR FEED {(H2-CO2)/(CO+CO2)} : 0.35

APPROACH TO METHANOL EQUILIBRIUM (deg.C) : 17.75

APPROACH TO WATER-GAS EQUILIBRIUM (deg.C) : 2.36

METHANOL COLLECTED AS % OF CALCULATED : 95.9

CALCULATED METHANOL PRODUCTION RATE (Kmol/hr) : 11.47

 

STREAM #	[PURE GASES - 1]	[(1+55)-15]	[32 - (50+55+62+60)]
STREAM LOCATIONS	FRESH FEED GAS	REACTOR FEED	REACTOR EFFLUENT
COMPONENT :			
-----	% diff.>	% diff.>	% diff.>
H2	-19.84016	-2.04726	-1.63528
CO	-4.60054	0.76737	-1.76256
CO2	-9.93333	1.58610	-1.11854
N2	-737.61871	1.93598	-1.56801
CH4	n.a.	2.68272	-1.51655
H2O	-----	n.a.	n.a.
CH3OH	-----	7.14007	3.95182

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN %
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	
CARBON:							
CO	87.1228	73.5969	2.8505	0.1442	-----	76.5916	12.0877
CO2	21.3872	20.4559	0.7923	0.4189	-----	21.6671	-1.3087
CH3OH	0.6011	0.6462	0.0250	0.0247	11.0025	11.6984	-1846.0103
OTHERS	0.4882	0.4806	0.0186	0.0028	0.1125	0.6146	-25.8827
TOTAL C	109.5994	95.1796	3.6865	0.5906	11.1150	110.5717	-0.8871
HYDROGEN:							
H2	118.7606	69.8365	2.7049	0.0614	-----	72.6028	38.8663
H2O	0.0000	0.0000	0.0000	0.0000	0.2661	0.2661	n.a.
OTHERS	4.3574	4.5071	0.1746	0.1094	44.4599	49.2510	-1030.2816
TOTAL H	123.1181	74.3436	2.8795	0.1708	44.7260	122.1199	0.9108
OXYGEN:							
TOTAL O	130.4984	115.1549	4.4601	1.0071	11.2526	131.8747	-1.0546
NITROGEN:							
TOTAL N	2.7176	2.6544	0.1028	0.0046	-----	2.7419	-1.6295
TOTAL MASS FLOW (kg/hr)	3572.6179	3102.3523	120.1594	23.3986	362.0180	3607.9295	-0.9884

	REACTOR FEED GAS	[15 - 32]	FRESH FEED GAS
	GC#1	GC#2	[15-(50+62+69)]
MASS BALANCE (%) :	0.00	0.00	-0.02
ELEMENTAL BALANCE (%) :			
CARBON	0.44	0.21	0.68
HYDROGEN	1.81	0.90	-2.46
OXYGEN	0.33	0.15	0.20
NITROGEN	-0.65	-0.06	5.74

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

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DATE : 07-DEC-89
TIME : 08:15:50
TIME INTERVAL : FROM: 0600 06-Jan
                TO: 0600 07-Jan

NUMBER OF AVERAGED HOURS : 24
PUN ID NUMBER : E7.125
FEED GAS TYPE: CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) : 168.7
OIL/SLURRY REACTOR INLET TEMP. (des.C) : 21.3
AVG. REACTOR SLURRY TEMPERATURE (des.C) : 250.4
REACTOR FREEBOARD TEMPERATURE (des.C) : 246.6
OIL/SLURRY OUTLET TEMP. (des.C) : 243.8
REACTOR FEED GAS PRESSURE (kPa) : 5539
REACTOR EFFLUENT GAS PRESSURE (kPa) : 5287
GAS SUPERFICIAL VELOCITY (cm/sec) : 15.3
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 0.0
SLURRY CONCENTRATION (wt%) : 39.0
CATALYST OXIDE IN REACTOR (kg oxide) : 425
GAS HOLD-UP (%) : 32.8
SPACE VELOCITY (1/kg-hr) : 8963
RECYCLE/FRESH FEED RATIO : 3.375
OIL/SLURRY CIRCULATION RATE (m3/hr) : 0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 136.48
PURGE GAS FLOW RATE <50> (ksmol/hr) : 5.21
HEAT TRANSFER COEFFICIENT (Watt/m2-des.C) : 574
  
```

STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	NEOH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
=====	=====	=====	=====	=====	=====	=====	=====	=====
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	59.50	26.51	34.92	34.70	24.29	24.42	4.93	-----
CO	36.56	56.38	51.39	51.46	51.66	51.61	23.18	-----
CO2	3.28	15.46	12.42	12.43	14.49	14.44	67.37	-----
N2	0.14	0.83	0.66	0.67	0.77	0.76	0.37	-----
CH4	0.04	0.29	0.23	0.22	0.26	0.26	0.35	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.68
CH3OH	0.01	0.51	0.46	0.37	8.26	8.21	3.97	97.43
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.46
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.17
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.14
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.08
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.93
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.10
TOTAL :	99.53	99.98	100.07	99.87	99.72	99.71	100.23	100.00
DENS,g/cc	0.005	0.050	0.031	0.031	0.037	0.037	0.005	0.790
AV.MOL.WT	12.99	23.57	20.91	20.95	24.30	24.26	37.63	72.16
Nm3/hr	971.7	2942.4	3817.8	3814.0	3287.4	3290.2	12.4	-----
ksmol/hr	38.89	131.27	170.32	170.16	146.66	146.72	0.55	11.18
l/hr,prod	-----	-----	-----	-----	-----	-----	-----	454.95

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

=====

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
		----	----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	39.7	39.7
CARBON MONOXIDE CONVERSION	(%) :	13.5	13.5
CARBON DIOXIDE CONVERSION	(%) :	-0.2	-0.4
RATIO H2 CONSUMED/CO CONSUMED	:	2.01	1.98
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	37.9	38.9
CARBON MONOXIDE CONVERSION	(%) :	12.9	13.1
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	37.3	37.6
CARBON MONOXIDE CONVERSION	(%) :	12.7	12.7
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL %
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (%) :	97.1	98.1
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.3

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	saol/hr-ks cat	ks/1000 Na3 fresh feed	ks/1000 Na3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	26.74	418.3	95.6
As Net MeOH Produced, OVERALL balance	25.80	403.6	92.2

REACTOR FEED (H2/(CO+1.5CO2)) :	0.49
REACTOR FEED ((H2-CO2)/(CO+CO2)) :	0.35
APPROACH TO METHANOL EQUILIBRIUM (des.C) :	17.99
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) :	4.16
METHANOL COLLECTED AS % OF CALCULATED :	96.0
CALCULATED METHANOL PRODUCTION RATE (Ksaol/hr) :	11.38

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-18.92266	-1.91103	-1.64445
CO	-4.69749	0.74972	-1.75992
CO2	-9.85498	1.91695	-1.28695
N2	-763.52899	0.12695	-0.87453
CH4	n.a.	2.85452	-1.36543
H2O	-----	n.a.	n.a.
CH3OH	-----	5.41680	3.84798

OVERALL ELEMENTAL BALANCE (Kg-atoms/hr) :

	INPUTS		OUTPUTS				(IN-OUT)/IN
STREAM # STREAM NAME	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	87.5689	74.0134	2.9385	0.1431	-----	77.0950	11.9607
CO2	21.1538	20.2916	0.8056	0.4159	-----	21.5131	-1.6986
CH3OH	0.6357	0.6686	0.0265	0.0245	10.9282	11.6478	-1732.4133
OTHERS	0.3794	0.3754	0.0149	0.0028	0.1118	0.5049	-33.0663
TOTAL C	109.7378	95.3489	3.7856	0.5863	11.0400	110.7608	-0.9323
HYDROGEN:							
H2	118.0914	69.5936	2.7631	0.0609	-----	72.4175	38.6767
H2O	0.0000	0.0000	0.0000	0.0000	0.2693	0.2693	n.a.
OTHERS	0.0604	4.1759	0.1658	0.1086	44.0481	48.4984	-1094.4238
TOTAL H	122.1518	73.7695	2.9289	0.1695	44.3174	121.1853	0.7923
OXYGEN:							
TOTAL O	130.5121	115.2651	4.5763	0.9997	11.1760	132.0172	-1.1532
NITROGEN:							
TOTAL N	2.2937	2.1869	0.0868	0.0046	-----	2.2784	0.6686
TOTAL MASS FLOW (kg/hr)	3564.5911	3093.8792	122.8357	23.2279	359.4315	3599.3743	-0.9758

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS
	GC#1	[15-(50+62+68)]
MASS BALANCE (%) :	-0.01	0.00
ELEMENTAL BALANCE (%) :		
CARBON	0.41	0.64
HYDROGEN	1.77	-2.28
OXYGEN	0.30	0.12
NITROGEN	-0.21	15.64

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY
=====

DATE :	07-DEC-89
TIME :	08:17:15
TIME INTERVAL :	FROM: 0600 07-Jan
	TO: 0600 08-Jan
NUMBER OF AVERAGED HOURS :	24
RUN ID NUMBER :	E7.126
FEED GAS TYPE:	CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) :	166.1
OIL/SLURRY REACTOR INLET TEMP. (des.C) :	22.1
AUG. REACTOR SLURRY TEMPERATURE (des.C) :	250.3
REACTOR FREEBOARD TEMPERATURE (des.C) :	246.5
OIL/SLURRY OUTLET TEMP. (des.C) :	243.5
REACTOR FEED GAS PRESSURE (kPa) :	5537
REACTOR EFFLUENT GAS PRESSURE (kPa) :	5287
GAS SUPERFICIAL VELOCITY (cm/sec) :	15.4
LIQUID SUPERFICIAL VELOCITY (cm/sec) :	0.0
SLURRY CONCENTRATION (wt%) :	38.9
CATALYST OXIDE IN REACTOR (kg oxide) :	425
GAS HOLD-UP (Z) :	32.5
SPACE VELOCITY (1/kg-hr) :	8982
RECYCLE/FRESH FEED RATIO :	3.359
OIL/SLURRY CIRCULATION RATE (m3/hr) :	0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) :	136.88
PURGE GAS FLOW RATE <50> (ksmol/hr) :	5.49
HEAT TRANSFER COEFFICIENT (Watt/m2-des.C) :	571

STREAM #	1	55	15	15	32	32	62	69
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDM PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT	=====	=====	=====	=====	=====	=====	=====	=====
=====	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<WT%>
H2	59.32	26.40	34.83	34.65	24.17	24.36	4.93	-----
CO	36.71	56.44	51.50	51.53	51.80	51.72	23.18	-----
CO2	3.36	15.14	12.23	12.23	14.22	14.21	67.37	-----
N2	0.18	1.12	0.87	0.88	1.02	1.04	0.37	-----
CH4	0.04	0.29	0.24	0.22	0.26	0.27	0.35	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.69
CH3OH	0.00	0.48	0.42	0.34	8.16	8.14	3.97	97.42
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.47
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.17
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.14
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.08
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.89
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.11
TOTAL :	99.61	99.86	100.08	99.85	99.64	99.74	100.23	100.00
DENS,g/cc	0.005	0.050	0.032	0.032	0.037	0.037	0.005	0.792
AV.MOL.WT	13.06	23.54	20.90	20.93	24.29	24.24	37.63	32.15
Mm3/hr	877.1	2945.1	3823.8	3822.2	3294.0	3297.3	12.4	-----
ksmol/hr	39.13	131.39	170.59	170.52	146.95	147.04	0.55	11.17
1/hr,prod	-----	-----	-----	-----	-----	-----	-----	453.38

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

=====

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
		-----	-----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	39.7	39.9
CARBON MONOXIDE CONVERSION	(%) :	13.4	13.4
CARBON DIOXIDE CONVERSION	(%) :	-0.1	-0.2
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.01
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	37.9	39.6
CARBON MONOXIDE CONVERSION	(%) :	12.8	13.0
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	37.4	37.6
CARBON MONOXIDE CONVERSION	(%) :	12.6	12.5
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR	OVERALL
	GC Average	*
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (%) :	96.8	99.0
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.3

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEDH SOURCE	mmol/hr-kg cat	kg/1000 Mm3 fresh feed	kg/1000 Mm3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	26.66	414.4	95.1
As Net MeOH produced, OVERALL balance	25.78	400.7	92.0

REACTOR FEED {H2/(CO+1.5CO2)} : 0.50

REACTOR FEED {(H2-CO2)/(CO+CO2)} : 0.35

APPROACH TO METHANOL EQUILIBRIUM (deg.C) : 19.27

APPROACH TO WATER-GAS EQUILIBRIUM (deg.C) : 7.15

METHANOL COLLECTED AS % OF CALCULATED : 96.3

CALCULATED METHANOL PRODUCTION RATE (Kmmol/hr) : 11.34

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT MATERIAL BALANCE SUMMARY

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-19.11692	-2.04202	-1.84191
CO	-4.82820	0.73114	-1.66026
CO2	-10.25867	1.66473	-1.16494
N2	-923.71320	2.44337	-1.97013
CH4	n.a.	2.60170	-2.19612
H2O	-----	n.a.	n.a.
CH3OH	-----	8.12907	3.30807

OVERALL ELEMENTAL BALANCE (Kg-atoms/hr) :

STREAM #	INPUTS		OUTPUTS				(IN-OUT)/IN
STREAM NAME	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	87.8687	74.1503	3.0959	0.1432	-----	77.3894	11.9260
CO2	20.8562	19.8965	0.8307	0.4162	-----	21.1434	-1.3768
CH3OH	0.5790	0.6302	0.0263	0.0245	10.9182	11.5992	-1903.4044
OTHERS	0.3837	0.3771	0.0157	0.0028	0.1117	0.5073	-32.2326
TOTAL C	109.6876	95.0541	3.9686	0.5867	11.0299	110.6394	-0.8677
HYDROGEN:							
H2	118.1666	69.3769	2.8966	0.0610	-----	72.3344	39.7860
H2O	0.0000	0.0000	0.0000	0.0000	0.2755	0.2755	n.a.
OTHERS	3.8506	4.0292	0.1682	0.1087	44.0077	49.3139	-1154.7173
TOTAL H	122.0171	73.4061	3.0648	0.1696	44.2832	120.9239	0.8961
OXYGEN:							
TOTAL O	130.1601	114.5735	4.7836	1.0005	11.1677	131.5252	-1.0488
NITROGEN:							
TOTAL N	2.9943	2.9300	0.1223	0.0046	-----	3.0569	-2.0912
TOTAL MASS FLOW (kg/hr)	3568.6311	3093.0684	129.1393	23.2450	359.0964	3604.5491	-1.0065

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]	FRESH FEED GAS
	GC#1	GC#2
	-----	-----
MASS BALANCE (%) :	0.01	-0.01
ELEMENTAL BALANCE (%) :		
CARBON	0.44	0.25
HYDROGEN	1.72	1.20
OXYGEN	0.34	0.18
NITROGEN	-3.04	-0.12
		0.70
		-2.20
		0.23
		8.86

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
PROCESS VARIABLES & ANALYTICAL SUMMARY

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DATE : 07-DEC-99
TIME : 08:18:45
TIME INTERVAL : FROM: 0600 09-Jan
                TO: 0800 09-Jan

NUMBER OF AVERAGED HOURS : 25
RUN ID NUMBER : E7.127
FEED GAS TYPE: CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 152.1
OIL/SLURRY REACTOR INLET TEMP. (deg.C) : 14.5
AVG. REACTOR SLURRY TEMPERATURE (deg.C) : 250.0
REACTOR FREEBOARD TEMPERATURE (deg.C) : 246.3
OIL/SLURRY OUTLET TEMP. (deg.C) : 242.7
REACTOR FEED GAS PRESSURE (kPa) : 5532
REACTOR EFFLUENT GAS PRESSURE (kPa) : 5287
GAS SUPERFICIAL VELOCITY (cm/sec) : 15.5
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 0.0
SLURRY CONCENTRATION (wt%) : 39.0
CATALYST OXIDE IN REACTOR (kg oxide) : 425
GAS HOLD-UP (%) : 32.7
SPACE VELOCITY (1/kg-hr) : 9031
RECYCLE/FRESH FEED RATIO : 3.391
OIL/SLURRY CIRCULATION RATE (m3/hr) : 0.0
PROD.SEPARATOR GAS FLOWRATE <50> + <55> (ksmol/hr) : 137.53
PURGE GAS FLOW RATE <50> (ksmol/hr) : 5.22
HEAT TRANSFER COEFFICIENT (Watt/m2-deg.C) : 565
  
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STREAM #	1	55	15	15	32	32	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDH PRODUC
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
=====	=====	=====	=====	=====	=====	=====	=====	=====
	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<MOLX>	<WTX>
H2	59.47	26.69	35.10	34.85	24.48	24.59	4.93	-----
CO	36.47	56.27	51.30	51.34	51.53	51.51	23.18	-----
CO2	3.43	15.17	12.28	12.26	14.27	14.25	67.37	-----
N2	0.17	1.04	0.83	0.84	0.97	0.97	0.37	-----
CH4	0.05	0.33	0.27	0.26	0.30	0.31	0.35	-----
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.68
CH3OH	0.01	0.29	0.32	0.21	8.10	8.09	3.97	97.43
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.02
C2H5OH	-----	-----	-----	-----	-----	-----	-----	0.47
C3OH'S	-----	-----	-----	-----	-----	-----	-----	0.17
C4OH'S	-----	-----	-----	-----	-----	-----	-----	0.14
C5OH'S	-----	-----	-----	-----	-----	-----	-----	0.08
ALKATENES	-----	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	-----	0.89
ALDEHYDES	-----	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	-----	0.12
TOTAL :	99.60	99.80	100.12	99.76	99.66	99.72	100.23	100.00
DENS,g/cc	0.006	0.051	0.032	0.033	0.037	0.037	0.005	0.799
AV.MOL.WT	13.03	23.46	20.84	20.87	24.21	24.18	37.63	32.16
Mm3/hr	877.2	2965.6	3845.8	3842.9	3312.3	3314.5	12.4	-----
ksmol/hr	39.13	132.30	171.57	171.44	147.77	147.80	0.56	11.74
l/hr,prod	-----	-----	-----	-----	-----	-----	-----	456.30

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
		----	----
CALCULATED BY GAS COMPOSITION			
HYDROGEN CONVERSION	(%) :	39.6	39.5
CARBON MONOXIDE CONVERSION	(%) :	13.5	13.5
CARBON DIOXIDE CONVERSION	(%) :	0.0	-0.3
RATIO H2 CONSUMED/CO CONSUMED	:	2.01	1.99
CALCULATED BY METHANOL IN EXIT GAS			
HYDROGEN CONVERSION	(%) :	37.9	38.9
CARBON MONOXIDE CONVERSION	(%) :	13.0	13.2
CALCULATED BY OVERALL BALANCE			
HYDROGEN CONVERSION	(%) :	37.4	37.7
CARBON MONOXIDE CONVERSION	(%) :	12.8	12.9
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	2.00

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL *
	-----	-----
CO (+CO2) SELECTIVITY TO METHANOL (%) :	97.3	98.3
CO (+CO2) SELECTIVITY TO ETHANOL (%) :	-----	0.3

* Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	smol/hr-kg cat	kg/1000 Nm3 fresh feed	kg/1000 Nm3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	27.04	420.3	96.0
As Net MeOH produced, OVERALL balance	26.15	406.4	92.9

REACTOR FEED {H2/(CO+1.5CO2)} :	0.50
REACTOR FEED {(H2-CO2)/(CO+CO2)} :	0.36
APPROACH TO METHANOL EQUILIBRIUM (des.C) :	19.22
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) :	5.46
METHANOL COLLECTED AS % OF CALCULATED :	96.3
CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) :	11.51

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

COMPONENT BALANCE (IN-OUT)/IN :

STREAM # STREAM LOCATIONS COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[1+55]-15] REACTOR FEED	[32 - (50+55+62+68)] REACTOR EFFLUENT
	<% diff.>	<% diff.>	<% diff.>
H2	-19.32101	-1.98894	-1.58133
CO	-4.61493	0.79316	-1.80849
CO2	-11.29485	1.84221	-0.90746
N2	-323.77640	0.83019	-0.12846
CH4	n.a.	3.47958	-2.48672
H2O	-----	n.a.	n.a.
CH3OH	-----	6.44815	3.85220

OVERALL ELEMENTAL BALANCE (Kg-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	%
CARBON:							
CO	88.0144	74.4468	2.9388	0.1442	-----	77.5297	11.9124
CO2	21.0208	20.0730	0.7924	0.4189	-----	21.2843	-1.536
CH3OH	0.3634	0.3838	0.0151	0.0247	11.0863	11.5099	-3067.5876
OTHERS	0.4423	0.4379	0.0173	0.0028	0.1134	0.5714	-29.1958
TOTAL C	109.8409	95.3415	3.7636	0.5906	11.1997	110.8953	-0.9599
HYDROGEN:							
H2	119.5036	70.6285	2.7881	0.0614	-----	73.4779	39.5140
H2O	0.0000	0.0000	0.0000	0.0000	0.2740	0.2740	n.a.
OTHERS	3.2230	3.2868	0.1297	0.1094	44.6852	48.2112	-1395.8513
TOTAL H	122.7265	73.9153	2.9178	0.1708	44.9593	121.9631	0.6220
OXYGEN:							
TOTAL O	130.4194	114.9765	4.5387	1.0071	11.3372	131.8594	-1.1042
NITROGEN:							
TOTAL N	2.8665	2.7598	0.1089	0.0046	-----	2.8734	-0.2392
TOTAL MASS FLOW (kg/hr)	3577.5286	3103.4265	122.5074	23.3986	364.6028	3613.9353	-1.0177

ELEMENTAL BALANCE (IN-OUT)/IN :

	REACTOR FEED GAS [15 - 32]		FRESH FEED GAS
	GC#1	GC#2	[15-(50+62+68)]
MASS BALANCE (%) :	0.00	0.00	-0.08
ELEMENTAL BALANCE (%) :			
CARBON	0.42	0.16	0.54
HYDROGEN	1.73	0.59	-3.01
OXYGEN	0.35	0.08	0.46
NITROGEN	-0.25	-0.11	13.11

END

**DATE
FILMED**

2 / 13 / 92