UNCLASSIFIED

THIS DOCUMENT CONSISTS OF 10 PAGES
THIS IS COPY 14 OF 14A

~~SECRET~~
DATE 7/7/48 INITIALS R.D.S.

MM-176

Contract Number AT-33-1-GEN-53

RECEIVED

OCT 11 1995

OSTI

MOUND LABORATORY

Operated By

MONSANTO CHEMICAL COMPANY

MIAMISBURG, OHIO

M. M. Haring
Laboratory Director

UNCLASSIFIED
Classification changed to _____ by _____
authority of Paul B. Dowd, th 6/23/70
by Alberta V. Weedner, 7/14/70
Reviewed by C.W. Huntington 8/2/79

GENERAL CHEMISTRY PROGRESS REPORT

~~Caution~~

~~This document contains information affecting the National Defense of the United States, its transmission or the disclosure of its contents in any manner to an unauthorized person is prohibited and may result in severe criminal penalties under applicable Federal Laws.~~

~~Restricted Data~~

~~This document contains restricted data as defined in the Atomic Energy Act of 1946.~~

Date: August 1-31, 1948

Prepared by: W. H. Power

Distributed: OCT 5 1948

~~SECRET~~

UNCLASSIFIED

DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED

MASTER

~~SECRET~~
UNCLASSIFIED

MM-176

DISTRIBUTION

1. - M. M. Haring
2. - J. J. Burbage
3. - Site Y
4. - Site Y
5. - Area Manager
6. - Area Manager
7. - Area Manager
8. - R. A. Staniforth
9. - Author
10. - J. W. Heyd
11. - Central Files
12. - Central Files
13. - Central Files
14. - Central Files

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

UNCLASSIFIED

DISCLAIMER

Portions of this document may be illegible in electronic image products. Images are produced from the best available original document.

UNCLASSIFIED

MLM-176

GENERAL CHEMISTRY GROUP

S. Barth, M. Ford, P. Dismore, and W. Power

ABSTRACT

Dialysis Studies of Postum Solutions - S. Barth

Dialysis studies of 1.5 N nitric acid solutions of postum of concentrations of 10^7 , 10^8 , and 10^9 d./min./ml. showed an average of 93 per cent dialyzable during a 24 hour period.

Decomposition Potentials of Postum Solutions - W. Power

Electrolytic reduction of postum in 4.7 N hydrochloric acid solution was followed by recording ionization current. Two inflections at 0.41 and 0.23 volts to the normal calomel electrode were recorded.

DETAILED REPORT

Dialysis Studies of Postum Solutions - S. Barth

In order to establish more satisfactory and reproducible conditions for the dialysis study of postum solutions, diffusion times have been varied from fifteen minutes to twenty-four hours. Results for shorter time intervals have already been reported.¹ Tables I to IV give results of seven and twenty-four hour runs.

UNCLASSIFIED

UNCLASSIFIED

MM-176

Table I

DIALYSIS OF POSTUM IN 1.5 N NITRIC ACID

1.24×10^9 d./min./ml. pH 0.02

Seven Hours Dialysis

Concentration of Solution B After 7 Hours Dialysis d./min./ml.	Per Cent Theoretical Equilibrium
2.94×10^8	83
3.08×10^8	87
3.28×10^8	93
3.29×10^8	93
3.36×10^8	94
3.13×10^8	90
Average	90
Standard Deviation	3.8
Probable Error of Mean	1.1

UNCLASSIFIED

UNCLASSIFIED

Concentration of Solution B After 24 Hours Dialysis	d./min./ml.	Per Cent Theoretical Equilibrium
5.54 x 10 ⁸	91	
5.64 x 10 ⁸	93	
5.73 x 10 ⁸	94	
5.82 x 10 ⁸	96	
5.86 x 10 ⁸	97	
5.81 x 10 ⁸	96	
5.86 x 10 ⁸	97	
Average	95	
Standard Deviation	2.1	
Probable Error of Mean	1.0	

Table II
DIALYSIS OF POTIUM IN 1.5 N NITRIC ACID
 2.12×10^9 d./min./ml.
24 Hours Dialysis

MM-176

UNCLASSIFIED

UNCLASSIFIED

~~SECRET~~

MM-176

Table IIIDIALYSIS OF POSTUM IN 1.5 N NITRIC ACID 2.39×10^8 d./min./ml. pH 0.0224 Hours Dialysis

<u>Concentration of Solution B After 24 Hours Dialysis d./min./ml.</u>	<u>Per Cent Theoretical Equilibrium</u>
6.18×10^7	90
5.88×10^7	86
6.15×10^7	90
6.57×10^7	96
6.08×10^7	89
6.62×10^7	97
6.63×10^7	<u>97</u>
Average	92
Standard Deviation	4.3
Probable Error of Mean	1.4

~~SECRET~~

UNCLASSIFIED

UNCLASSIFIED

MLM-176

Table IVDIALYSIS OF POSTUM IN 1.5 N NITRIC ACID 6.30×10^7 d./min./ml.24 Hours Dialysis

<u>Concentration of Solution B After 24 Hours Dialysis d./min./ml.</u>	<u>Per Cent Theoretical Equilibrium</u>
1.72×10^7	95
1.68×10^7	93
1.69×10^7	94
1.59×10^7	88
1.57×10^7	87
1.76×10^7	<u>98</u>
Average	93
Standard Deviation	3.8
Probable Error of Mean	1.2

Results of this and preceding reports together with those of Fainberg's² are plotted on Plate P-57. Points at short time intervals are noticed to be scattered in the steeply-rising portion of the curve. After 24 hours' dialysis time, however, the curve is quite flat, and three runs 10^7 , 10^8 , and 10^9 activity concentrations were found to check each other within the accuracy of the method. Rate of dialysis did not vary with concentration in the range used. The average of the three 24 hour runs,

UNCLASSIFIED

DIALYSIS OF POSTUM IN 1.5 N NITRIC ACID.

UNCLASSIFIED

PLATE P-57

UNCLASSIFIED

UNCLASSIFIED

MLM-176

93 per cent, will be used to calculate per cent dialyzable activity in future runs in which postum in slightly acid or neutral unbuffered solutions will be studied.

References

1. Barth, S., General Chemistry Progress Reports, February through June, 1948.
2. Fainberg, A., Final Report No. 28, March 11, 1946.

Decomposition Potentials of Postum Solutions - W. Power

Electrolytic reduction of postum in 4.7 N hydrochloric acid was followed by an ionization current record as previously described.¹ A tracing of the automatically recorded record is given by Plate P-55. Two inflections were noted, one at 0.41 and one at 0.23 volts to the normal calomel electrode.

FUTURE PLANS

More runs will be made in an attempt to verify the two inflections noticed and the conditions varied to permit an explanation of the inflections. If the inflections are due to two oxidation states of postum being reducible at different potentials, introduction of a reducing chemical as hydrazine or hydroxylamine should eliminate one of the inflections.

Reference

1. Power, W., General Chemistry Progress Report, MLM-155, July 1-31, 1948.

WHP/mw

UNCLASSIFIED

UNCLASSIFIED

MM-176

ELECTROLYTIC REDUCTION OF POSTUM

2.35 d./min./5 λ in 4.7 N HCl

+0.23 V.

+0.41 V.

—IONIZATION CURRENT—
2000 μ a

CIRCUIT I PLATE P-55
AMPLIFIER EL-150

IMPEDANCE 5000 MEGOHMS
RANGE 2500 MV.

SPEEDOMAX.
FULL SCALE: 10 MV.
CHART SPEED: 45 IN./HR.

+0.45 +0.40 +0.35 +0.30 +0.25
—POTENTIAL vs. N.C.E.—

UNCLASSIFIED

PLATE P-56