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MLM-162

Contract Number AT-33-1-GEN-53

MONSANTO CHEMICAL COMPANY - UNIT III

DAYTON, OHIO

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LABORATORY INSTRUMENT DESIGN PROGRESS REPORT

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Date: July 1-31, 1948

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Distributed: AUG 16 1948

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LABORATORY INSTRUMENT DESIGN GROUP

L. A. Jewett, C. A. Lasher, R. G. Olt, and E. W. Stautzenbach

ABSTRACT

One current model Ryerson quartz-fiber microbalance fitted with a quartz-fiber beam but lacking the entire optical system was received from Argonne National Laboratory on June 30, 1948.

The first trials of the fiber drawing machine indicated excessive vibration originating in the motorized variable-speed transmissions and accentuated by the machine frame. Isolation of the motorized transmission vibrations from the drawing machine permitted successful drawing on first trials of the eight diameters of fibers between 750 and 5 microns needed for balance beam construction.

Each trial yielded a full reel (approximately 150 feet) of usable fiber, though storage facilities were inadequate to preserve the entire quantity.

Training of L. A. Jewett and E. W. Stautzenbach in the construction and installation of quartz-fiber beams was started.

DETAILED REPORTBalance

One partially completed current model Ryerson quartz-fiber microbalance was received from Argonne National Laboratory on June 30, 1948.

The portion received consisted of the balance assembly per drawings C.S. 1013 less the aluminum outer case, prisms, lenses, lamps, and associated holders plus a quartz-fiber beam system in addition to the one assembled in the balance. Serial number of the balance is USA 41011-ANL, USA 13579-ML. All lenses, prisms, and drawings of mountings needed for completion of this balance are on hand.

Quartz-Fiber Research

Preliminary tests on the fiber drawing machine completed in June revealed vibration in the motorized variable-speed transmissions causing noticeable frame vibration. Fibers drawn with vibration present

Calculated Fiber Diameter		Stock Rod Dia. In.	Feed In. per Min.	Reeling Rate In. per Min.
In.	Microns			
.023	750	.350	1.720	400
	200	.225-.234	1.172	2000
	175	.225-.234	.900	1000
	100	.225-.234	.580	2000
	75	.225-.234	.328	2000
	23	.074	1.200	7660
	23	.074	1.200	8200
	12	.023	1.200	2880
	5	.023	.400	5000

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TABLE I

Torch Tip		Gas Pressure		Flame Length Inner Cone, In.	Torch Angle to Horizontal
Airco Size No.	Flame Shape				
		Oxygen	Propane		
#8	Long	10	10	3/4	30°
#4	Long	10	10	1/2	30°
#4	Long	10	10	3/8	30°
#4	Long	10	10	3/8	30°
#4	Long	10	10	3/8	30°
#00	Bulbous	10	10	1/8	40°
#00	Bulbous	5	5	1/8	40°
#00	Long	8	6.5	1/16	40°
#00	Long	3.5	3.5	1/16	40°

were variable in diameter and strength. No correlation was found between calculated and drawn fiber sizes.

For subsequent trials, both the feed and reel drive transmissions were removed from the drawing machine frame, mounted on wall brackets, and connected to the machine with 1 inch I.D. tubular rubber connections. Vibration from the transmissions was not transmitted to the drawing machine frame with this arrangement.

Table I lists the conditions under which were drawn the eight sizes of fibers needed for balance beam construction. These are not necessarily optimum conditions for the first full reel drawn in each size was considered satisfactory except for the 23 micron size.

Three reels of 23 micron fibers were drawn in order to provide a range of slight variations in size and to gain experience in the drawing and handling of small size fibers.

Numerous additions and improvements to the fiber drawing machine such as removable bands for the reel, a more rigid frame, improved vibration control, etc., are contemplated but have been set aside until experience has been gained in construction and installation of balance beams.

L. A. Jewett and E. W. Stautzenbach have practiced handling beams from construction jig to carrying case to balance and return. Their practice has been started in working fiber following, in general, the techniques listed in the Argonne manual.

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