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By NE Broderick ADD 3/15/96

Mr. Earl P. Stevenson
A. D. Little, Inc.
30 Charles River Rd.
Cambridge, Mass.

Dear Mr. Stevenson:

After considerable mechanical difficulties, the "fluidized" operations on the methoxy compound are now progressing satisfactorily. The fluidized operations involve suspending the absorbent powder in an air stream during absorption and in an oxygen stream during desorption. The experimental tube is 22 mm. in diameter and approximately 50 cm. long, and is jacketed with a heat transfer fluid that can be either heated or cooled. The system involves a closed circuit in which air is circulated and oxygen introduced to maintain constant pressure during absorption. Measurements of the oxygen introduction furnish the information for calculating the rates of absorption. The circulating air stream passes through a cooling coil before entering the "jiggling" tube, and it is dried with magnesium perchlorate before passing over the compound. The heat transfer medium employed is normal butyl alcohol, the temperature of which is thermostatically controlled at the desired value. During desorption oxygen is recirculated through the unit in order to fluidize the suspension, and the rate of desorption is determined by the rate of oxygen removal from the closed circuit necessary to maintain constant pressure. The gas in the closed circuit system is circulated by a diaphragm type pump which minimizes the danger of leakage and avoids the introduction of any oil into the absorption system.

Batch operation with approximately 20 grams of the 35-80 mesh methoxy compound obtained from the Rumford Chemical Company was carried out in some preliminary runs. In these batch runs, the powder was fluidized in the unit without any net flow of the solid such as would take place in a continuous unit. Under operating conditions, this quantity of absorbent filled about half of the glass tube and very little difficulty of carry-over of the fine dust was encountered. The dusting of the compound has appeared to be the greatest for initial operation and to become progressively less. This would indicate

that the dust was present in the original material and was not largely due to attrition during the fluidized operation.

The attached figure presents the results obtained in three runs at atmospheric pressure. In this figure the weight per cent oxygen saturation is plotted as a function of the time. The three runs were essentially the same with the exception that the temperatures were 7°, 0°, and -12°C respectively. The curves indicate a very rapid rate of absorption and become asymptotic at about five minutes. The asymptote or saturation value is not as high as would be expec ted but we believe that this is due to the fact that the compound employed was not a particularly active sample. The run at 7°C. was made first and due to the low saturation value the compound was removed and reactivation attempted. The runs at 0 and -12°C. indicate a higher saturation value but still point to a rather inactive compound. We are planning to carry out runs with more active compounds and believe that they will appear even more favorable.

Comparison of these data with previous runs made on material packed in a tube is not possible because these latter runs all were made starting with the bed at 100°C, and the absorption was therefore retarded because of the cooling that had to be accomplished before the absorption could take place. However, no greatly increased rate of absorption in the jiggling operation is suspected.

The data on desorption in the fluidized operation are very meagre but qualitatively they indicate that desorption is very rapid.

We feel that the fluidized operations appear extremely promising and runs are being made to give more exact engineering data relative to the absorption and desorption characteristics.

Yours very truly,

E. R. Gilliland WEC

E. R. Gilliland

rl
cc: W. E. Lobo
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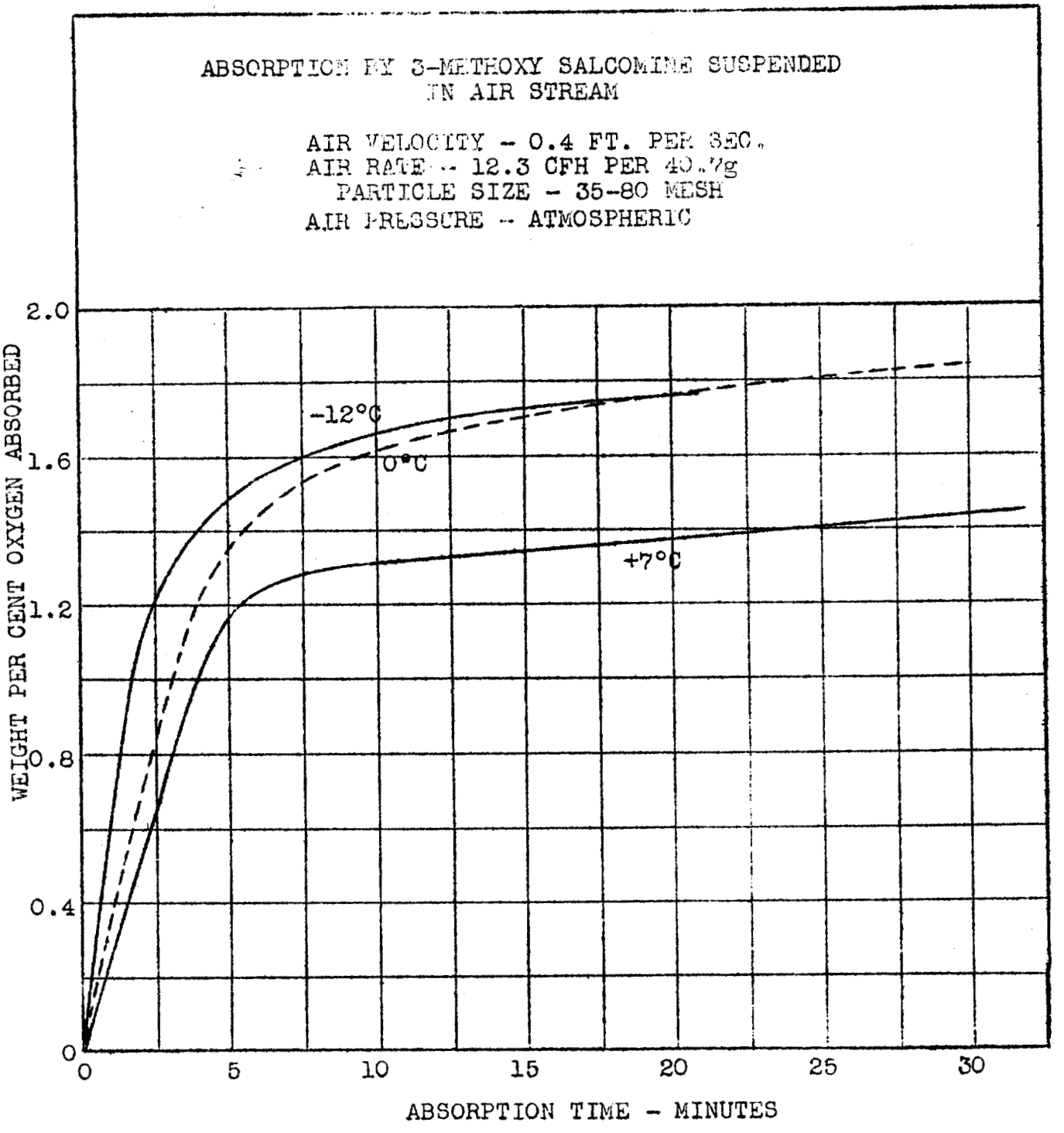
ABSORPTION BY 3-METHOXY SALCOMINE SUSPENDED
IN AIR STREAM
AIR VELOCITY - 0.4 FT. PER SEC.
AIR RATE - 12.3 CFH PER 40.7g
PARTICLE SIZE - 35-80 MESH
AIR PRESSURE - ATMOSPHERIC
-12°C
0°C
+7°C
WEIGHT PER CENT OXYGEN ABSORBED
2.0
1.6
1.2
0.8
0.4
0
0
5
10
15
20
25
30
ABSORPTION TIME - MINUTES

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