

Richardson
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MASSACHUSETTS INSTITUTE OF TECHNOLOGY
Cambridge
Massachusetts

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October 16, 1942

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

~~This document contains information affecting the national defense of the United States within the meaning of the Espionage Act, 50 U.S.C., 31 and 32. Its transmission or the revelation of its contents in any manner to an unauthorized person is prohibited by law.~~

Dear Mr. Stevenson:

Further work on the deterioration project appears to be in line with the indications that we reported in our letter of October 3. The deterioration appears to be a very definite function of the absolute quantity of oxygen produced per unit of absorbent. The data at present are not very complete but runs are in progress which we feel should give the definite answer. However, the present indications are so interesting that we feel they should be reported even if they have to be modified to some extent at a later date.

Figure 1 shows a plot of the productivity as a function of the number of cycles for a variety of different runs. The experimental data on which these curves are based are not very complete but we believe they are sufficient to give a general picture. We have adopted the word productivity to indicate the amount of oxygen absorbed in a given test cycle and believe that it is preferable to activity which has been used in a number of ways by the different groups. Obviously, the amount of oxygen produced during the life of the test sample is proportional to the areas under the curves given in Figure 1. It will be noted from Figure 2 that a cycle giving a high initial productivity likewise gives a high rate of deterioration.

Figure 3 shows a curve of saturation versus oxygen production. The curve represents data taken at absorption pressures of 40, 80, and 250 lbs. per sq. in. and for long and short cycles. The correlation indicates that the deterioration is mainly a function of the absolute amount of oxygen produced and is not very greatly affected by the cycle conditions. If such a conclusion is substantiated, the question of the cycle would be less limited than we had assumed during the last few months. In other words,

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Mr. E. P. Stevenson

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as far as deterioration is concerned, a high pressure cycle is apparently no worse than our 80 lb. cycle. Likewise, it may be that the adiabatic operation at high pressure will again look promising.

A number of additional runs are in progress in an attempt to obtain more accurate data for a graph of the type of Figure 1. In addition, we do not feel completely certain that the degree of saturation is the only variable in determining deterioration and therefore plan to make runs giving different rates of absorption but also giving the same saturation per cycle. Likewise, the effect of moisture content is not very certain. However, with the more satisfactory picture that is being obtained we should be able to obtain definite answers on these other variables.

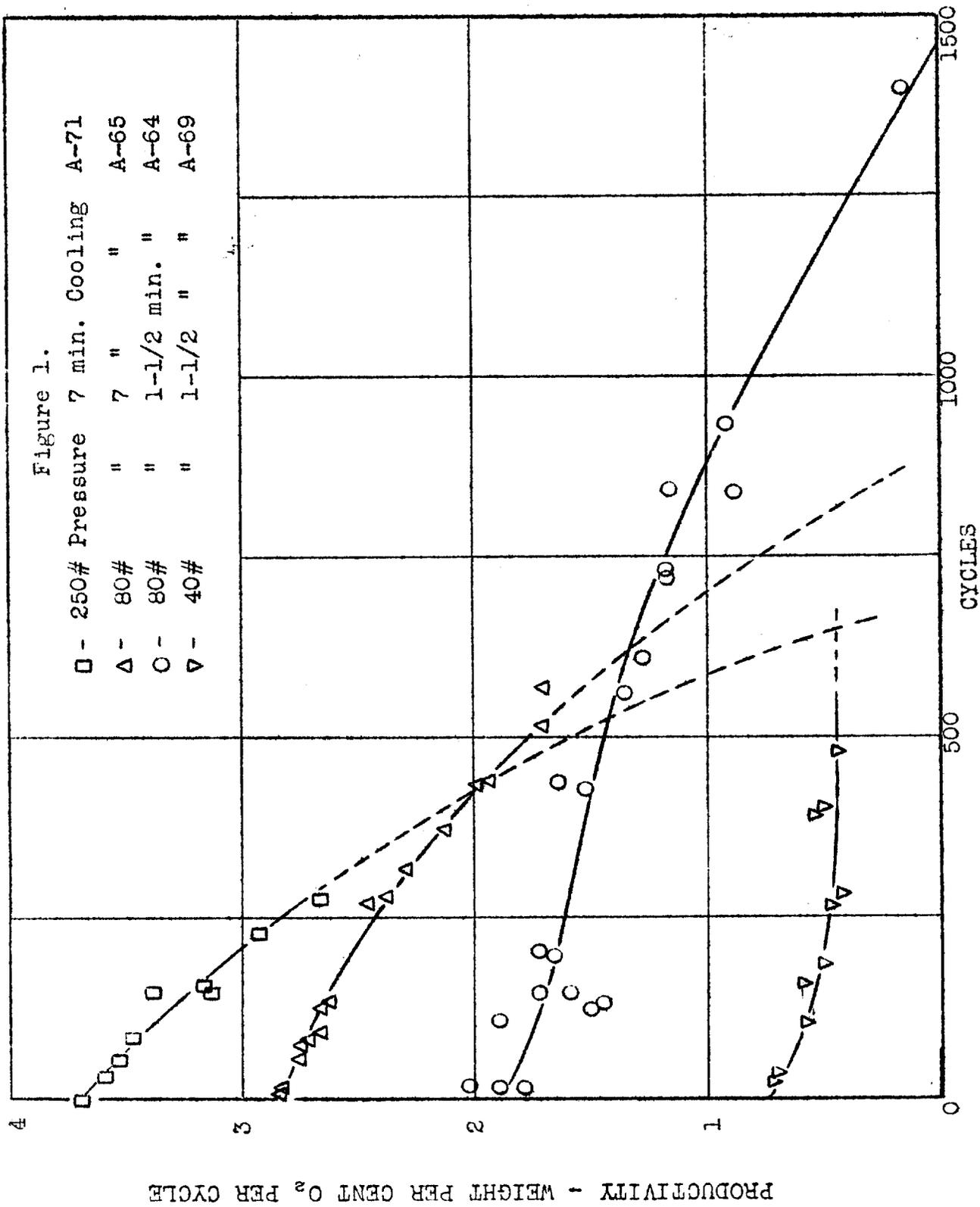
Yours very truly,

E. R. Gilliland
E. R. Gilliland *ll*

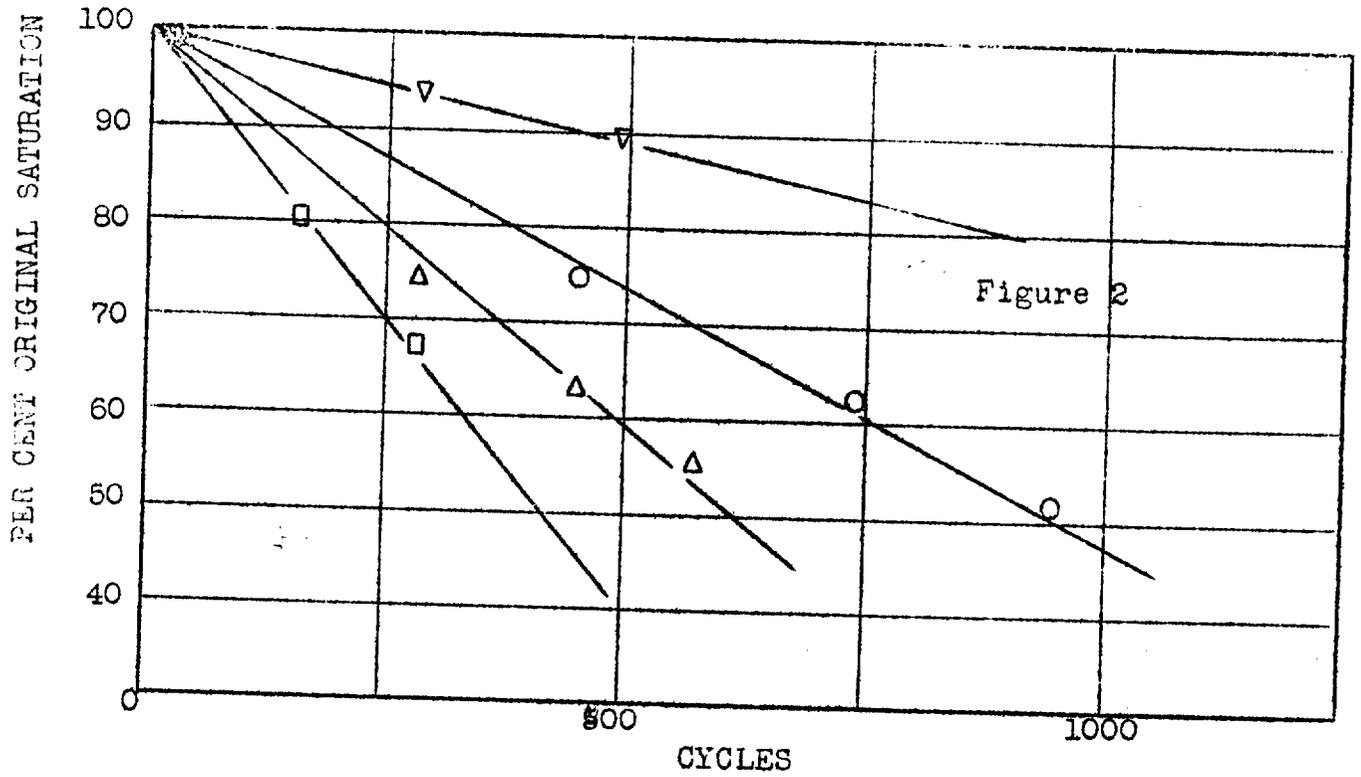
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cc: W. E. Lobo
H. Diehl
A. T. Larson
D. B. Curll, Jr.
M. Calvin
T. A. Geissman
S. S. Prentiss (2)
C. C. Furnas (3)

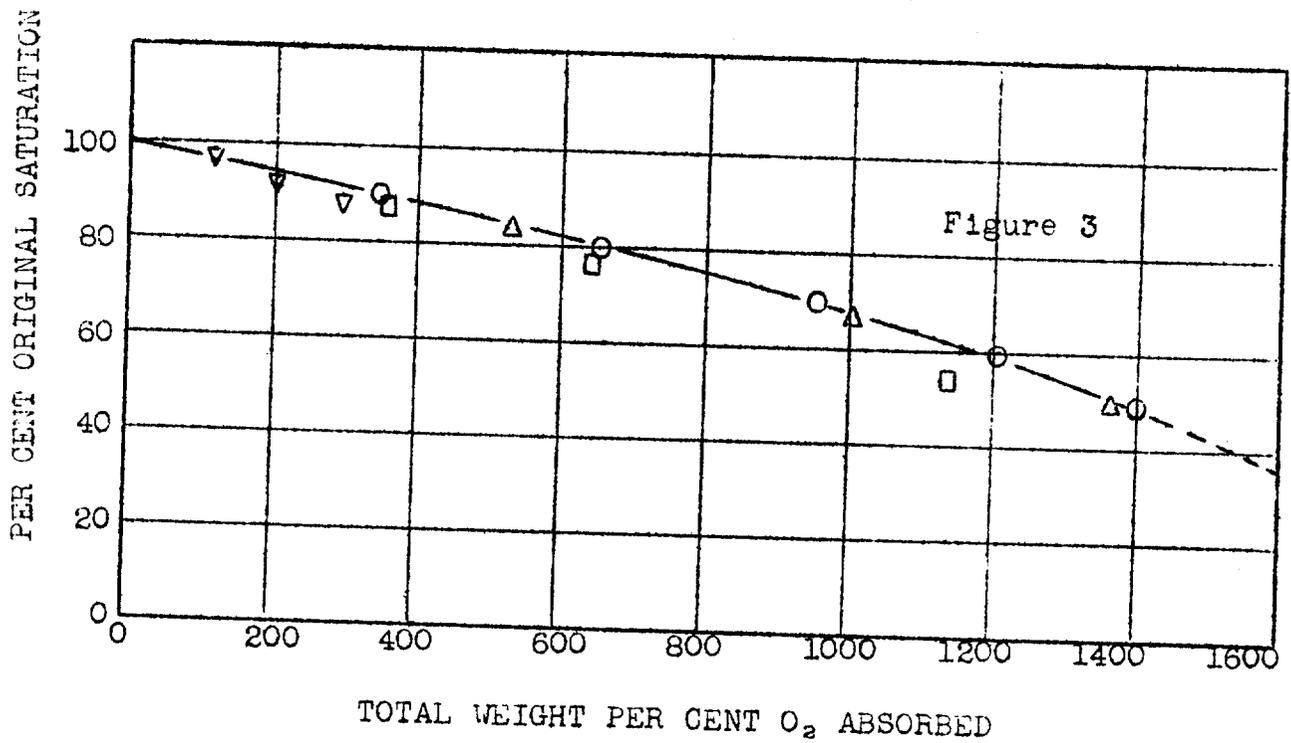
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- - 250# Pressure 7 min. cooling
- Δ - 80# " 7 " "
- - 80# " 1-1/2 min. cooling
- ▽ - 40# " 1-1/2 " "



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