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September 1, 1948

Mr. J. P. Burns
807 Munsey Building
Washington, D. C.

BEST COPY AVAILABLE

Dear Mr. Burns:

Thank you for your letter of July 21 enclosing the assignment of Cases 5, 6, 7, and 8.

Considerable water has flowed down the Mississippi since we last met in May. Almost enough things have happened to warrant my visiting you personally again.

Our relations with the Naval Research Laboratory have been very puzzling. It quickly became evident that our estimates of the cost of building a 100 cu. ft. unit were too low. When I indicated this to the NRL and suggested a contract, Dr. Sanders dashed out to Ames and looked the work over. Hach's machine was not finished and apparently did not make much of an impression on Dr. Sanders, for although he stated he would return in about two weeks in connection with a trip to Peoria he did not do so. We heard nothing further from the NRL until the week following Calvin's visit East. A copy of this letter from Dr. Sanders is enclosed. I received the impression he regretted that the business had ever gotten started. I appreciate this since I believe he is justified by the results. We have not produced an apparatus satisfactory for submarine use and have fallen down completely on the smaller medical unit. Under the circumstances I do not feel a further request to the NRL for funds is justified, even though the way is opened for at least the $2,000 originally mentioned. I decided therefore to ask the National

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BY AUTH. GE-DARJ 4.3.1
BY David L. Clark ADC DATE 4/3/96
By [illegible] Broderick ADD 3/13/96

Defense Research Committee to take over Hach's machine. I discussed the matter with Latimer and Calvin at Northwestern July 14 and we all agreed that this was probably the best thing to do, particularly if we could get Stevenson to agree to let Calvin and me proceed with the development of small machines. Accordingly I wrote Adams, Stevenson and Furnas trying to get the matter fixed up. Haven't heard yet. See enclosed correspondence. Will probably wind up paying for the machine myself.

We put Hach's machine in motion July 13th and produced about 12 cu. ft. of oxygen of 93 per cent purity per hour. The enclosed Report XXXIV described the machine. We have made a number of changes and have more than doubled the output. Hach has now completed extensive heat transfer measurements and tests on mixing type conveyors and has modified the conveyors so that the next time he tries it it is going to deliver the 100 cu. ft. expected. The job is too big for a submarine. The Bureau of Ships has told Stevenson (see correspondence enclosed) that such a machine has no use on American type submarines anyway. This is a very curious angle. Anyhow, the machine works and when the heat transfer bug is out will be the answer to the general problem of which type of machine is best. The transferring device and general idea of maintaining the deoxygenation pressure higher than the oxygenation pressure works fine.

Enclosed is the first draft of an application covering Hach's machine. The drawings have been done by a new draftsman and are not quite as neat as our earlier drawings; I hope, however, that you will find them satisfactory. Enclosed are the necessary first and last pages of the application already executed. This should save a few days time. The thing which has worried me about this application is that the same thing can be done by the so-called "fluid catalyst" technique worked out at Massachusetts Institute of Technology and commercialized by the Kellogg Company. Moreover, Furnas and Kellogg are thinking and probably have already started

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work on using the methoxy compound in this manner. I have not been able to learn much about the fluid catalyst technique but essentially it involves the transport of a solid by means of a gas stream. I am not sure just how the chambers are separated from one another but believe that a technique similar to that in Hach's machine must be used and advantage taken of the pressure differential to separate the oxygen in the deoxygenation chamber from the air in the oxygenation chamber. In our application, therefore, the emphasis should be thrown on this aspect of the machine and the problem of actually transporting the material through the chambers made a secondary consideration. As I indicated this transport can be effected by various methods including the use of a gas stream. This might possibly cover the fluid catalyst business.

The 3-methoxy compound shows real promise but unfortunately is extremely hygroscopic so that the air used must be extremely well dried. This is a serious disadvantage since it means extra weight and chemicals. Nevertheless the National Defense Research Committee is building a bomber unit using the 3-methoxy compound as well as one using the parent compound. At present the 3-ethoxy compound looks even better; it loses its water below 100°. It is faster perhaps than the methoxy compound although we are having troubles measuring the rate of oxygenation. I think it will be best if we shortly file another application specifically covering the 3-substituted compounds 3-nitro, 3-methoxy, 3-ethoxy, and 3-alkoxy in general.

Incidentally, all through Case 8 the 3-methoxy compound is incorrectly named. It should be di-(3-methoxysalicylal)ethylenediimine cobalt.

I believe that the office action on Case 3 must be answered sometime this month.

We have eight or ten reports in preparation including one large progress report.

Very truly yours,

Harvey Diehl

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Enc.: Reports XXIV, XXXII, XXXIV
XXXV, XXXVIII, XXXIX, XL
First draft Case 9, drawings, photostat copies, first and last pages executed.
Report of trip by Liggett and Head.
Copies of correspondence July 25-September 1.

cc: W. M. Latimer

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