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Aluminum Company of America

ALUMINUM RESEARCH LABORATORIES

POST OFFICE BOX 772

FRANCIS C. FRARY
DIRECTOR

New Kensington, Pa.

March 21, 1941

Dr. Leroy U. Gardner, Director
The Saranac Laboratory,
Saranac Lake, N.Y.

Dear Dr. Gardner:

I am very glad indeed to hear that the Ontario Mining Association has agreed to let you proceed with your program. If we can be of any further assistance to you in that connection, we shall certainly be very glad to do so.

With reference to the aluminum hydroxide, there are quite a number of varieties of this material, and the colloidal precipitated hydroxide which has never been dried behaves quite differently in its solubility from any of the dried varieties. There are two common varieties of dried aluminum hydroxide: (1) the alpha monohydrate and (2) the alpha trihydrate. If you precipitate an aluminum salt, such as the aluminum chloride which you mention, with ammonium hydroxide, you get a colloidal material which may be aluminum hydroxide or may be a basic chloride (which behaves quite differently in some respects from the aluminum hydroxide) depending upon the conditions of precipitation. If you dry the colloidal hydroxide, you may get either the alpha monohydrate or the alpha trihydrate or a beta trihydrate, which may go over in whole or in part to the alpha trihydrate with

time, all depending upon such conditions as temperature and rate of precipitation. There is an extensive literature on these hydrates, and much of it is very contradictory.

I do not know which varieties of hydrate you have used in your experiments, but if you will note Table 7 in the first article by Denny, Robson and Irwin, and Table 6 in their second article, you will see that while they got 92% reduction in the solubility of their silica with freshly precipitated $\text{Al}(\text{OH})_3$, they got only about 41% reduction with the commercial C.P. (presumably dry) product, and about the same with the same amount of bauxite which, like the commercial dry product, is the trihydrate. (I am assuming that they are using American bauxite - the European bauxites are mostly the alpha monohydrate.) Because of this uncertainty, I sent them some samples of pure alpha monohydrate and alpha trihydrate in very finely divided state, and you will note in Table 6 of their second article that this did not seem to have any effect in reducing the solubility of silica.

Because of the fact that we know we can increase the activity of aluminum hydrate by calcining it at a temperature of about 500°C , reducing the water to about 5% and converting the hydrate into one known as gamma alumina, we sent them some of this material, which is shown in the table as being "Activated Amorphous Alumina" (S 242-5), and which, as you will note, ^{gave} them an 89% reduction in the solubility of the silica.

Our aluminum hydrate is made by precipitation

out of an alkaline (sodium aluminate) solution rather than the acid solution which you have used. We do, however, produce an extremely finely divided grade of this material, which we sell under the designation "C-730 Aluminum Hydrate", which is much finer than any other known variety of hydrate, and actually averages in particle size around 0.6 microns. This would therefore be very well adapted, as far as its physical state is concerned, to the inhalation experiments. I am having a sample of this material sent to you under separate cover from our plant at East St. Louis, and we will be glad to furnish you with 50 pounds of it if it meets your requirements. We do not commercially produce this in the activated form, but we would be glad to activate some of it for you in the laboratory if you decide that that would be more useful for your experiments.

I am also having a sample of the activated variety sent you from East St. Louis, and if you are equipped to try the experiments on the insolubilization of silica, or other similar experiments, to determine the relative activity of these two forms, you would be able to determine which one of these would be better for your purpose. There will be no question of priorities or anything of that sort involved, and we will be glad to send you the material gratis when you decide which variety is most likely to be satisfactory for your purpose.

We also make another grade which we call "C-732" that is the same hydrate as C-730 but has been dried so that

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We also make another grade which we call "C-732" that is the same hydrate as C-730 but has been dried, so that

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it has about 10% of free moisture. This is somewhat more reactive than the C-730 grade, but would, I think be difficult to disseminate in the air in the form of dust, and would also, I think, promptly dry out if it were possible to disseminate it in the air; so that it would become the same as the C-730. However, if you would like a sample of this, we would be glad to send it to you.

We will be glad to do anything else that we can to help you in connection with these experiments.

Very truly yours,

FCF:ML


Director

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