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INTER-OFFICE LETTER

FROM Research Center OFFICE Mineral Products DEPT

FOR Cleveland OFFICE Auxiliaries DATE April 19, 1963

MR Dr. J. V. Hunn SUBJECT Lithopone - Germany

ANSWERING LETTER OF DICTATED BY

At our conference March 28 you showed me (and then took back with you) a memo concerning lithopone production in Germany by Sachtleben A-G. I believe there was the possibility of the exchange of information between this company and ours. You suggested, I believe, that I should give some consideration to how Sachtleben might be making high strength lithopone.

A 164 page book entitled, "Lithopone", by Dr. Erich A. Becker, was published in 1957 by the Berliner Union GmbH of Stuttgart, Germany. It contains what appears to be a detailed description of current practices in German lithopone manufacture. It might be a good idea for us to purchase this book. I have in front of me, now, a copy which belongs to John Crerar Library and I see that the technology used by Sachtleben is quite different from our own.

The book says that in the 1880's, Mr. R. Sachtleben was the first to achieve commercial success with a lithopone process based on chloridizing roasting. This process, which is said to be in wide use in Germany at present, is based on an ore consisting of a mixture of iron pyrite and zinc sulfide. This ore is given a preliminary roasting, which converts much of the sulfur to SO_2 which is then used to make sulfuric acid. The residue consists of iron oxide and zinc compounds in which most of the zinc is still present as ZnS with small amounts of ZnO and $ZnSO_4$.

This roasted residue is mixed with about 5% of unroasted pyrite and 17% of rock salt and is then reroasted in a mechanically rabbled multiple hearth furnace at 500 - 550°C. The reaction is exothermic and essentially all of the zinc is brought into a water soluble form. Countercurrent leaching with water is carried out on this material and a solution is obtained, containing the ions Zn^{++}, Na^{+}, Cl^{-}, and SO_4^{--}. The residue of iron oxide is used in a blast furnace for the production of metallic iron.

The ratio of zinc sulfate to zinc chloride in the zinc liquor is then adjusted by refrigerating the solution to remove sodium sulfate by crystallization, using the fact that the solubility of Na_2SO_4 is 21.9% at 25°C and only 4.5% at 0°C. The sodium sulfate crystals are used to make blanc fixe and in other chemical processes.

The zinc liquor is purified by adjusting the pH with ZnO and oxidizing with chlorine, (which is said to have replaced the older permanganate method), and by adding zinc dust to precipitate heavy metals.

For regular lithopone, the purified zinc liquor is mixed with barium liquor and the following reaction takes place.

$$ZnCl_2 + Na_2SO_4 + BaS = ZnS + BaSO_4 + 2NaCl$$

To obtain lithopone of higher strength, a zinc liquor with a lower sulfate content, (made by refrigeration), is used. The following equations are given for the production of lithopone containing 45.5% ZnS and 62.5% ZnS respectively.

$$2ZnCl_2 + Na_2SO_4 + 2BaS = 2ZnS + BaSO_4 + BaCl_2 + 2NaCl$$

$$4ZnCl_2 + Na_2SO_4 + 4BaS = 4ZnS + BaSO_4 + 3BaCl_2 + 2NaCl$$

The barium chloride solution obtained as a by-product in the above equations is mixed with the previously separated Na_2SO_4 to precipitate blanc fixe. If the zinc liquor is prepared from an acid-soluble zinc compound, such as ZnO, it is dissolved not in H_2SO_4, but in a mixture of H_2SO_4 and HCl so as to precipitate the lithopone from a chloride-containing solution.

The book discusses the calcination of lithopone and the way this is affected by chlorides. It says chlorides are good for the calcination, permitting it to be carried out at a lower temperature. Washing the pigment to remove soluble chlorides is done after the calcination.

I have presented the above description in some detail because it appears that the German practice is a long way from our own, and is in a direction in which we would probably not want to go, even if we knew every technical secret. I am in doubt, therefore, as to whether Sachtleben's know-how in lithopone is worth buying.

I have asked our librarian at Crerar for more information about German lithopone methods, and this will be available at a later date. I wanted you to have this information now, however, because it may be relevant to your future planning or negotiations.

Truman Kirkpatrick
Mineral Products Research Laboratory

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cc: SBC
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