

THE R. & H. CHEMICALS DEPARTMENT
E.I. du Pont de Nemours & Co., Inc.
Chemical Division--Niagara Falls
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Manufacture of Titanium Chloride

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Special Report

INTRODUCTION

On Friday, April 14th., the author called on Dr. Keats at the du Pont Experiment Station at Wilmington to discuss with him the manufacture of titanium chloride which in turn could be converted to the oxide.

RECOMMENDATION

In view of the large tonnage of chlorine involved, it is recommended that the problem of producing titanium chloride be reviewed and, if necessary, a certain amount of laboratory work be done in order to obtain a preliminary estimate of the possibility of producing titanium chloride.

DISCUSSION

The Krebs Corporation manufactures titanium dioxide from titanium ore imported from India. The manufacturing process consists of grinding the ore to 200 - 300 mesh and subsequently dissolving the iron and titanium in 70 - 72% sulfuric acid. The iron which is present in the ferric state is reduced to ferrous with scrap iron. The sulfuric acid solution is then diluted and the titanium sulfate hydrolyzed. The precipitated titanium dioxide is filtered, washed and calcined at 800°C.

The titanium oxide, known as anatase, obtained by the sulfate process is used in the preparation of paints. Anatase is not the most desirable form of titanium dioxide. Another form known as rutile is obtained on hydrolyzing the chloride. The rutile has better covering power and would be more desirable.

Dr. Keats of the Experiment Station is now working on a project to find a suitable method of manufacturing the rutile instead of the anatase. Rutile may be obtained either by hydrolyzing the chloride or else heating anatase to 1150°C. The rutile obtained by heating anatase is not satisfactory. At

DISCUSSION (Cont'd)

present, the only feasible method for obtaining the rutile seems to be from the chloride.

In view of the availability of large quantities of chlorine at Niagara Falls, it is logical for us to look into the possibility of manufacturing titanium chloride. Preliminary cost calculations by Dr. Keats indicate that the cost of the chloride would be less than the sulfate provided the manufacturing operations were carried out at Niagara Falls.

At the present time, the Krebs Corporation manufactures 10 tons of titanium pigment per day. This amount of titania would require about 24 to 38 tons of chlorine per day, depending upon the manufacturing methods developed.

The composition of the titanium ore now treated is:

TiO ₂	52%
Fe	30%
Al ₂ O ₃	5%
SiO ₂	
CaO	
MgO	

It will be noted that by-product iron chloride amounting to about 18 tons FeCl₃ per day would be produced, or the amount of iron chloride produced as by-product would be equal to the present consumption of FeCl₃ for Seweze treatment (5,500 tons in 1931).

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