

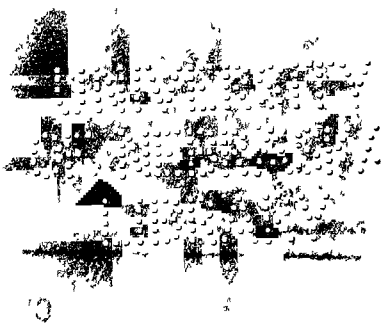
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THE PREPARATION
OF
ANHYDROUS YTTRIUM CHLORIDE

A Thesis Presented to the Faculty
of the
Graduate College
of
The University of Nebraska

in partial fulfillment of the requirements for the

Degree
of
MASTER OF ARTS



by

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The Preparation of Anhydrous Yttrium Chloride.

The best of the present methods of separating the rare earths are those employing a series of fractionations. These operations are very laborious and require much time, so that a simpler and quicker method is needed.

Doctor Benton Dales suggested the possibility of a separation of these elements by employing the organic addition products of the anhydrous chlorides. Perhaps some of these elements would not form an additive compound under the conditions that others would.

To form these organic compounds anhydrous yttrium chloride must be prepared in fairly large quantities. The present methods¹ of preparing the anhydrous chloride are not applicable to the production of large amounts and some of the methods published are of doubtful design. This investigation was made in order to

1. The Chemistry of the Rare Earths. S.I. Levy. Pg. 121.
Abegg's Handbuch der Anorganischen Chemie III, 149.

obtain the normal anhydrous yttrium¹ chloride in quantities sufficiently large to experiment with their organic addition products.

Since yttrium chloride dissolves in pyridine² and since pyridine possesses some ionizing power, an electric current was passed through a pyridine solution of yttrium chloride in hopes that metallic yttrium would be deposited. The metal could easily be converted into the chloride. No such result occurred because the electric current decomposed the pyridine. A solvent other than water must be used as elemental yttrium reacts with water.

Phosphorus forms very stable compounds with oxygen. It was thought that if a mixture of yttrium oxide were mixed with phosphorus and dry chlorine passed over the mixture, the phosphorus would unite with the oxygen and the chlorine unite with the yttrium. This experiment as well as many others failed.

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1. For brevity the elements of the yttrium group are designated in this thesis as "yttrium", although yttrium is only one of the several elements of the group.
 2. Chemistry of the Rare Earths. S.I. Levy. Pg. 210.