P - 24

STUDIES ON THE ISOLATION OF CHEMICAL COMPONENTS FROM MONAZITE SAND

H. M. P. G. Sobitha Manike, W. Mallawaarachchi and H. W. Dias
(Department of Chemistry, University of Peradeniya)

Chemical processing of Monazite would lead to the isolation of its chemical components containing the elements Cerium, Lanthanum, Thorium and Phosphorus. The sand could be initially broken down by means of several chemical methods. In this study concentrated Sulphuric acid was used for the break down process. First the optimum conditions for the break down reaction were investigated by studying the percentage decomposition 'D' of the mineral with respect to the following variable conditions:

(1) Mole ratio of Monazite: Sulphuric acid (2) Volume of Sulphuric acid (3) Time of reaction (4) Temperature of reaction (5) Particle size of the mineral and (6) Batch size of the mineral.

Results showed that 'D' increased almost linearly with respect to (1) and increased in an exponential manner with respect to (2), (3), and (4). 'D' also varied with particle size, being higher for the finely powdered mineral for various batch sizes ranging from 10g to 100g.

The sand was then broken down with concentrated Sulphuric acid under the optimum conditions determined as above, with a view to quantitative isolation of its components. Thorium was isolated completely as its phosphate. The rare-earths (RE) Lanthanum and Cerium were precipitated as the double sulphates, $Na_2SO_4.(RE)_2(SO_4)_3 2H_2O$, and were finally isolated as the hydrous oxides. Cerium was separated from this oxide mixture as Ceric Stearate. In the double sulphate precipitation method it was found that an optimum amount of sodium sulphate was required for the salting-out process and the solid sodium sulphate had to be added in one step. A small quantity of the rare-earth salts, about 90% of the Phosphorus content of the mineral (as phosphoric acid), and the excess of sodium sulphate remained in the mother liquor after the removal of the rare-earth double sulphates.

The above research was supported by a grant from the National Science Council of Sri Lanka.