Selective Precipitation of Lanthanum and Neodymium oxides from Pulmoddai Monazite, Sri Lanka

Udayakantha KGI, Chameera SADK, Kulogin S and Rohitha LPS and *Dissanayake DMDOK

Department of Earth Resources Engineering, University of Moratuwa, Sri Lanka

*Corresponding author – dmdok@uom.lk

Pulmoddai is the largest known deposit of heavy mineral sand in Sri Lanka. Because of the high concentration of Rare earth elements (REEs), Pulmoddai deposit's value is considered to be economically enhanced by extracting REEs. Lanka mineral sand produces 100-120 tons of monazite per year and is currently treated as a waste. This crude monazite consists of Light rare earth elements and the radioactive element of Thorium (Th) and Uranium (U). The objective of this work was to develop a systematic scientific process to separate phosphate ion, radioactive elements and Neodymium and Lanthanum oxides from this monazite. In today's age, many extraction methods are used to extract the REEs. But it does have some limitations in Sri Lankan context. Hence, this study was carried out using a process of selective precipitation. Dephosphorization was carried out in alkaline media with different Sodium hydroxide concentrations of 50, 60, 70, 80% (w/v) at temperature 150 ^{0}C for 4 hours at 1atm. The optimum dephosphorization was observed in 80% (w/v) of NaOH concentration. Digested rare earth hydroxides were neutralized by using 60% (w/v) of hydrochloric acid at temperature 90 ^{0}C for 1 hour at 1atm. 2% (w/v) of oxalic acid was used in the rare earth chloride solution for removing impurities. Rare earth oxides (REOs) were obtained at 900 ^{0}C using calcination of rare earth oxalates. RE oxides were dissolved using 80% (w/v) HCL. In selective precipitation, 15% (w/v) NH_4OH with $KMnO_4$ were added to isolate Lanthanum and Neodymium hydroxides from RE chloride solution at controlled pH 4. Once again, 15% (w/v) NH_4OH with $KMnO_4$ at regulated pH 8.5 was applied to separate Lanthanum and Neodymium hydroxides. To obtain their oxide forms, these two hydroxides were calcinated at 900 ^{0}C.

Keywords: Acid Leaching, Alkaline digestion, Rare Earth Oxides, Oxalic acid

Acknowledgement: AHEAD/DOR/6026-LK/8743-LK