

Value addition to Eppawala Carbonatite

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ABSTRACT

Weathered carbonatites are economically valuable as they provide significant amount of ore bodies of Rare Earth Elements (REE), phosphorus, niobium, copper, iron, titanium, barium, fluorine, zirconium, etc. However, utilities of fresh carbonatites are very limited in the world as they are exposed as smaller scattered bodies. Apatite found at the residual capping of the massive carbonatite body exposed around Eppawala, North-central Sri Lanka is currently mined for phosphate. More than 80,000 m² of fresh carbonatite has been exposed to the surface in this area. Present study was carried-out mainly for petrographical, chemical and thermal characterization of Eppawala carbonatite to estimate its economic potential. In addition, possibility to synthesis Precipitated Calcium Carbonate (PCC) from carbonate phase of the fresh carbonatite was investigated. Field and petrographical studies were performed to determine the mineralogical composition of the carbonatite. Thermal and chemical analyses were performed to understand chemical and physical characteristics of carbonate minerals found in the rock. Thermal behavior of the carbonate phase at various temperatures (600 °C to 950 °C) was studied by Thermo Gravimetric Analysis (TGA), Fourier Transform Infrared Spectroscopy (FT - IR) and powder X-ray Diffraction (XRD) techniques. Petrographical and field studies revealed that the most common carbonate phase available in fresh carbonatites is calcite (>60%). Modal percentage of the apatite is about 15% while iron oxide minerals and silicate minerals have lower modal percentages (<3%). According to chemical analysis the carbonate phase of the carbonatite has higher calcium content than the other crystalline carbonate rocks found in Sri Lanka. At the same time, thermal studies show that the heating up to 950°C for six hour is sufficient for complete decomposition of carbonate minerals resulting about 45% weight loss confirming abundance of calcite. Therefore, fresh carbonatite at Eppawala ore body is an excellent source for PCC. Further, high quality apatite can also be easily separated by removing iron oxides and silicates using simple techniques.

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