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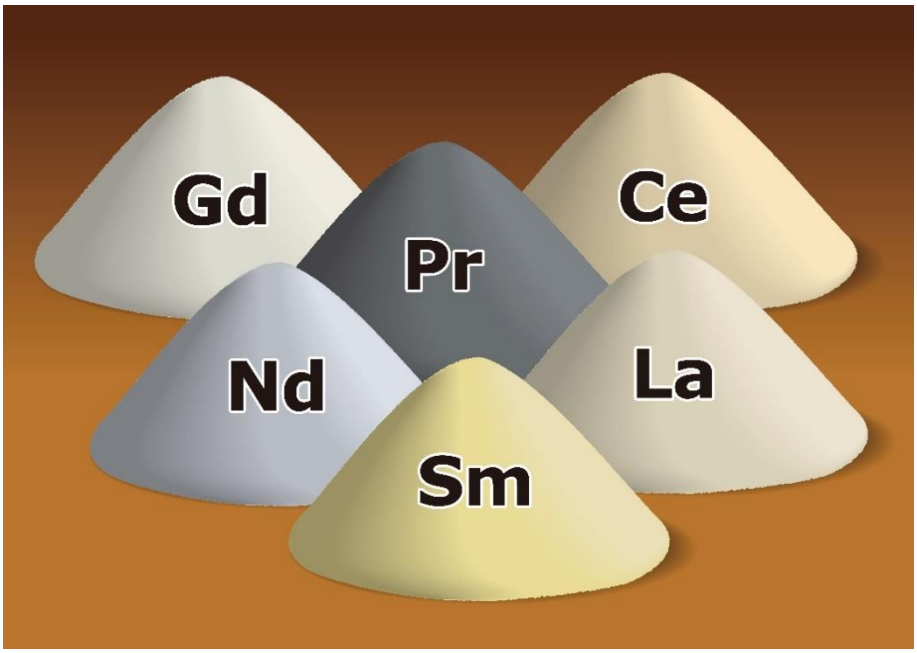

Rare Earth Elements: Developing Efficient extraction and purification processes

ABSTRACT

This paper outlines the use of a modern electrolyte theory (chemistry model) to predict the chemical extraction of rare earth elements (REE) from mineral deposits. The aim is to aid the engineer in maximizing product yield and to predict secondary products formation resulting from the chemical extraction operation.

The paper includes a brief overview of the model and its departure from strong electrolyte models. It also discusses how experimental data for each the sixteen REE's differ and it effect on the ability to model these elements over different compositions and ranges. We next present the prediction of REE phase stability and speciation using extractive acids. We show the impact of impurities like high chloride concentration on extraction efficiency.

The last section of the paper contains process simulation results for REE extraction from several ore sources. The simulations include the acid digestion and chemical separation sections, and present effects of different acids and complexing agents on separating these elements from impurities.

Despite the limited validation data for REE, solution/phase predictions of the ore from which the REE's are extracted (e.g., oxides, phosphates, chlorides, silicates, etc.) are well validated. This enables accurate simulation of REE extraction from the rock matrix including the corresponding composition of the leachate and the leached ore (if critical for enhanced extraction).

Click here to download the paper or contact OLI to begin a conversation or request additional information.