Nickel Laterites – Use of Mineralogy for Process Optimization

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ABSTRACT

Nickel laterite ore is used to produce nickel sulfate, a key ingredient in the batteries that drive electric vehicles and nickel metal, predominantly to manufacture stainless steel. Nickel laterite production is on the rise and surpassing conventional sulfide deposits. The efficiency of mining and processing nickel laterites is defined by their mineralogical composition. A case study from both saprolite and laterite horizons investigated the use of X-ray diffraction (XRD) in combination with statistical methods such as cluster analysis to make ore sorting and processing more efficient and minimize costs for energy. Besides the identification of the different mineral phases, the quantitative composition of the samples was determined. Data clustering of the samples was tested that will allows a fast and easy separation of the different lithologies and ore grades. Mineralogy also plays a key role during further downstream processing of nickel laterites to nickel metal. XRD was used to monitor the mineralogy of calcine, matte and slag. The value of mineralogical monitoring for grade definition, ore sorting, and processing will be explained.