Potential of Mineral Composition Reconstruction for Monitoring the Performance of an Iron Ore Concentration Plant

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Abstract : The performance of a separation process is usually evaluated using performance indices calculated from elemental assays readily available from the chemical analysis laboratory. However, the separation process performance is essentially related to the properties of the minerals that carry the elements and not those of the elements. Since elements or metals can be carried by valuable and gangue minerals in the ore and that each mineral responds differently to a mineral processing method, the use of only elemental assays could lead to erroneous or uncertain conclusions on the process performance. This paper discusses the advantages of using performance indices calculated from minerals content, such as minerals recovery, for process performance assessments. A method is presented that uses elemental assays to estimate the minerals content of the solids in various process streams. The method combines the stoichiometric composition of the minerals and constraints of mass conservation for the minerals through the concentration process to estimate the minerals content from elemental assays. The advantage of assessing a concentration process using mineral based performance indices is illustrated for an iron ore concentration circuit.

Keywords : data reconciliation, iron ore concentration, mineral composition, process performance assessment

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