Paper Number: 4704

Considering rheology as a key geometallurgical tool

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Ores from the same body may exhibit extensive variability in their mineralogy and texture. The ability to quantify this variability linked to metallurgical performance is one of the primary goals of geometallurgy. Ultimately this information can be incorporated into the geometallurgical block model and used to inform design around all core activities of mining and processing. This study focuses on the phyllosilicate minerals which are particularly prevalent in Great Dyke PGE ores in Zimbabwe.

The Great Dyke is the world's second largest platinum group element (PGE) resource, after the Bushveld Complex in South Africa [1]. In contrast to the ores from the Bushveld Complex that are relatively pristine with minor alteration, ores from the Main Sulfide Zone (MSZ) of the Great Dyke are characterized by extensive oxidation and alteration resulting in numerous metallurgical challenges in recovering the PGE. One such challenge results from the high grades of phyllosilicate alteration minerals (e.g. talc, serpentine, chlorite, smectite) and their effect on the rheology of the mineral slurries. An example of such a challenge is that of poor gas dispersion in froth flotation [2,3] which results in lower valuable mineral recoveries.

This study compares the behaviour of three different Great Dyke ores sampled along strike, focusing on their mineralogical composition and slurry rheological characteristics. The relative contribution of the different phyllosilicate minerals to complex rheology, and potential opportunities to manage this are considered. The role of rheology as a geometallurgical tool is also discussed.

References:

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