Paper Number: 4551

Characterising flotation performance for geometallurgy - where are we at?

Bradshaw, D.J. [1], Vos, F. [2] and Hunt, J.A.[3]

[1] Minerals to Metals Signature Theme, University of Cape Town, South Africa. dee.bradshaw@uct.ac.za.
[2] Julius Kruttschnitt Mineral Research Centre, The University of Queensland, Australia
[3]Minerals Engineering, Materials & Environment, Université de Liège, Belgium

---

The emerging field of geometallurgy is an integrated discipline that aims to optimise mineral resource utilisation by building linkages between the geological contribution in the ore and its implications on downstream processing (metallurgy). The former is primarily concerned with the specific rock and ore types and their location within a deposit, whereas processing will focus on how best to treat the ore that has been delivered to the plant. This gives rise to discussions comparing the 'intrinsic rock properties' and the 'manipulated machine operating variables' as part of the nature vs nurture debate and contributes to the space – time conundrum.

The effectiveness of flotation and resulting flotation performance is classically characterised by an ore dependent 'grade-recovery' relationship or curve. It is possible to move along this curve by changing operating variables that affect the mass recovery, such as air flow rate, but not the intrinsic separation potential of the ore. This changes the final recovery and grade, making it difficult to use the one number (ie. % recovery) to decouple the contribution from the ore and the method used to process it.

This paper discusses the merits and constraints of various methods of predicting the contribution of the ore properties to separation potential by flotation and the resulting flotation performance. It provides a summary of recent developments (e.g. JKMSI, 1 L batch test, planetary ball mill, etc) and discusses where we are in terms of flotation performance for geometallurgy and what remains to be done.