

## Rheology of Mining Deposits

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### ABSTRACT

The geo-metallurgical behaviour of a mineralized body is highly relevant since it defines the profitability of any mining-metallurgy endeavour.

Within this context, the rheological characterizations of the different ores that will be processed in a metallurgical plant also gain importance.

Rheology is the science that studies material's deformations and flow. In the vast field of fluids, rheology defines the initial yield stress necessary to start the flow, and the viscosity (connected with the resistance to flow) under different dynamic conditions.

In metallurgical processes the rheology of mining products (tailings/concentrates/ solutions) defines:

- Thickening limits
- Slurries transportability conditions
- Extreme dewatering possibilities
- The geometry and stability of sedimentation (sand walls/slurries dam)

Rheology is critical in order to determine the global consumption of fresh water in a concentrator plant (make up). Today, make-up could be the critical factor for the success of a mining project.

With the partial financing from a Chilean Government Agency (CORFO), JRI has carried out a nationwide rheological characterization study of tailings of all Chilean plants in operation. These characterizations, both vast and meticulous, allowed reaching certainty with regard to the range of rheological parameters that cover most of the copper deposits of the country.

The paper proposes a simplified methodology to characterize the rheological behaviour of the different Geometallurgical Units (UGM in Spanish) of any deposit of metallic ore, either under operation or under prospection. This methodology includes the specification of samples for rheological tests, and how to understand and use the results.