

The MTM Sulphation Roast Process for Critical Metals

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Roasting Hydrometallurgy Copper Rare Earth cobalt nickel molybdenum

MINETOMETAL is developing technology for recovering critical metals from complex sulphide concentrates. The technology is based on sulphation roasting followed by selective alkaline leaching and precipitation.

The current work is primarily aimed at copper concentrates with unacceptable levels of arsenic. Flotation can be used to give marketable low arsenic concentrates, but this leaves an issue of how to recover the copper from the high arsenic concentrate. Fully integrated producers can handle this within their smelters but is difficult for smaller producers who lack suitable technology.

MINETOMETAL uses lime roasting to fix the sulphur present as sulphates and give highly oxidising roasting conditions where the arsenic forms cupric arsenate and is not volatilised. This avoids the environmental issue of gaseous arsenic and avoids the need for an acid plant and a sulphuric acid market.

The calcine is leached in ammonia/ammonium chloride liquor to solubilise most of the copper which is then precipitated out to give cupric oxide suitable for gaseous reduction to metal. The insoluble cupric arsenate in the residue is leached in dilute sulphuric acid to recover the copper and enable precipitation of an inert ferric arsenate.

MINETOMETAL is also investigating using sulphation lime roasting for recovering other critical metals such rare earths, nickel, cobalt and molybdenum. This work is at a very early stage, but the chemistry suggests a process can be developed.

The roasting emulates the sulphuric baking used for rare earths and leaves them in a soluble form. The nickel and cobalt report as sulphates and can be leached at a PH where the copper and molybdenum are insoluble. The molybdenum sulphide reports in the calcine as the oxide and is leached in caustic soda. The copper is leached in ammonia/ammonium chloride and recovered using the conventional MTM Process.