

Developments in Heap Leaching as a Technology Choice for Value Extraction from Primary and Secondary Resources

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Abstract

Heap leaching is part of the group of “percolation leaching” processes that selectively remove metal values from an ore into a suitable aqueous leaching agent that seeps through a pile or mass of the ore. It has become well-established technology choice for the treatment of low-grade copper and gold ores and is also practiced for uranium ores and REE recovery from ion adsorption clays. Various other applications (Zn, Ni, PGMs) have been explored but not reached commercial significance as yet. Apart from the different chemistries and mineralogies, all these applications operate on very similar principles, which are laid out in some detail in this keynote

Selection of heap leaching as process technology is primarily driven by its ability to extract value from low-grade materials, as the need for high capital and operating expenditures, especially for intensive comminution processes to produce a concentrate material for further processing, is avoided. However, the relatively long time required to recover the metal value from larger particles, with overall poorer metal extraction achieved, imposes certain economic penalties which have resulted in heap leaching to remain limited to low-grade ores.

Nonetheless, ever-increasing energy costs and awareness of the associated carbon footprint have recently led to a re-evaluation of the technology for primary ores. At the same time the drive towards resource efficiency and the attainment of circular economies for many metals has also opened significant opportunities for the heap leaching of tailings and waste materials and thus a re-evaluation of the technology. Some examples of these developments are discussed in the presentation.