

Attempt for An Expert Systems Leading to Intelligent Extraction of Cobalt and Copper from Co-Cu Complex Ore

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Abstract

The trivalent cobalt (Co^{3+}), mainly found in the heterogenite $[\text{Co}(\text{Cu})\text{OOH}]$ has been reported to hardly dissolve in conventional acids such as sulphuric acid. The cobalt leaching yield in such cases is as low as less than 10%. The dissolution of cobalt bearing minerals in acidic media but in presence of reducing agent like $[\text{SO}_2]$ increased the cobalt leaching yield to 90% in some cases. On the other hand, Co often found associated with Cu occurs not only in easy to process ores but some in complex ores like mixed sulphides, mixed oxides or mixed sulphides and oxides. The increase in cobalt bearing mineralogical complexity hinders the ease for the metal extraction. Dispersed attempts to address encountered cases are abundant but a consolidated data base of the process route for a sustainable cobalt recovery from its ores is missing. This paper will discuss an elaboration of an expert systems for cobalt and copper recovery by leaching from their complex ores. An expert system is a computer program platform designed to mimic human intelligence and decision making skills in a given situation. To establish a workable expert system, an appropriate database and optimisation algorithms are required. Secondary data showing the observed co and cu recovery yields were collected from literature spanning from 2010 to 2020. Parameters as feed grade, types and strengths of reagents used, percentage recovery and the mineralogical variability were the targeted inputs. The selection of appropriate optimisation algorithms for the prediction of optimal Cobalt and copper recoveries will be discussed.

Keywords

Expert system, intelligent extraction, cobalt extraction, copper extraction, Co-Cu complex ore