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Bio-mineralization of metal-containing ores and concentrates

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Abstract

Bio-mining is the use of microorganisms to extract metals from sulfide and/or iron-containing ores and mineral concentrates. The iron and sulfide is microbially oxidized to produce ferric iron and sulfuric acid, and these chemicals convert the insoluble sulfides of metals such as copper, nickel and zinc to soluble metal sulfates that can be readily recovered from solution. Although gold is inert to microbial action, microbes can be used to recover gold from certain types of minerals because as they oxidize the ore, they open its structure, thereby allowing gold-solubilizing chemicals such as cyanide to penetrate the mineral. Here, we review a strongly growing microbially-based metal extraction industry, which uses either rapid stirred-tank or slower irrigation technology to recover metals from an increasing range of minerals using a diversity of microbes that grow at a variety of temperatures.



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