

MINERALOGICAL FACTORS AFFECTING THE EXTRACTION OF GOLD IN VARIOUS ORES

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ABSTRACT

There are several major factors that affect gold ore processing. Of which, gold grade, mineralogy and metallurgy are the three major ones. Technically, gold is commonly extracted from various ores using gravity, flotation, cyanidation or a combination of these processes. For refractory gold ore processing, pretreatment technologies, such as fine-grinding, autoclaving, roasting and biooxidation will also be required. The reason for using different process flowsheet is mainly because gold often occurs in different forms and minerals, and each ore has to be treated differently. Mineralogically, gold is classified as microscopic, submicroscopic gold and surface-bound gold. In a gold or copper-gold ore, gold may occur in two or three forms, making gold processing extremely challenging. In addition to gold deportment, bulk mineralogy may have negative impact on gold processing. Microscopic gold can be extracted using conventional technologies and gravity is always recommended when coarse gold exists. However, grain size, liberation and association may affect gold extraction depending on the process(es) involved. Submicroscopic gold is commonly contained in the lattice of pyrite and arsenopyrite and hard to liberate or expose, and hence impact gold recovery by conventional technologies. Mineral speciation and liberation characteristics of primary host minerals, mineral speciation and texture of iron oxides newly formed during preoxidation, gold distribution and preg-robbing capability of carbonaceous matter may also affect the extraction of gold in refractory ores. This paper discusses the common mineralogical factors that may affect the extraction of gold in various ores with case studies from a variety of processing options such as gravity separation, flotation, cyanidation and pre-oxidation.

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