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# Enhancement of gold recovery using bioleaching from gold concentrate

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The gold in refractory ores is encapsulated as fine particles (sometimes at a molecular level) in the crystal structure of the sulfide (typically pyrite with or without arsenopyrite) matrix. This makes it impossible to extract a significant amount of refractory gold by cyanidation since the cyanide solution cannot penetrate the pyrite/arsenopyrite crystals and dissolve gold particles, even after fine grinding. To effectively extract gold from these ores, an oxidative pretreatment is necessary to break down the sulfide matrix. The most popular methods of pretreatment include nitric acid oxidation, roasting, pressure oxidation and biological oxidation by microorganisms. This study investigated the bioleaching efficiency of Au concentrate under batch experimental conditions (adaptation cycles and chemical composition adaptation) using the indigenous acidophilic bacteria collected from gold mine leachate in Sunsin gold mine, Korea. We conducted the batch experiments at two different chemical composition (CuSO4 and ZnSO4), two different adaptation cycles 1'st (3 weeks) and 2'nd (6 weeks). The results showed that the pH in the bacteria inoculating sample decreased than initial condition and Eh increased. In the chemical composition adaptation case, the leached accumulation content of Fe and Pb was exhibited in CuSO4 adaptation bacteria sample more than in ZnSO4 adaptation bacteria samples, possibly due to pre-adaptation effect on chalcopyrite (CuFeS2) in gold concentrate. And after 21 days on the CuSO4 adaptation cycles case, content of Fe and Pb was appeared at 1'st adaptation bacteria sample(Fe - 1.82 and Pb - 25.81 times per control sample) lower than at 2'nd adaptation bacteria sample(Fe – 2.87 and Pb – 62.05 times per control sample). This study indicates that adaptation chemical composition and adaptation cycles can play an important role in bioleaching of gold concentrate in eco-/economic metallurgy process.