

Leaching of pyrite in cupric chloride solution

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Abstract: Pyrite (FeS_2) is the most abundant sulphide mineral in the world and may contain significant amounts of gold locked in its structure. Traditionally, pyrite has to be oxidized in order to break down the mineral matrix for better gold liberation by e.g. roasting, pressure leaching and bioleaching [1]. Due to environmental and health concerns, as well as public opinion, alternative methods are developed to replace gold cyanide leaching, which has been the preferred gold leaching process. Gold is known to form a stable complex with chloride as $[\text{AuCl}_4]^-$ or $[\text{AuCl}_2]^-$. In chloride leaching of pyrite in the presence of $[\text{Cu}^{2+}]$ which acts as a catalyst/oxidant, the pyrite structure can be simultaneously broken down and the gold dissolves into a solution from which it can be later recovered [2, 3]. In this study, dissolution of the pyrite concentrate in cupric chloride solutions was investigated. The effect of cupric ion concentration (16, 32 g/L), temperature, (60, 75, 90 °C), chloride ion concentration (50, 150 g/L), pH (1, 1.5) and mixed chloride-bromide ion concentration (75+75 g/L) on pyrite dissolution were studied during 6 hour batch leaching experiments. Redox potentials between 0.495-0.511 V vs. Ag/AgCl resulted in pyrite dissolution of 31-34%, whereas redox potentials between 0.523-0.573 V vs. Ag/AgCl resulted in 45-68% pyrite dissolution.

References

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