

Thiosulfate Leaching of the Auriferous Ore from Castromil Deposit: A Case Study

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Abstract : The exploitation of gold ore deposits is highly dependent on efficient mineral processing methods, although actual perspectives based on life-cycle assessment introduce difficulties that were unforeseen in a very recent past. Cyanidation is the most applied gold processing method, but the potential environmental problems derived from the usage of cyanide as leaching reagent led to a demand for alternative methods. Ammoniacal thiosulfate leaching is one of the most important alternatives to cyanidation. In this article, some experimental studies carried out in order to assess the feasibility of thiosulfate as a leaching agent for the ore from the unexploited Portuguese gold mine of Castromil. It became clear that the process depends on the concentrations of ammonia, thiosulfate and copper. Based on this fact, a few leaching tests were performed in order to assess the best reagent prescription, and also the effects of different combination of these concentrations. Higher thiosulfate concentrations cause the decrease of gold dissolution. Lower concentrations of ammonia require higher thiosulfate concentrations, and higher ammonia concentrations require lower thiosulfate concentrations. The addition of copper increases the gold dissolution ratio. Subsequently, some alternative operatory conditions were tested such as variations in temperature and in the solid/liquid ratio as well as the application of a pre-treatment before the leaching stage. Finally, thiosulfate leaching was compared to cyanidation. Thiosulfate leaching showed to be an important alternative, although a pre-treatment is required to increase the yield of the gold dissolution.

Keywords : gold, leaching, pre-treatment, thiosulfate

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