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Kinetics study of thiosulphate gold dissolution from primary leaching precipitates of refractory gold ores

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The gold industry in South Africa, mainly based on the metal extraction through cyanide leaching and the use of microorganisms, has been among the top 10% country's main source of income. This results in a strong economy, emergence of new towns and new financial structures. The use of cyanide as a lixiviant raises serious environmental concerns as it negatively impacts on the biodiversity, humans, soil, water, air and surrounding flora. Additionally, gold extraction operational costs continue to grow because of the ore falling grades, increased mining depth in the reserves, and a drop in the gold price on the market, resulting in a gradual drop in gold production. As a result, enhanced productivity is crucial to the gold industry's sustainability in South Africa. In the search of alternative solutions, thiosulphate (copper ammonia system) is studied as a potential substitute to cyanide for the recovery of gold from its minerals. The paper discusses the kinetics of gold dissolution in a thiosulphate aqueous solution as lixiviant concentration is varied from 0.5 M to 3M and the contact time in the leaching vessel is maintained in the range between 30 minutes and 6 hours. The shrinking core model as well as the solution diffusion model exploiting the double layer concept elucidate the outcomes of the work justifying the kinetics models observed.

Apply to be considered for a student ; award (Yes / No)?

No

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N/A

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