

عنوان مقاله:

Kinetics of Sphalerite leaching by Sodium Nitrate in Sulfuric Acid

محل انتشار:

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خلاصه مقاله:

In the present work, the extraction of zinc from a sphalerite concentrate using sodium nitrate as an oxidant in a sulfuric acid solution was investigated. The effective parameters such as the temperature, sulfuric acid and sodium nitrite concentrations, stirring speed, particle size, and solid/liquid (S/L) ratio were analyzed. The dissolution rate increased with increase in the sulfuric acid and sodium nitrite concentrations and temperature but decreased with increase in the particle size and S/L ratio. Moreover, the stirring speed had a significant effect on the leaching rate. Under the optimum conditions, 74.11% of zinc was obtained. The kinetic data obtained was analyzed by the shrinking core model (SCM). A new SCM variant captured the kinetic data more appropriately. Based on this model, the activities of the reactants control the diffusion but the two concentrations affect the second order reaction rate or diffusion in both directions. At 75 °C, the R2 values in the surface chemical reactions and diffusion were 0.78 and 0.89, respectively. Using the new model, however, the R2 value 0.989 was obtained. The reaction orders with respect to [H₂SO₄], [NaNO₃], S/L ratio, and particle size were 1.603, 1.093, -0.9156, and -2.177, respectively. The activation energy for the dissolution was 29.23 kJ/mol.

کلمات کلیدی:

Sulfide Ores, Leaching, Reaction Kinetics, Modeling

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