



Kinetics of dissolution of Mardin-Mazıdađı (Turkey) phosphate ore in dilute phosphoric acid solutions

M. Sınırkaya, A.K. Özer, M.S. Gulaboglu

Department of Chemical Engineering, Atatürk University, Erzurum, Turkey

Abstract

The dissolution process of phosphate rock from the Semikan area (Mardin-Mazıdađı, Turkey) using dilute phosphoric acid has been investigated. The work involved studying the effect of important variables, such as reaction time, stirring speed, particle size fraction, phosphoric acid concentration and temperature. Van der Sluis et al.'s model was used to determine the rate of the partial dissolution of phosphate ore. Mass-transfer coefficients (k_L) varied between 2.8 and $28.5 \cdot 10^{-3} \text{ m} \cdot \text{s}^{-1}$. The activation energy of the process varied between 16 and $20 \text{ kJ} \cdot \text{mol}^{-1}$. It has been found that the dissolution process is controlled by calcium ion diffusion, rather than by chemical reaction.

Key words: Phosphate rock, Phosphoric acid, Dissolution kinetics