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A Kinetic Study of the Dissolution of Natural Halite from Lake Katwe (Uganda) in Aqueous Solutions

Hillary Kasedde
Department of Materials Science and Engineering, KTH Royal Institute of Technology, Stockholm, Sweden.

John Baptist Kirabira
Department of Mechanical Engineering, College of Engineering, Design, Art and Technology, Makerere University, Kampala, Uganda.

Abstract

Large deposits of halite are present in the brines and evaporites of Lake Katwe. In this study, the dissolution of natural halite from the lake deposit was investigated in a batch reactor. The effects of particle size, agitation speed, reaction temperature, and solid-to-liquid ratio were selected as experimental parameters. Results showed that the dissolution rate increased with increase in reaction temperature, agitation speed and decreased with particle size and solid-to-liquid ratio. Moreover, the experimental data was analyzed according to the heterogeneous and homogeneous reaction models. It was established that the dissolution rate describes the Avrami model and is controlled by a diffusion mechanism. Consequently, the apparent activation energy (E_a) for the process was calculated to be 33.3 kJ/mol over the temperature range from 303 to 323 K.

Keywords: Lake Katwe; Halite; Dissolution; Kinetics; Avrami model

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