Dissolution Kinetics of Chevreul's Salt in Ammonium Cloride Solutions

Authors : Mustafa Sertçelik, Turan Çalban, Hacali Necefoğlu, Sabri Çolak

Abstract : In this study, Chevreul's salt solubility and its dissolution kinetics in ammonium chloride solutions were investigated. Chevreul's salt that we used in the studies was obtained by using the optimum conditions (ammonium sulphide concentration; 0,4 M, copper sulphate concentration; 0,25 M, temperature; 60°C, stirring speed; 600 rev/min, pH; 4 and reaction time; 15 mins) determined by T. Çalban et al. Chevreul's salt solubility in ammonium chloride solutions and the kinetics of dissolution were investigated. The selected parameters that affect solubility were reaction temperature, concentration of ammonium chloride, stirring speed, and solid/liquid ratio. Correlation of experimental results had been achieved using linear regression implemented in the statistical package program statistica. The effect of parameters on Chevreul's salt solubility was examined and integrated rate expression of dissolution rate was found using kinetic models in solid-liquid heterogeneous reactions. The results revealed that the dissolution rate of Chevreul's salt was decreasing while temperature, concentration of ammonium chloride and stirring speed were increasing. On the other hand, dissolution rate was found to be decreasing with the increase of solid/liquid ratio. Based on result of the applications of the obtained experimental results to the kinetic models, we can deduce that Chevreul's salt dissolution rate is controlled by diffusion through the ash (or product layer). Activation energy of the reaction of dissolution was found as 74.83 kJ/mol. The integrated rate expression along with the effects of parameters on Chevreul's salt solubility was found to be as follows: $1-3(1-X)2/3+2(1-X)= [2,96.1013.(CA)3,08 .(S/L)-038.(W)1,23 e-9001,2/T].t$

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