Modeling and Simulation of Ce(IV) Mediated Electrochemical Oxidation Process for the Destruction of EDTA

이재욱, 정상준[1], 문일식[1,*],
Subramanian Balaji[1], Vasily V. Kokovkin[1]
서남대학교; [1]순천대학교
(ismoon@sunchon.ac.kr*)

Ce(IV) mediated electrochemical oxidation (MEO) of ethylenediamine tetra acetic acid (EDTA) in aqueous solution was investigated under various conditions of temperature and concentrations of nitric acid, Ce(IV), and EDTA. In this reaction, EDTA is oxidized to carbon dioxide and the reaction follows the pseudo-first-order kinetic model. On the other hand, the values of thermodynamic parameters of enthalpy, activation energy, and Gibbs free energy were 26.7 kJ/mol, -230 J/mol·K, 29.7 kJ/mol, and 118 kJ/mol. MEO model was formulated by employing a total mass balance, component mass balance, and unsteady-state energy balances in the reactor as well as in the jacket. It was found that the MEO model successfully simulated the experimental data obtained under various operating conditions.