



Thermodynamic studies of the strontium adsorption on iron species generated by electrocoagulation

J.R. Parga^{a,*}, G. González^a, H. Moreno^b, J.L. Valenzuela^c

^aDepartment of Metallurgy and Materials Science, Institute Technology of Saltillo, V. Carranza 2400, Saltillo Coahuila, CP 25000, México
Tel./Fax: +52(844) 4389515; email: jrparga@its.mx

^bChemical Engineering Department, Institute Technology of the Laguna, Cuauhtémoc y Revolución S/N, CP 27000, Torreón, Coahuila, México

^cDepartment of Chemical Engineering and Metallurgy, University of Sonora, L. Encinas y Rosales S/N, Hermosillo Sonora, Mexico

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ABSTRACT

In this research we present and discuss the results of the use of the Electrocoagulation (EC) process for strontium removal from wastewater. The phenomena associated with strontium removal is adsorption on iron magnetic species generated from the dissolution of iron electrodes of the electrolytic cell. With the EC process more than 99 percent of strontium was removed from wastewater without addition of chemical reagents. Sludge generated by EC was characterized by Chemical Analyses, X-Ray Diffraction, Scanning Electron Microscopy and Vibrating Sample Magnetometer (VSM) in order to document the adsorption of strontium on iron-species. The electrogenerated crystalline iron oxides magnetite (Fe_3O_4) and maghemite ($\gamma\text{-Fe}_2\text{O}_3$) powders have higher values for saturation magnetization, but lower values for remanent magnetization and coercive field than commercial strontium hexaferrite with micrometric particle size. The experimental data were correlated employing a Langmuir adsorption isotherm. Thermodynamic parameters such as ΔG° , ΔH° and ΔS° were evaluated ($\Delta G^\circ = -23.49$ KJ/mol, $\Delta H^\circ = -24.92$ KJ/mol and $\Delta S^\circ = -0.00479$ KJ/mol K) and the adsorption process was found to be exothermic and spontaneous in nature. In addition, results indirectly indicate the feasibility of the EC process for strontium removal.

Keywords: Electrocoagulation; Strontium; Adsorption isotherm; Thermodynamics

*Corresponding author.