World Academy of Science, Engineering and Technology
International Journal of Energy and Environmental Engineering
Vol:10, No:06, 2016

Electrocoagulation of Ni(OH)2/NiOOH for the Removal of Boron Using Nickel Foam as Sacrificial Anode

Authors : Yu-Jen Shih, Yao-Hui Hunag

Abstract : Electrocoagulation (EC) using metallic nickel foam as anode and cathode for the removal of boron from solution was studied. The electrolytic parameters included pH, current density, and initial boron concentration for optimizing the EC process. Experimental results showed that removal efficiency was increased by elevating pH from 4.0 to 8.0, and then decreased at higher pH. The electrolytic efficacy was not affected by current density. In respect of energy consumption, 1.25 mA/cm2 of current density was acceptable for an effective EC of boron, while increasing boric acid from 10 to 100 ppm-B did not impair removal efficiency too much. Cyclic voltammetry indicated that the oxide film, Ni(OH)2 and NiOOH, at specific overpotentials would result in less weight loss of anode than that predicted by the Faraday’s law. The optimal conditions under which 99.2% of boron was removed and less than 1 ppm-B remained in the electrolyte would be pH 8, four pairs of electrodes, and 1.25 mA/cm2 in 120 min as treating wastewaters containing 10 ppm-B. XRD and SEM characterization suggested that the granular crystallites of hydroxide precipitates was composed of theophrastite.

Keywords : borohydrides, hydrogen generation, NiOOH, electrocoagulation, cyclic voltammetry, boron removal
Conference Title : ICCE 2016 : International Conference on Clean Energy
Conference Location : San Francisco, United States
Conference Dates : June 09-10, 2016