Environmental Engineering and Management Journal xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
http://www.eemj.icpm.tuiasi.ro/; http://www.eemj.eu

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REDUCTION OF OBNOXIOUS CR (VI) FROM ELECTROPLATING EFFLUENT BY HYDRAZINE: KINETIC OPTIMIZATION AND MECHANISTIC MODELING FOR WASTEWATER TREATMENT

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Abstract

The simple way to deal with obnoxious hexavalent chromium is to reduce it to its trivalent form, which is comparatively less toxic. In this article, Cr(VI) was reduced to Cr(III) using hydrazine. The effect of various process parameters such as molar ratios of Cr(VI) to N2H4, the temperature of the reaction, and the environmental chemistry of solution on the reduction kinetics have been evaluated. Experiments demonstrate an order of three for the reaction. The reaction was first order with respect to N2H4 and second order with respect to Cr(VI). A very high percent reduction of 96.8% was obtained at 50 °C for the Cr(VI) to N2H4 molar ratio of 1:5. The reduction rate constants increased with an increase in temperature, and the activation energy of 35.22 kJ/mol was calculated for the reaction. The sludge generated because of the precipitation of insoluble Cr(OH)3 was characterized using FTIR, XRD, and FESEM/.

Keywords: chromium, heavy metals, pollutant, reduction kinetics, wastewater

Received: February, 2020; Revised final: June, 2020; Accepted: July, 2020

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