

Batch Adsorption of Lead (II) Ions from Aqueous Solution using Iodate Doped Chitosan Composite

Asha H. Gedam^{1*} and Rajendra S. Dongre²

^{1*}Cummins College of Engineering for Women, Nagpur- 441 110, India

²Post Graduate Teaching Department of Chemistry, RTM Nagpur University, Nagpur -440033, India
E-mail: agedam.ccoew@gmail.com

Abstract—Iodate doped chitosan composite was synthesized by impregnation methodology (1:1 w/w ratio) and evaluated as an adsorbent for the batch mode Pb (II) mitigation from aqueous solution. The doped adsorbent was comprehensively characterized by FTIR and SEM analysis. The influence of various chemical parameters viz. pH, contact time, dose of adsorbent and initial metal ion concentration on adsorption performance of Pb (II) ions was analyzed. Equilibrium adsorption isotherm and kinetics of adsorption has also been studied. The maximum removal of the Pb (II) ions using iodate doped chitosan adsorbent was observed at optimum pH 6. The pH at point zero charge (pHpzc) of the I-CS adsorbent was determined by solid addition method was evaluated to be 3.9. The dose of adsorbent on the percentage removal of Pb (II) ions also has a prominent effect and maximum Pb (II) ions mitigation found at 0.5 g/L adsorbent dose with 99% efficiency achieved in 4h. The adsorption of Pb (II) ions shown applicability of the Langmuir and Freundlich adsorption isotherm suggests the existence of both heterogeneous surface and monolayer coverage of adsorbed molecules. The adsorption process follows pseudo-second-order kinetics. The recyclability studies of I-CS composite were done in four cycles and exhibited 25-30 % decreased Pb(II) adsorption ability. The cost of removal of Pb (II) is expected to be quiet low compared to other similar composites, since it is economic and easily available biopolymer in nature. This doped composite adsorbent proved to be an effective for adsorption of Pb (II) ions from wastewater.

Keywords: Iodate doped chitosan, Pb (II), Adsorption, Isotherm, Kinetics.