Adsorption studies of chromium (VI) on weak base resins Tulsion A-10X (MP) and Amberlyst A-21 (MP) in aqueous and mixed media

Janhavi M. Karekar, Sanjaykumar V. Divekar*

Department of Chemistry, KLS's Gogte Institute of Technology, Affiliated and Autonomous Institution under Visvesvaraya Technological University, Belagavi – 590008, Karnataka, India, Tel. +91 9480398575, Fax +91 831 2441909, email: vmkarekar@git.edu (J.M. Karekar), Tel.+91 988660316, email: svdivekar@git.edu (S.V. Divekar)

ABSTRACT

The adsorption studies of chromium (VI) in aqueous and aqueous-organic solvents mixed media is carried out using weak base anion exchangers Tulsion A-10 X (MP) and Amberlyst A-21 (MP) by batch process. Adsorption of chromium (VI) is investigated by varying contact time, chromium (VI) concentration, resin dosage, temperature and pH. The effect of solvent on adsorption of chromium (VI) was also studied at different solvent compositions. The percentage of chromium (VI) removal was found faster on Amberlyst A-21 (MP) than Tulsion A-10X (MP) due to the difference in resin structure. However, the percentage removal of chromium (VI) is up to 99% on both the resins. Chromium (VI) removal is maximum in the pH range 2.0 to 5.0 with a resin dosage of 150 mg and initial chromium (VI) concentration 350 mg·L^{-1}. The equilibrium sorption data was analysed with Freundlich and Langmuir isotherms. The data fits well in Langmuir model indicating monolayer adsorption of chromium (VI) on the resin. Adsorption process follows pseudo-second order kinetic equation and is controlled by intra-particle diffusion. The desorption study indicates that NaOH is better desorbent for resin Amberlyst A-21(MP) than Tulsion A-10X(MP). Thermodynamic parameters were evaluated by applying Van't Hoff equation to the adsorption process.

Keywords: Chromium(VI); Anion exchanger; Adsorption isotherm; Kinetics; Equilibrium

*Corresponding author.