Insoluble anionic cyclodextrin polymer for removal of cationic molecules from water

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Abstract: Contamination of undesired cationic organic substances in water could be a serious topic for environment. In this study, cationic molecule (methylene blue) was selected to evaluate the adsorption capacity of insoluble anionic cyclodextrin polymer by batch adsorption process. This insoluble polymer was prepared by crosslinking between beta-cyclodextrin and citric acid at high temperature and it were characterized by optical microscopy, ionic exchange capacity and Fourier transform infrared spectroscopy. The swelling study of this insoluble polymer was performed in water. Different factors such as pH of solution, adsorption time, initial concentration and adsorption temperature were studied. The kinetic adsorption was fitted to pseudo second-order model and the adsorption isotherm was suitable to Langmuir model. The percentage of removal of methylene blue reaches 98.2% at pH = 5 for 10 mg/L of methylene blue. The thermodynamic study was carried out at different temperatures.

Keywords: Methylene blue; Benzalkonium chloride; Adsorption; Insoluble polymer; Waste water treatment