Characterization and isothermal studies of Cd removal from aqueous solutions using sludge-based activated carbon

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ABSTRACT

Generated sewage sludge by wastewater treatment plants is carbonaceous in nature and rich in organic materials, therefore, it has the potential to be converted into activated carbon. In this study, the sludge-based activated carbon was obtained using sewage sludge from Volkovo wastewater treatment plant in Skopje by chemical activation under controlled conditions. Prepared sludge-based activated carbon was characterized using scanning electron microscope and X-ray diffractometer, and was studied its application as adsorbent for cadmium removal from aqueous solutions. The experimental results performed to determine the efficiency of the sludge-based activated carbon for cadmium removal from aqueous solutions, shows that the removal of Cd was 73.91%. The effects of parameters such as pH, mass of adsorbent, contact time and initial cadmium ion concentration were investigated and presented in this study. The sludge-based activated carbon's maximum capacity was determined in equilibrium studies. Experimental data were fitted to adsorption models and better fit was obtained with the Langmuir adsorption isotherm.

Keywords: Cadmium; Sewage sludge; Adsorption isotherm; Adsorption capacity; WWTP Volkovo

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