A study on dynamic simulation of phenol adsorption in activated carbon packed bed column

Abstract

This study is mainly concerned about the dynamic simulation of phenol adsorption within the packed bed column filled with activated carbon derived from dates' stones. The process parameters such as column length, inlet liquid flow rate, initial phenol concentration of feed liquid and characteristics of activated carbon for the small scale packed bed adsorption column are investigated based on the dynamic simulation results using Aspen Adsorption V7.1 simulation program. The relationship between inlet liquid feed flow rate, breakthrough time and saturation time, relationship between initial phenol concentration, breakthrough time and saturation time, and relationship between packed bed column height, breakthrough time, saturation time, and C/C_o ratio were studied. Based on the optimized simulation results, the ideal proposed small scale adsorption column suitable for a single household to treat drinking water which is contaminated with 2.0189×10^{-7} mol/l phenol concentration on annual usage should have a column diameter, column height, and activated carbon particle diameter magnitudes 1.0 m, 10.0 m and 1.5 mm, respectively with 240 m^3/year inlet feed liquid flow rate. However, based on the simulation, the adsorption column is not feasible for conventional water treatment plant.