

A DOE Study of Ultrasound Intensified Removal of Phenol

Authors : P. R. Rahul, A. Kannan

Abstract : Ultrasound-aided adsorption of phenol by Granular Activated Carbon (GAC) was investigated at different frequencies ranging from 35 kHz, 58 kHz, and 192 kHz. Other factors influencing adsorption such as Adsorbent dosage (g/L), the initial concentration of the phenol solution (ppm) and RPM was also considered along with the frequency variable. However, this study involved calorimetric measurements which helped in determining the effect of frequency on the % removal of phenol from the power dissipated to the system was normalized. It was found that low frequency (35 kHz) cavitation effects had a profound influence on the % removal of phenol per unit power. This study also had cavitation mapping of the ultrasonic baths, and it showed that the effect of cavitation on the adsorption system is irrespective of the position of the vessel. Hence, the vessel was placed at the center of the bath. In this study, novel temperature control and monitoring system to make sure that the system is under proper condition while operations. From the BET studies, it was found that there was only 5% increase in the surface area and hence it was concluded that ultrasound doesn't profoundly alter the equilibrium value of the adsorption system. DOE studies indicated that adsorbent dosage has a higher influence on the % removal in comparison with other factors.

Keywords : ultrasound, adsorption, granulated activated carbon, phenol

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