Bioregeneration of granular activated carbon loaded with binary mixture of phenol and 4-chlorophenol

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Received 4 March 2015; Accepted 9 October 2015

ABSTRACT

The extent of bioregeneration of granular activated carbon (GAC) loaded with binary mixture of phenol and 4-chlorophenol (4-CP) was investigated. Batch studies were conducted at (i) different initial phenol and 4-CP loading concentrations and (ii) various GAC dosages to examine the effects of different ratios of phenol to 4-CP adsorbed ($Q_{\text{ph}}^f$ to $Q_{4\text{-CP}}^f$) on bioregeneration efficiency. The bioregeneration efficiency was higher when the $Q_{\text{ph}}^f$ to $Q_{4\text{-CP}}^f$ ratio was higher due to lower adsorption irreversibility of phenol. Increasing the GAC dosage under saturation condition at the same initial conditions only marginally improved the bioregeneration efficiency. The characteristics of the adsorption process (i.e. the irreversibility of adsorption) of each adsorbate are an important factor influencing the extent of bioregeneration in binary component-loaded GAC.

Keywords: Bioregeneration; Activated carbon; Binary system; Phenol; 4-Chlorophenol