Extraction of Phenolic Pollutants (Phenol and p-Chlorophenol) from Industrial Wastewater

Abstract

The efficiency of five new solvents as a selective solvent in the extraction of phenol and *p*-chlorophenol from wastewater was investigated. The phenols samples were collected from real petroleum refinery wastewater and from an experimentaly prepared aqueous phenol solution. In this work, data have been estimated for 10 systems containing, phenol + water or *p*-chlorophenol + water as a common component liquid and + five solvents [ethylene glycol, diethylene glycol, poly(ethylene glycol) (200), dimethylsulfoxide and tetramethylene sulfolone (sulfolane)]. The consistency and accuracy of the tie-line data were evaluated using three correlation relations namely, Bachman, Hand, and Othmer, and Tobias correlation. The Plait Point for each ternary system was estimated. Among the five solvents used to extract the phenol or *p*-chlorophenol from wastewater, diethylene glycol (DEG) has the highest selectivity and distribution coefficient and the greatest differences between its boiling point and density and those of phenol or *p*-chlorophenol. It can therefore, be regarded as an excellent solvent for extracting phenol or *p*-chlorophenol from wastewater. The liquid–liquid equilibrium data have been predicated using the nonrandom-two-liquid (NRTL) model and universal-quasi-chemical (UNIQUAC) model. The binary interaction parameters have been calculated using the Maximum Likelihood Principle technique. The experimental data fitted by the NRTL model are more accurate than the UNIQUAC model.