Treatment of chloro-hydrocarbon contaminated ground water

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Abstract

Treatment of chloro-hydrocarbon contaminated ground water by air stripping with an air stream adsorption has been demonstrated for the following chemicals: trichloroethylene (TCE), dichloromethane (DCM), 1,2-dichloroethylene (DCE), 1,2-dichloroethane (DCA), chlorobenzene (CB), and 2-dichloroethyl ether (DCEE).

Experimental results indicated that all the six chemicals could be removed easily from the ground water except DCEE. In order to remove DCEE more efficiently a series air stripping system was designed. A study has been made to compare the removal percents of DCEE for different number of stripping columns in series based on the same energy input parameter. The energy input parameter is defined as the air flow rate, G, times the pressure drop, ΔP, across the column, $G \times \Delta P$, and is considered as the most important parameter in determining the cost of air stripping.

Based on the same energy input parameter, the removal percentage of DCEE increases from 90% to 94.5% as the stripping system changed from one 6.693-m column to two 3.346-m columns. However, the increase of removal percentage for each additional column becomes smaller than 1% as the number of columns is more than three.

The overall mass transfer coefficients, $K_L a$, obtained from this experiment were found in good agreement with those predicted from either the Onda's correlation or Shulman's model for all the chemicals used in this study.

Biodegradation of chloro-hydrocarbons in an anaerobic system has also been initiated. Preliminary results indicated that the optimum pH value for the biological activity in this study is 6.8. Using acclimated seedings no inhibitation of the biological activity was observed at the concentrations of DCEE and TCE up to 2000 ppm.