CHAPTER VIII
CONCLUSIONS AND RECOMMENDATIONS

In this work, the regeneration of TCE saturated GAC and XAD-4 polymeric resin in packed-bed adsorbers by using SDS was studied in order to investigate the parameters affecting the regeneration. The results showed that more than 95% of TCE can be removed by using a 0.1 M SDS concentration in the regenerant for both adsorbents. For both adsorbents, the water flushing step improved the adsorption capacity of the regenerated adsorbents compared with the regenerated adsorbents without the water flushing (from 7% to 15% for GAC, and from 40% and 60% for the resin, respectively). The adsorption capacity of the regenerated GAC and the regenerated resin was reduced to about 15% and 60% of their original capacity, respectively. TCE desorption by this method is internal mass transfer limited for GAC as the regenerant flow rate and SDS concentration in the regenerant do not significantly affect the TCE removal rate whereas the desorption for the resin is equilibrium limited as the regenerant flow rate and SDS concentration in the regenerant affect the TCE removal rate. The irreversibly adsorbed surfactant left as a heel following regeneration is difficult to desorb for the resin, but not as difficult as with GAC. However, for GAC, when flushing temperature was increased from 30°C to 50°C, the SDS removal doubled. The adsorption-desorption isotherms indicate that the surfactant heel is related to a fraction of the SDS, which is irreversibly adsorbed. This heel is the cause of reduced adsorption capacity for TCE from air. In addition, for the resin, the mechanism of TCE desorption is preceeded by adsorption of SDS monomer.

The fundamental aspects of the influencing parameters in other adsorbents as well as types of surfactant are still interesting. These would lead to prediction of an appropriate adsorbent and surfactant to achieve the highest effective adsorption capacity of the regenerated adsorbents.