in which the highest positive concentration gradient between the GAC and the bulk liquid occurred. Columns with intermediary concentration gradients behaved accordingly to expected. Therefore, the hypothesis that bioregeneration is directly proportional to negative concentration gradient was confirmed.

Application of centrifugal elutriation for aqueous suspensions

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Abstract

Centrifugal elutriation (counter-flow separation), a common technique in the medical field to fractionate cells, was tested for: (1) the feasibility of use in fractionating aqueous suspensions; and, (2) its application in dynamic sorption and desorption studies for hazardous organic compounds associated with aqueous suspensions. The suspensions were separated and could be held in the chamber due to the opposing forces of counter-flow fluid versus centrifugation in which particles reached a point of effective zero velocity in a specially designed chamber. When either the flow rate was increased or the centrifugal force-field was decreased, discrete fractions of particles were eluted from the chamber for collection.

For the feasibility studies, the test suspensions included: a mixture of three suspensions of uniform latex polymer microspheres (12–25 μm in diameter; density of 2.6 g/cm^3); a silty clay suspension, (0–40 μm in diameter; density of 2.6 g/cm^3); a biotic suspension of two algae species with similar densities but of different size; and, a suspension containing two ranges of particles of similar size but different densities. The latex microspheres were separated into three discrete fractions with an overall mass balance of 91%. *Chlorella pyrenoidosa* was separated from a mixed suspension with *Scenedesmus quadricauda* with recoveries from 92–98%. A suspension of biotic (*C. pyrenoidosa*) and abiotic (clay) particles was separated recovering 82% of the algae discretely. The technique of centrifugal elutriation proved to be a fast and efficient means of isolating discrete fractions of aquatic particles as a function of either size or density.

Studying the dynamic aspects of contaminant-particle interactions has been

enhanced by the availability of an apparatus which can maintain a suspension in a moving fluid. With centrifugal elutriation a suspension of contaminated particles, standard silica particles and *C. pyrenoidosa*, were held in the chamber while "clean" media was passed through allowing time dependent determination of contaminant release. The experiment was also run in reverse to allow sorption studies. Silica was found to release 93% of pentachlorophenol within one hour while algai suspensions released 82% within one hour. A model has been developed to describe the release of partitioning processes under dynamic conditions. This technique shows great promise both as a sample handling methodology and a research tool.

Application of microwave heating techniques to the detoxification of contaminated soils

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Abstract

A series of soil samples contaminated with *p*-xylene have been subjected to various vacuum conditions in a microwave heated chamber. Tests thus far indicate that the soil is readily decontaminated at low temperatures without combustion when heated under vacuum conditions. On the other hand, it is very difficult to remove the solvent under atmospheric pressure conditions even with microwave heating. In addition, it was found that the solvent removal rate was increased several times if the soil samples contained moisture in the form of 3% water. The combination of moisture and vacuum yielded the best results. This observation, which is confirmed in the literature, can probably be attributed to the enhancement of microwave absorption by the water molecule and by partial pressure effects of the water vapor which is generated upon heating. The combination of these effects coupled with the low absolute pressure of the vacuum chamber create, in principal, steam distillation of the hydrocarbon solvent.
