FLUORO-SORB® 200 ADSORBENT

SORPTION OF DISSOLVED PCB CONGENERS

FLUORO-SORB® 200 adsorbent has great potential as a filtration media for treating PFAS contaminated groundwater and drinking water. There is also interest in understanding the ability of FLUORO-SORB® 200 to adsorb other co-contaminants, such as polychlorinated biphenyl (PCB) congeners. The University of Texas at Austin conducted a set of laboratory tests to determine PCB sorption coefficient, k_d, values for CETCO FLUORO-SORB® 200 adsorbent. CETCO FLUORO-SORB® 200 adsorbent was subjected to batch sorption measurements using water spiked with three PCB congeners exhibiting a range of hydrophobicity; congeners 28, 52 and 101.

Due to the strongly sorbing nature of these compounds it was necessary to use a very low sorbent to water ratio. Thus, these tests were performed in 1 liter vessels with small masses of sorbent. Minimal headspace was left in the jars to minimize loss to the headspace. Also, low sorbent spiking and sampling was done as quickly as possible with a micro pipette to avoid losses during those steps. First, 1 liter of an electrolytic/biocide solution containing 10 mM each of sodium chloride, calcium dichloride, and sodium azide was added to a 1 Liter amber glass jar containing the pre-weighed mass of sorbent (20-80 mg) or no sorbent in the case of the blanks. To this jar a stock solution of acetone containing three congeners of Polychlorinated Biphenyls was added: 2,4,4'-Trichlorobiphenyl (PCB 28); 2,2',5,5'-Tetrachlorobiphenyl (PCB 52); 2,2',4,5,5'-Pentachlorobiphenyl (PCB 101). The concentration of the congeners in acetone was proportional to their solubility and volume of stock was chosen to give the batches an aqueous concentration near to the solubility of each congener. These jars were then sealed and allowed to equilibrate for 1 week in a rotary tumbler, after which time 1 mL of the sample was withdrawn and placed in a sample vial for PCB analysis by GC-ECD.

Both samples with sorbent and blanks were prepared. An initial concentration was also measured. The blank concentration indicated that there were no significant losses from the initial concentration. The measured sorption coefficients are tabulated in Table 1. CETCO FLUORO-SORB® 200 adsorbent exhibited sorption coefficients that ranged from 51-76% of K_{OC} for the three congeners. Based upon this information a conservative estimated of the dissolved partition coefficient of other PCB congeners onto CETCO FLUORO-SORB® 200 adsorbent would be 50% of the PCB K_{OC}. If the current data is affected by kinetics, the sorption would be greater than these estimates.

Congener	28	52	101
FLUORO-SORB 200 adsorbent Kd (L/kg)	124,000	121,000	366,000
Ce range (ug/L)	0-25	0-7	0-0.9
KOC	164,000	233,000	716,000
Kd/KOC	0.76	0.52	0.51

Table 1. PCB Congener Sorption Summary

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