

# ADSORPTION OF PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS) ON VARIOUS ADSORBENTS

## COMPARISON of FLUORO-SORB® 200 ADSORBENT WITH OTHER MEDIA

Dr. Jinxia Liu, McGill University, studied the performance of FLUORO-SORB® 200 Adsorbent for removal of per- and polyfluoroalkyl substances (PFAS) from an aqueous film-forming foam (AFFF) contaminated groundwater. In this study, batch adsorption experiments demonstrated that Fluoro-sorb adsorbent can effectively remove PFAS from a contaminated groundwater via adsorption. Removal of PFAS was superior to granular activated carbon (GAC) and comparable to ion exchange (IX) resin.

The AFFF-contaminated groundwater, which was collected near a firefighting training area at a former airfield, contained total PFAS of  $64.9 \pm 1.0$   $\mu\text{g/L}$ , with PFOA ( $5.99 \pm 0.11$   $\mu\text{g/L}$ ) and PFOS ( $14.2 \pm 0.3$   $\mu\text{g/L}$ ) present. Chemical oxygen demand (COD) was 7.9 mg/L and total organic carbon (TOC) was 2.4 mg/L. Other non-PFAS contaminants detected were diesel (C 10 -C 28, 0.43 mg/L) and acetone (8.3 mg/L). Mineral concentrations of calcium (50 mg/L), magnesium (6.6 mg/L), sodium (2.6 mg/L) and potassium (0.77 mg/L) were measured. The initial pH value of the groundwater was pH 8.

Batch adsorption experiments were carried out with various adsorbents: FLUORO-SORB® 200 Adsorbent, IX resin, GAC (re-agglomerated bituminous type), and hardwood-based biochar. The AFFF-impacted groundwater (400 ml) and 40 mg of the adsorbents were mixed for 168 hours in 500 mL high-density polyethylene (HDPE) bottles. The amount of PFAS removed, run in triplicate, is illustrated in Figure 1. For Total PFAS, Fluoro-sorb adsorbent achieved 86% removal compared to 94% for ion exchange resin and 59% for GAC. Biochar performed poorly with 10% removal of total PFAS. Fluoro-sorb adsorbent performance was superior for PFOS (94% removed) compared to the IX resin (89% removed). For PFOA, the Fluoro-sorb adsorbent removed 88% compared to 97% removal by IX resin. These results demonstrate that Fluoro-sorb adsorbent is a highly effective option for PFAS treatment.

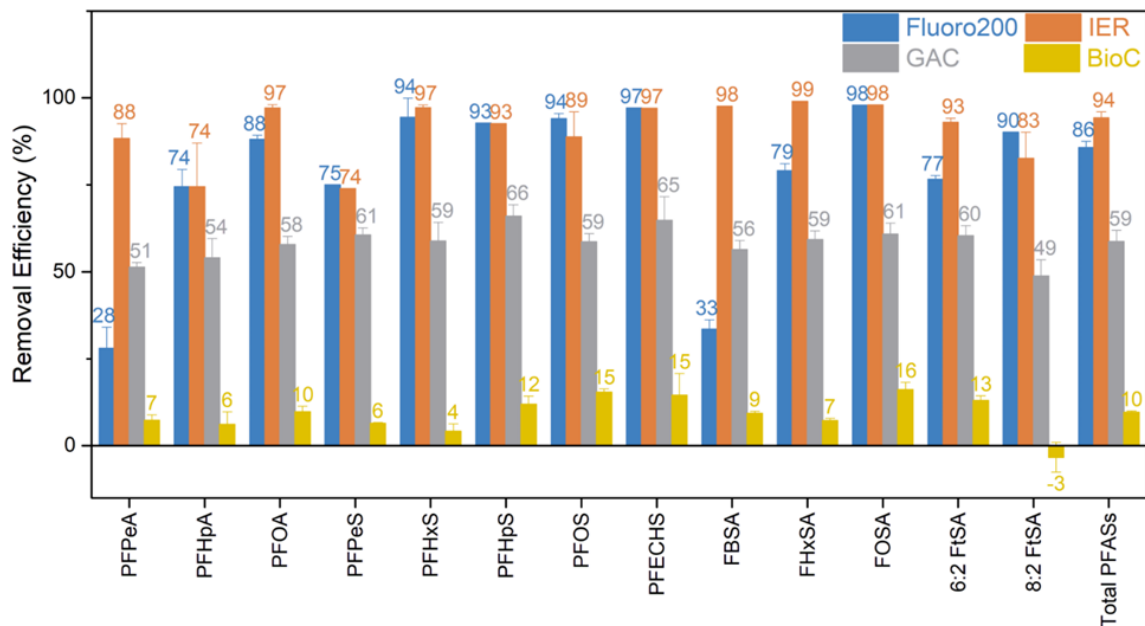


Figure 1: Adsorption of PFAS from AFFF-impacted groundwater by various adsorbents (Yan et al. 2020).

**Reference:** Yan, B., Munoz, G., Sauv e, S., and Liu, J. (2020) "Molecular mechanisms of per- and polyfluoroalkyl substances on a modified clay: a combined experimental and molecular simulation", *Water Research*, 184, 116166.