

BERLIN WATER: EVALUATION OF FLUORO-SORB® ADSORBENT, GRANULAR ACTIVATED CARBON, AND ION EXCHANGE MEDIA

PROJECT DETAILS

Equilibrium Studies

LOCATION

Berlin, Germany

PRODUCTS USED

FLUORO-SORB® 200 Adsorbent

Though many water treatment systems currently use granular activated carbon (GAC) or anion exchange resin (IX) to address per- and polyfluoroalkyl substance (PFAS) contamination, these media can be prone to early breakthrough, especially of short chains, due to competition of dissolved organic matter and inorganic anions, which can make these media less cost effective. This study sought to test several different types of media, including FLUORO-SORB® Adsorbent, to identify solutions that can remove PFAS and other organic micro pollutants such as pharmaceuticals, while balancing cost effectiveness

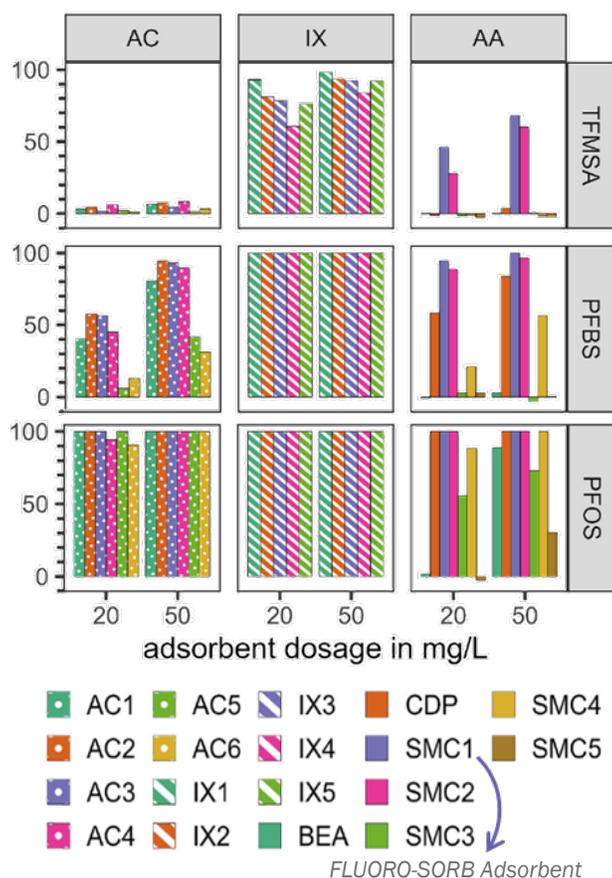


Figure 1. Percent removal of TFMSA, PFBS, and PFOS, which represent ultra-short, short and long chain sulfonate PFAS. FLUORO-SORB Adsorbent, shown in purple as “SMC1”. FLUORO-SORB Adsorbent outperformed GAC & AAs.

CHALLENGE:

With ever evolving regulations on PFAS and organic micropollutants (OMP) throughout the US and Europe, it is critical that water utilities are able to treat both sets of contaminants efficiently and effectively. It is critical to understand the sorption capacities of each adsorbent and each contaminant, while balancing cost effectiveness with strong performance in order to best serve the public clean water.

SOLUTION:

Berlin Water evaluated FLUORO-SORB Adsorbent side by side several IX, GAC, and alternative adsorbents (AA) for 12 PFAS and 16 OMP, ranging from pharmaceuticals to industrial chemicals to X-Ray contrast agents. This included evaluations of PFAS percent removal, as well as adsorption of OMP and dissolved organic matter (DOM).

RESULT:

Evaluation of the impacts of DOM showed that FLUORO-SORB Adsorbent did not adsorb any DOM, while several of the GAC and IX tested adsorbed measurable quantities of DOM when exposed to 20 mg/L and 50 mg/L solutions. FLUORO-SORB Adsorbent was competitive with IX in terms of PFAS removal, and significantly surpassed GAC performance for both long and short chain PFAS. FLUORO-SORB Adsorbent outperformed all GAC and AAs, and was competitive with the performance of IX, especially for long chain PFAS. Figure 1 shows ultra-short chain, short chain, and long chain sulfonate PFAS, where FLUORO-SORB Adsorbent is labeled “SMC1” in purple and FLUORO-SORB Flex was represented as “SMC2” in pink. FLUORO-SORB Adsorbent is highly selective for PFAS, therefore it did not adsorb the majority of the OMP with the exception of anionic pharmaceuticals, diclofenac and valsartan acid. For systems which require removal of a broad range of contaminants, a treatment train of FLUORO-SORB Adsorbent followed by a GAC would be a strong approach to address PFAS and OMP contamination in drinking water.

1. Rückbeil, F. E., Sperlich, A., Gnirss, R., Dittmann, D., Kämpfe, A., Höra, C., & Ruhl, A. S. (2025). Comparing activated carbons, ion exchange resins and alternative adsorbents for the removal of perfluoroalkyl and other persistent and mobile substances. *Chemical Engineering Journal*, 164070.

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