

RemBind outperforms granular activated carbon in binding perfluorinated compounds in water

Background

Sensatec GmbH of Germany carried out independent lab-scale trials to test the ability of Ziltek's RemBind Plus versus granular activated carbon (GAC) to treat water contaminated with perfluorinated compounds (PFCs).

Methodology

A column filter was set up using a mixture of 10% quartz sand and 90% RemBind Plus by weight. A second column contained GAC as a comparison.

Firstly, a tracer test using sodium chloride was run to determine hydraulic breakthrough rates and the column pore volume.

Next a water solution with a total PFC concentration of 1.85 mg/L (510 µg/L PFOS) was run through the column with continuous flow to determine breakthrough rates.

Water samples were taken from the column outlet after the following numbers of pore volume exchange: 1, 5, 10, 20, 30, 50, and 100 and analyzed for the PFC compounds perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA), potassium perfluorobutane sulfonate (PFBS) and Perfluorobutyric acid (PFBA).

Results

From the tracer test with sodium chloride, a flow rate of 3.1 mL per min was determined and the required time for one exchange of pore volume was 54 minutes.

Results in Figures 1 and 2 show that there was minimal breakthrough of all tested compounds after 100 pore volumes of water had passed through the RemBind Plus column. For the GAC column, the smaller PFC compounds PFBS and PFBA broke through immediately after only 1 pore volume.

Conclusion

The binding capacity of RemBind Plus for the smaller chain PFC compounds PFBA and PFBS is superior to that of GAC. This is likely due to the presence of the non-carbon components of RemBind Plus creating unique physicochemical interactions with the smaller chain PFC compounds.



Residual PFC concentration after different column passages - RemBind Plus

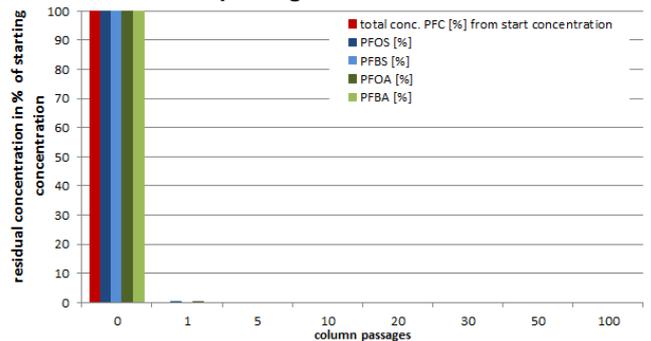


Figure 1: Residual PFC concentrations (% of starting concentration) after 0, 1, 5, 10, 20, 30, 50 and 100 column pore volumes of RemBind Plus

Residual PFC concentration after different column passages - Activated Carbon

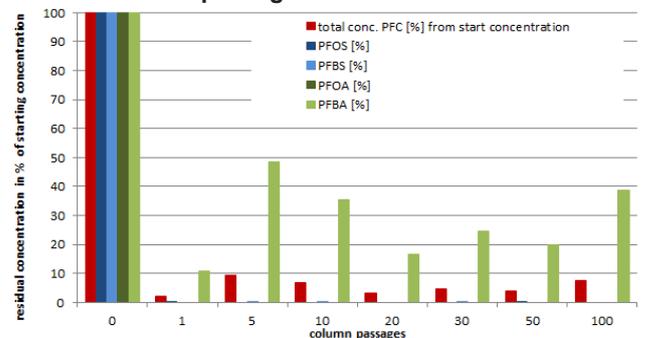


Figure 2: Residual PFC concentrations (% of starting concentration) after 0, 1, 5, 10, 20, 30, 50 and 100 column pore volumes of granular activated carbon

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