



Emerging Pollutants: Protecting Water Quality for the Health of People and the Environment

NANOFILTRATION OF PERFLUORINATED COMPOUNDS AS A FUNCTION OF WATER MATRIX PROPERTIES

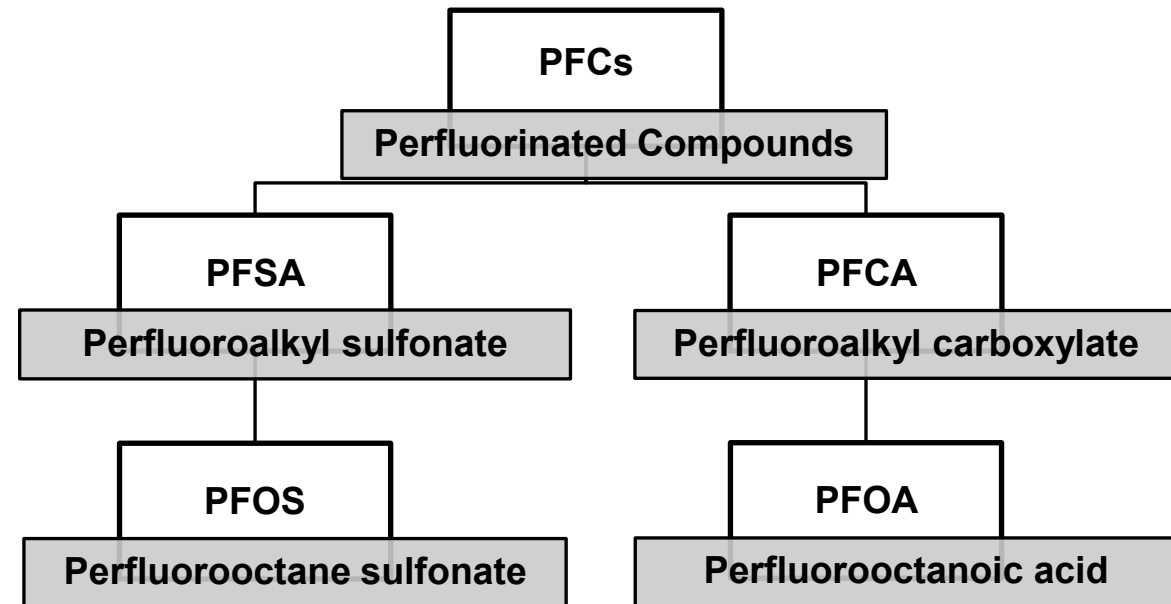
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Perfluorinated Compounds (PFCs)

- Manufactured in consumer products
- Carbon-Fluorine based structure
- Bio-accumulative properties
- Environmental persistence



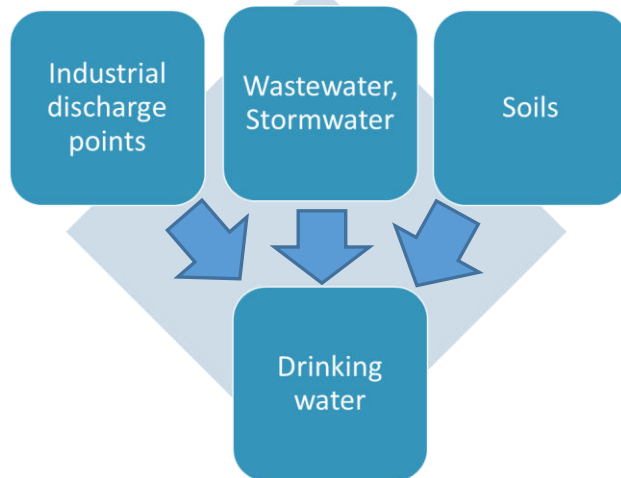
PFOA & PFOS: Occurrence, contamination pathways and health risks

- **Surface Water**

- 1150 ng/L PFOA 318 ng/L PFOS several locations in Georgia (Konwick et al., 2008)

- **Groundwater**

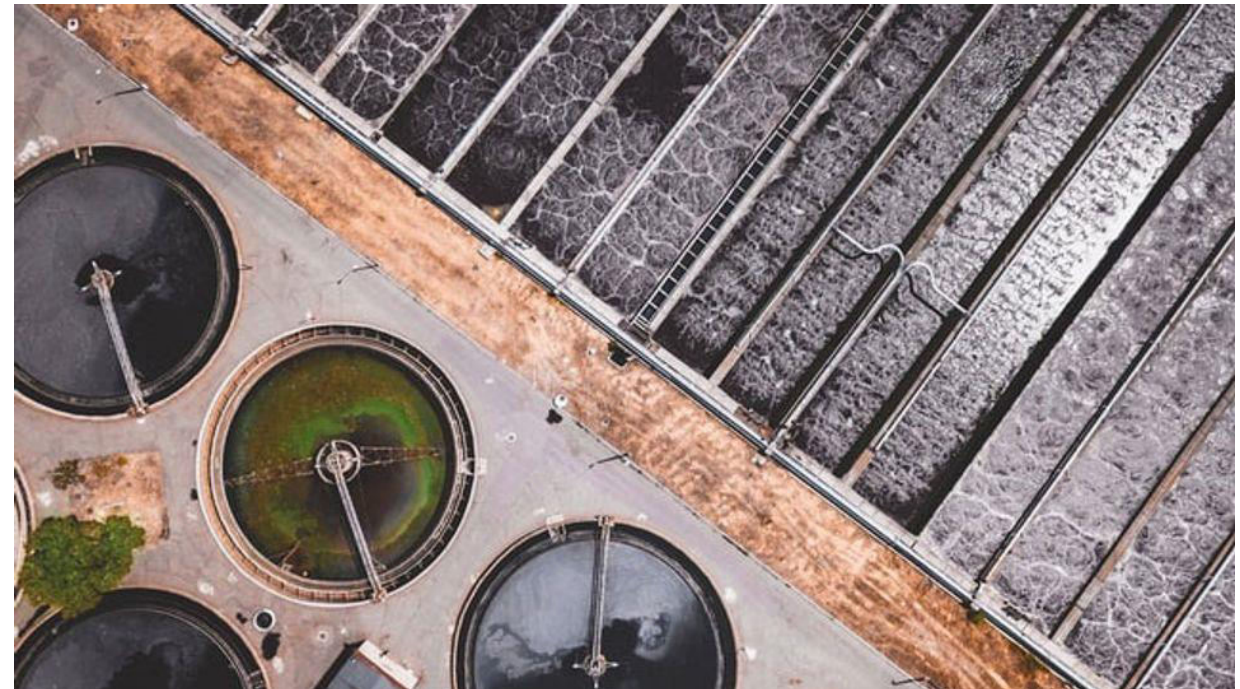
- 190 ng/L PFOA in contaminated groundwater firefighting foams in New Jersey (Post et al., 2009)
- Alabama, Michigan, New Jersey, Florida, Minnesota, Nevada



Low birth weight	Cancer
Liver effects	Immune effects
Thyroid effects	Others

Removal methods of PFOA & PFOS from water

- conventional treatment, advanced oxidation
- Granular Activated Carbon
- Ion Exchange
- **Membrane Treatment**



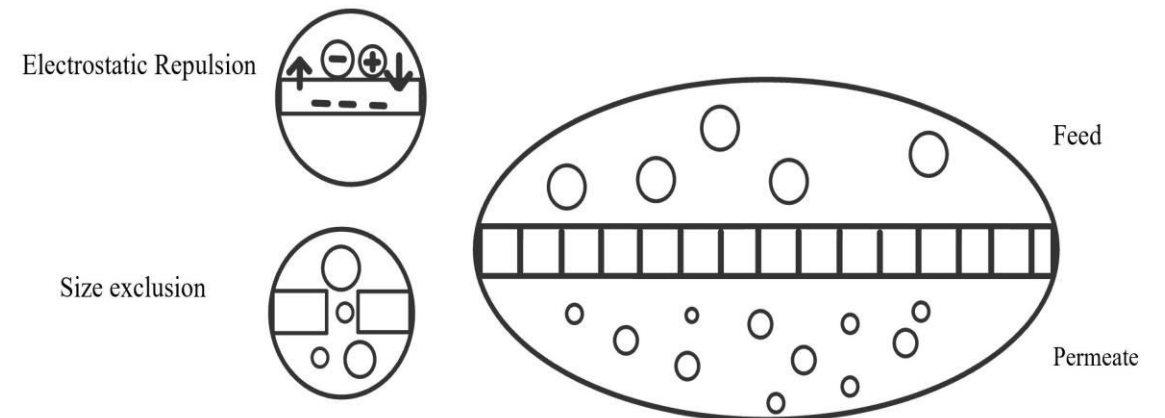
Literature Review Findings

Main rejection mechanism: size exclusion, increased by the presence of NOM

Very few studies used real water matrices

Rejection of PFOS was increased by the presence of cations (calcium and magnesium)

Removal Mechanisms by NF



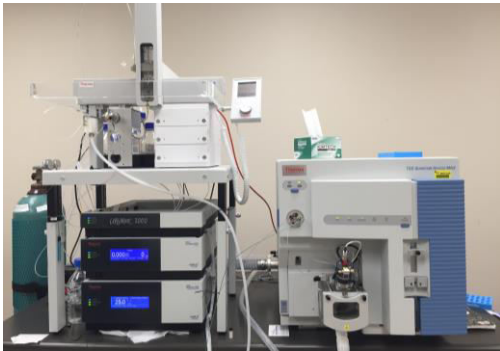
Research Objectives

1. To evaluate the rejection of PFOS and PFOA using nanofiltration;
2. To determine the rejection of PFOS and PFOA as a function of water matrix properties.

Parameters (mg/L)	Surface Water	Groundwater	D.I. Water
TDS	64.0	555	N.D.
Magnesium	2.00	5.00	0.060
Calcium	8.00	122	0.100
DOC	2.80	10.0	N.D.

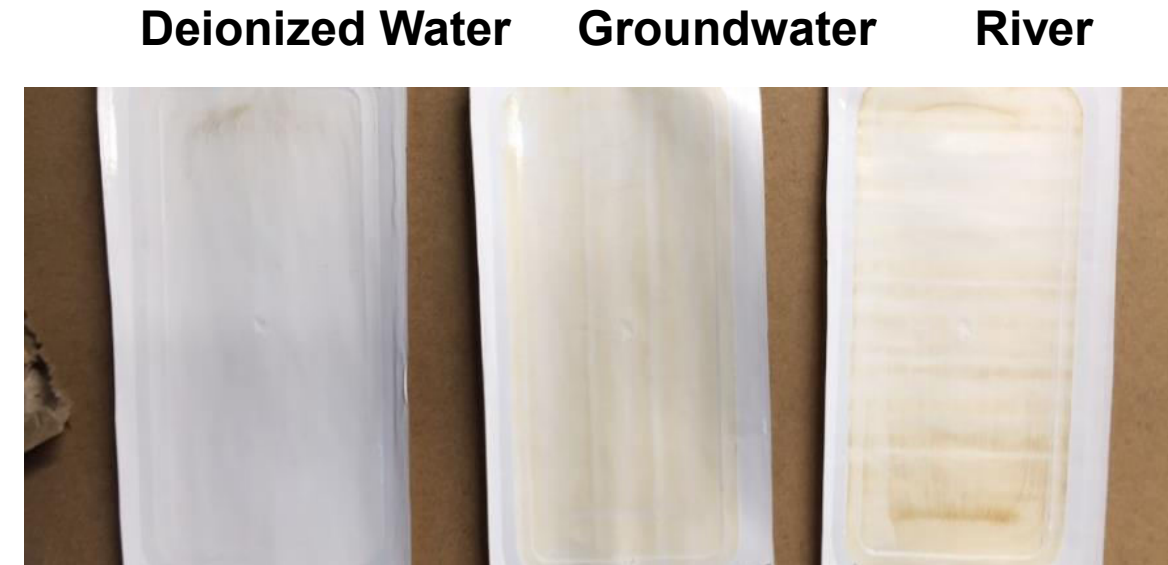
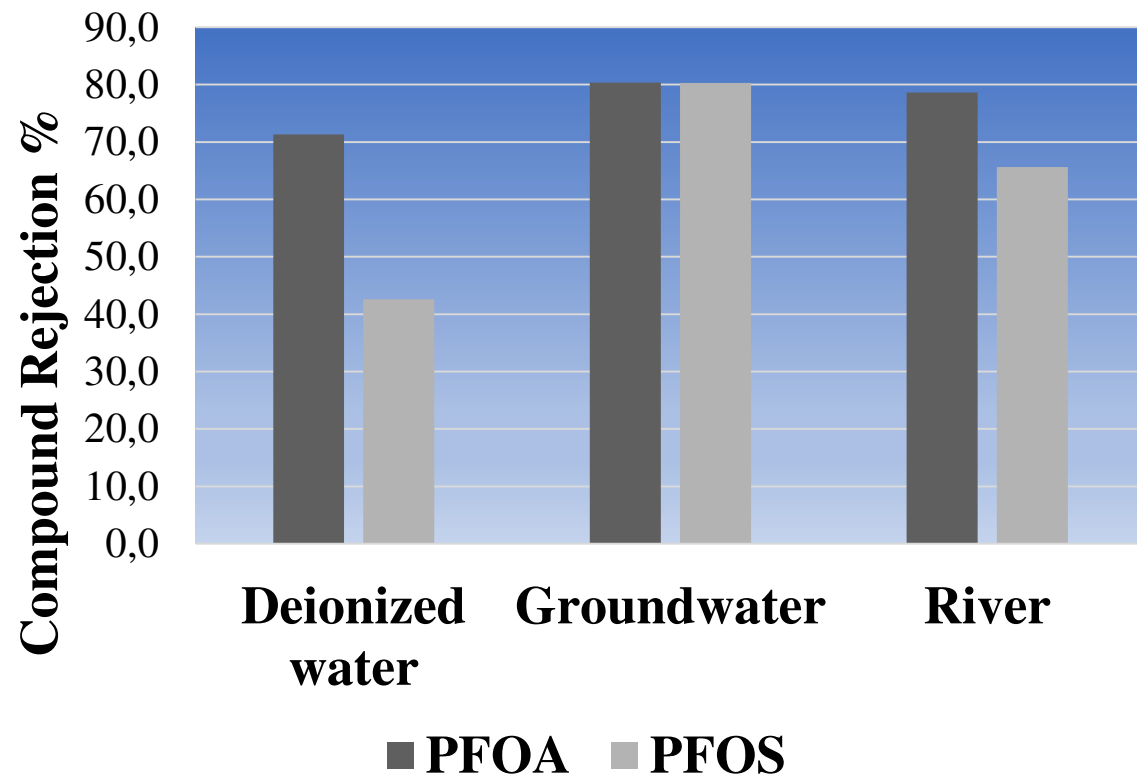


Materials and Methods

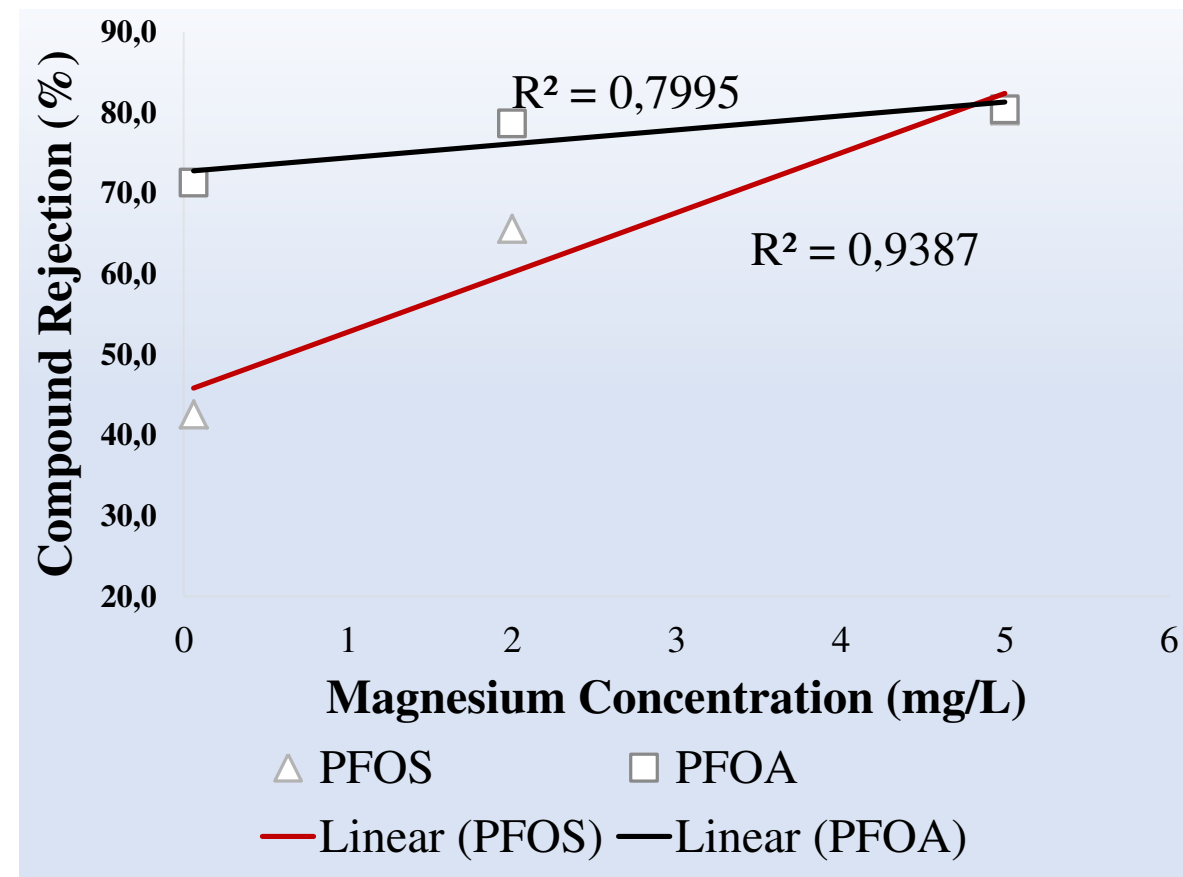
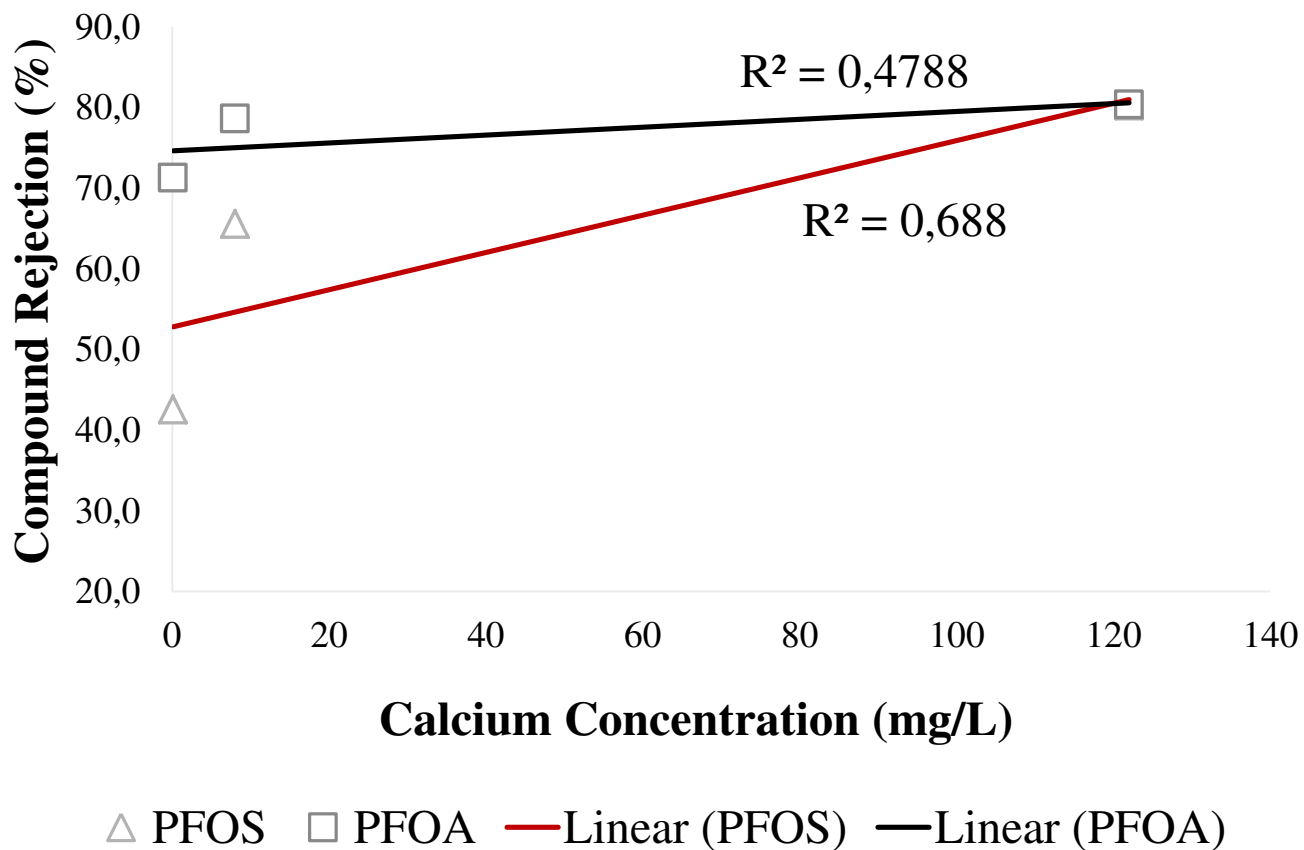


- Bench-scale CF042 membrane filtration
- NE70 Membrane
- Solid phase extraction
- LCMS method development and analysis

Results

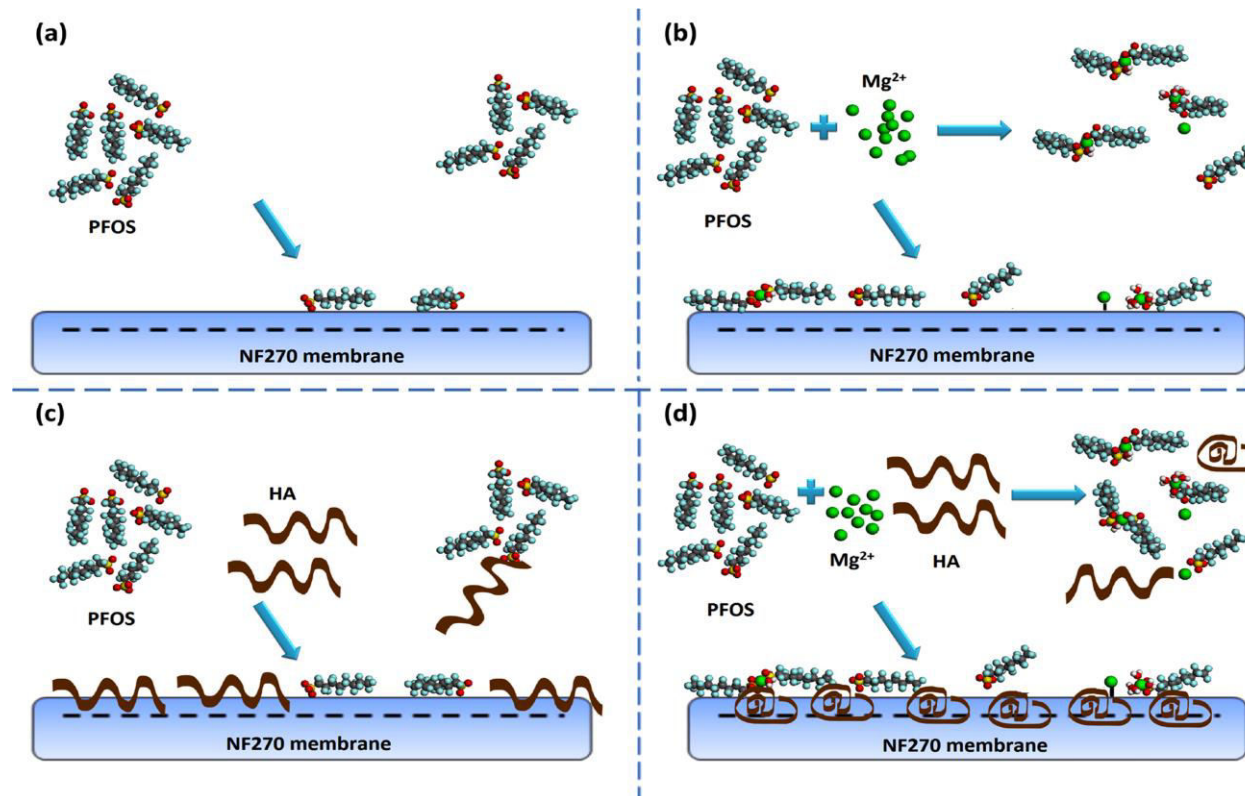


Results

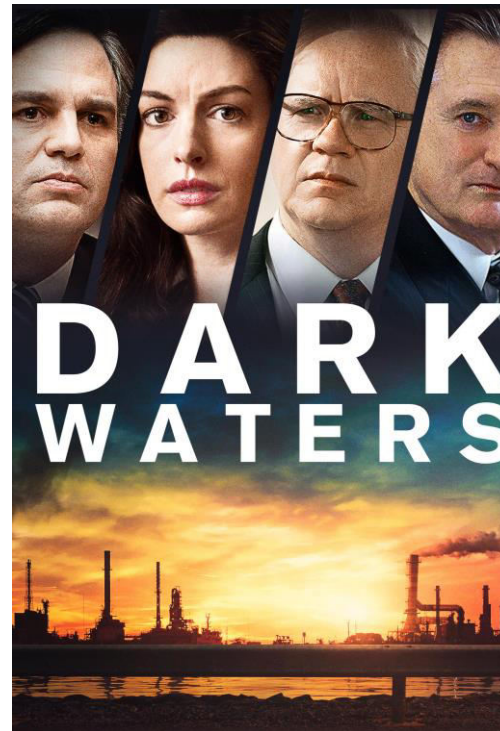


Discussions

- Presence of Sulfonic Groups
- Enhanced rejection with presence of Humic Acid (HA) and Mg ion



Occurrence of PFOA and PFOS in Africa



- Detected in Burkina and Ivory Coast (Ssebugere et al, 2020) while **no PFA investigation in Mali to my knowledge** ;
- PFA concentration of 2–20 ng/L in West Africa (Huff Chester et al, 2022);
- Likely presence of PFOA and PFOS in the environment in Mali too
- Current interests:
 - Investigating the occurrence of PFAs in Mali
 - Awareness raising