

Introductie in PFAS

PROFESSIONAL EDUCATION IN PERSISTENT CHEMICALS

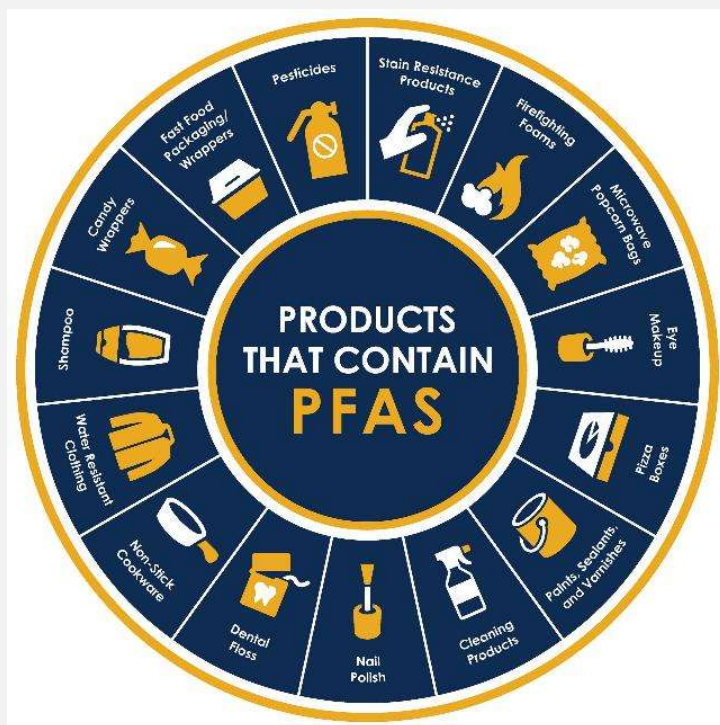
Mariska Ronteltap | Hoogheemraadschap Delfland | TU Delft

STOWA PFAS DAG 17 April 2025 Wageningen, NL

www.promisc.es.eu



PFAS en de waterketen – tsja..



- ‘De forever chemicals’
- ‘Ze zijn schadelijk en zijn overal’
- ‘Je vindt ze vaak in deze producten’
- Maar hoe nu iets preciezer?

EU Project PROMISCES, 2020 - 2025



Preventing **Recalcitrant Organic Mobile Industrial chemicalS** for **Circular Economy** in the **Soil-sediment-water system**

→ hoe voorkomen we dat forever chemicals in de weg staan van circulariteit in de waterketen?



[FIND COURSES](#)[LEARNING ONLINE](#)[FOR BUSINESS](#)[HELP & SUPPORT](#)

LOGIN

☐ Mathematics, Statistics & Data Analysis

☐ Mechanical Engineering

☐ Physics and Chemical Engineering

Course type

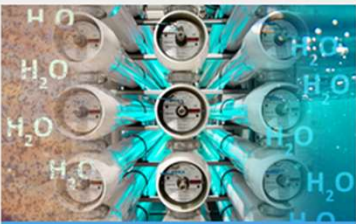
☐ Free Course (MOOC)

☒ Professional Education Course

☐ Online Academic Course

☐ Program

 RESET FILTERS



Nanofiltration and Reverse Osmosis in Water Treatment

Learn about these increasingly important technologies in the production of drinking water, industrial water treatme...

 Starts Sep 24, 2025

 Professional Education Course  7 weeks



PFAS - Persistent Micropollutants in the Water Cycle

Learn about the origin of per- and polyfluoroalkyl substances, their toxicity, regulation, and environmental impact. Exp...

 Starts Oct 15, 2025

 Professional Education Course  6 weeks



High-Rate Anaerobic Wastewater Treatment

Learn the principles, potentials, reactor concepts, and troubleshooting techniques for anaerobic wastewater treatment.

 Starts Oct 22, 2025

 Professional Education Course  6 weeks

PROFESSIONAL EDUCATION IN PERSISTENT CHEMICALS

ProfEd 1:

PFAS in de waterketen



Doelgroep; wat gaan ze leren?

Water professionals in de breedste zin

Deze cursus wil een echte introductie geven in het onderwerp:

Wat zijn nu precies deze 'forever chemicals'?

Waarom zo problematisch voor mens en milieu?

Hoe zijn de stoffen te analyseren?

Wat is het verschil tussen separatie en destructie?

En hoe kunnen deze stappen worden bereikt?



1. Introduction
2. PFAS in water cycle
3. Analytics
4. Separation techniques
5. Destruction mechanisms
6. Combining treatment trains

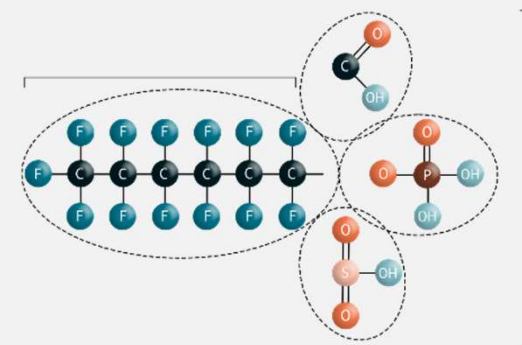
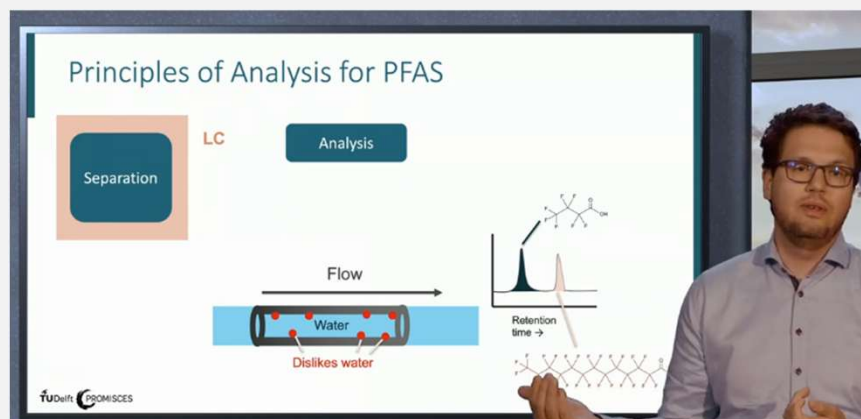
Zes-weekse cursus

In elke week:

- Knowledge clip
- Voices from the field
- Zelfstudievragen
- Individuele en groepsopdrachten
- Geschreven hoofdstuk als begeleidende tekst

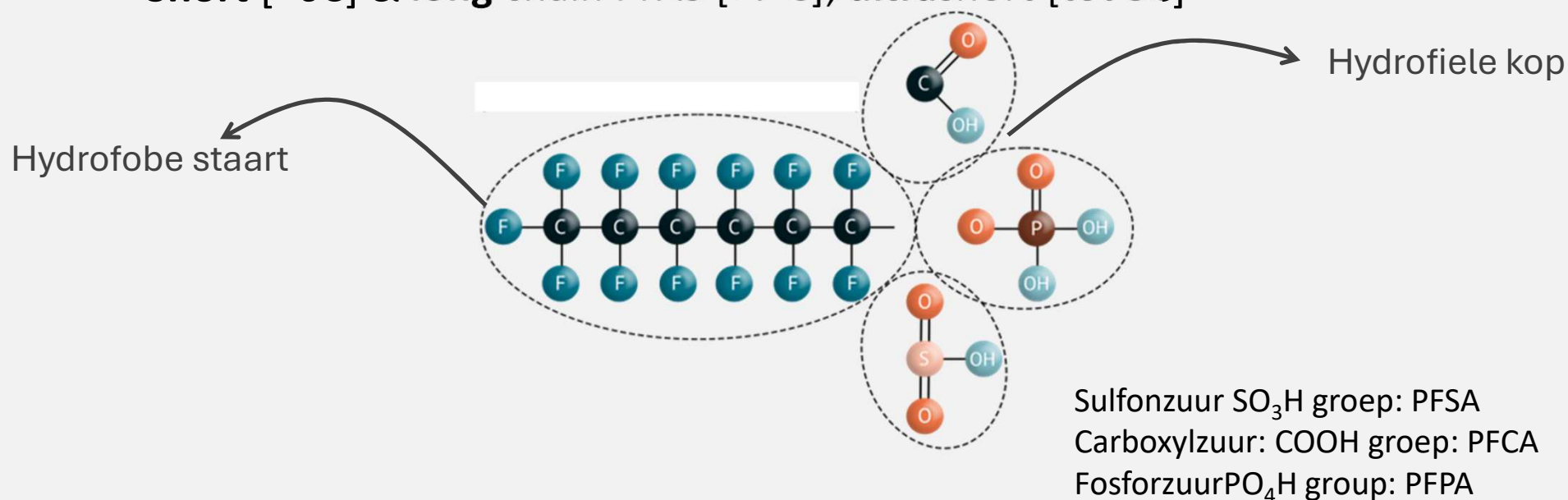
8-12 min
max 12 min
per onderdeel
2 grotere

...

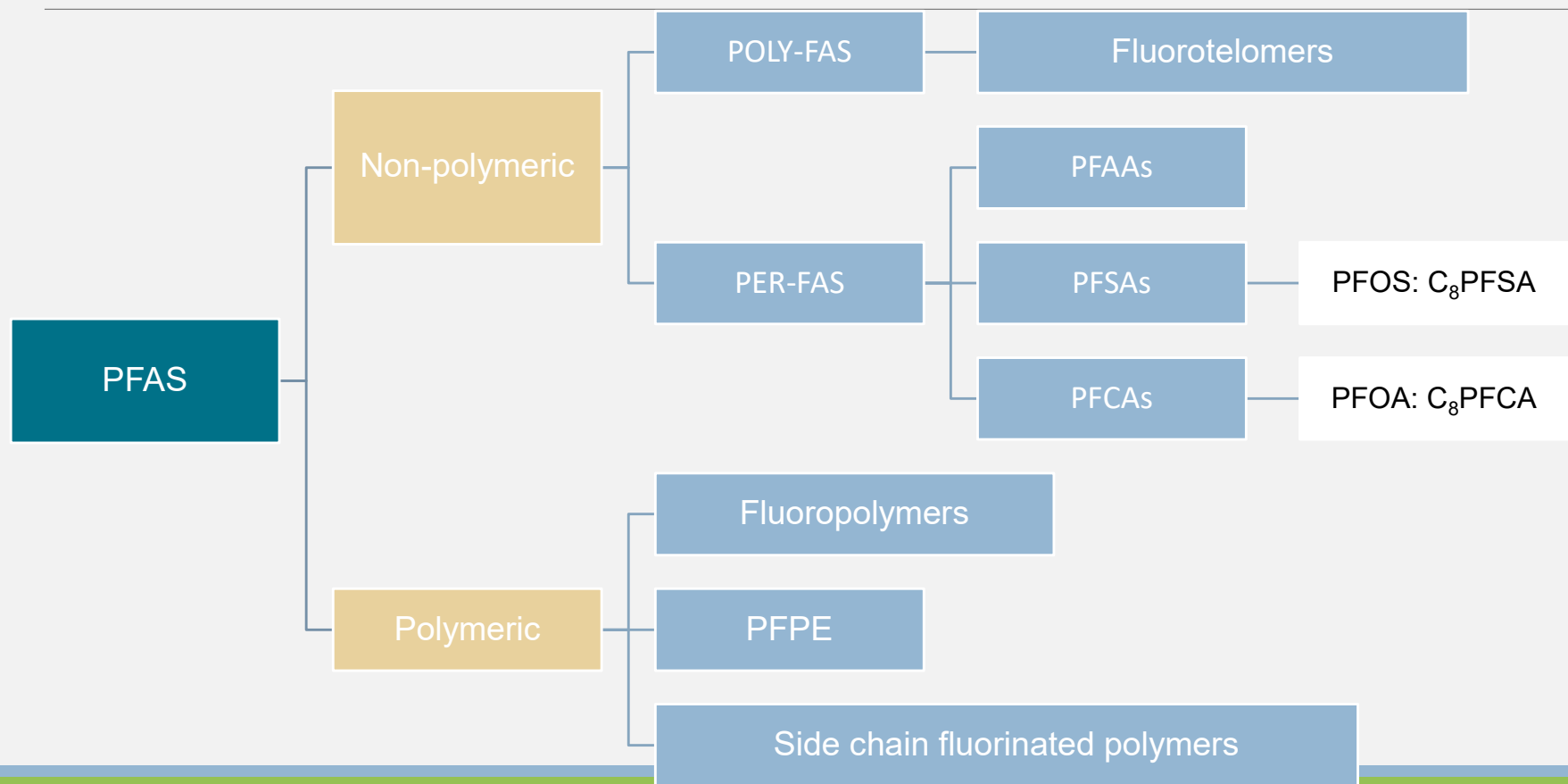


Definitie, kenmerken van PFAS

- **Per** and **poly** fluoro alkyl substances: $-\text{CF}_3$, $-\text{CF}_2$
- **Short** [$<6\text{C}$] & **long** chain PFAS [$>7\text{C}$]; **ultrashort** [tot 3C]



PFAS Stamboom



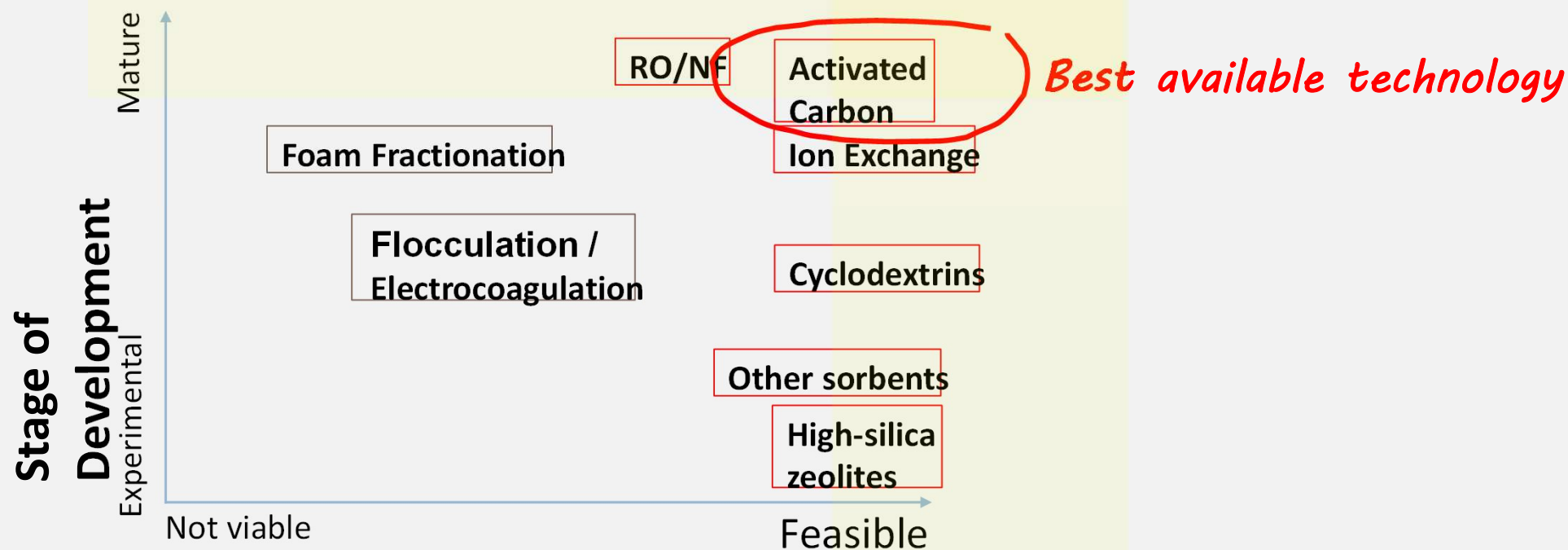
Analyse: voorbereiding is key!



PEMI1p 2024 Week 3 3 PFAS sampling dos and donts video

<https://www.youtube.com/watch?v=JdNKn1OZQe0>

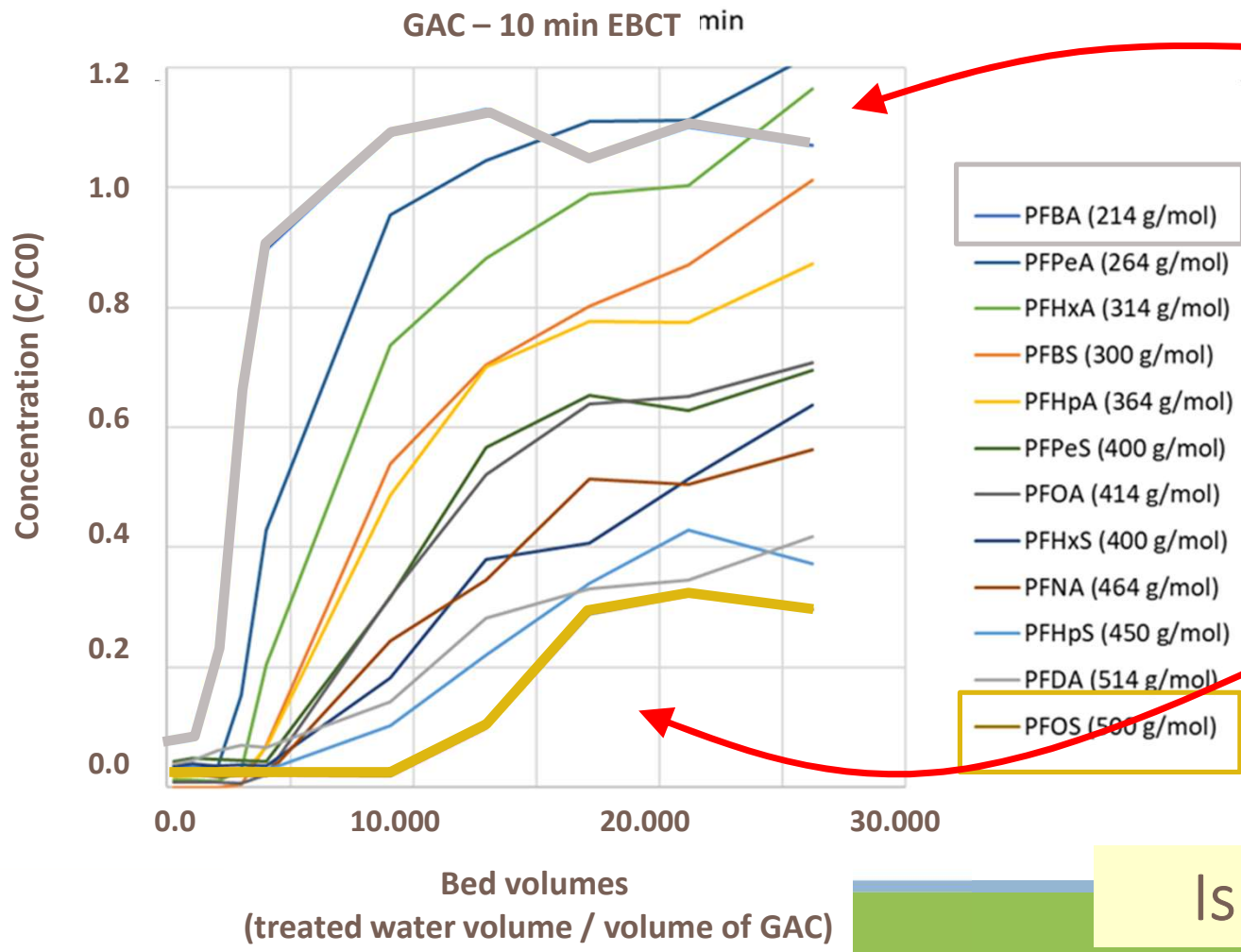
Scheidings technieken



Range of Practicality

Graphic modified from Ross, I, McDonough, J, Miles, J, et al. A review of emerging technologies for remediation of PFASs. *Remediation*. 2018; 28: 101–126. <https://doi.org/10.1002/rem.21553>

PROMISGES Activated carbon is great But...



*Short chain PFAS
Slaan snel door*

*Long chain PFAS later; nog
steeds sneller dan veel
andere OMPs*

Is er een betere adsorbent?

Gewenste eigenschappen:



B-Cyclodextrin



High-silica zeolites



Selectiviteit voor PFAS in complexe matrices (ionen en andere organische stoffen)

Scheiding van PFAS met een korte keten

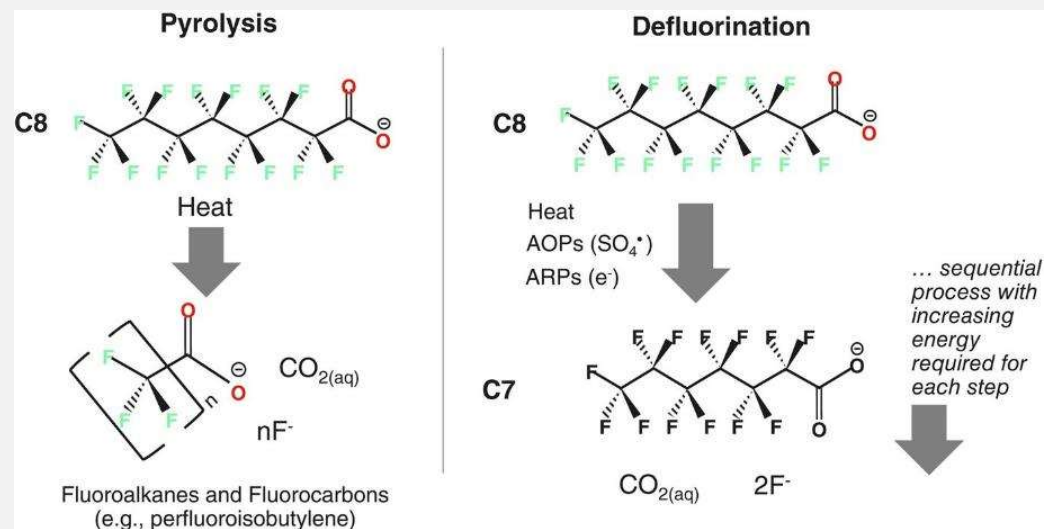
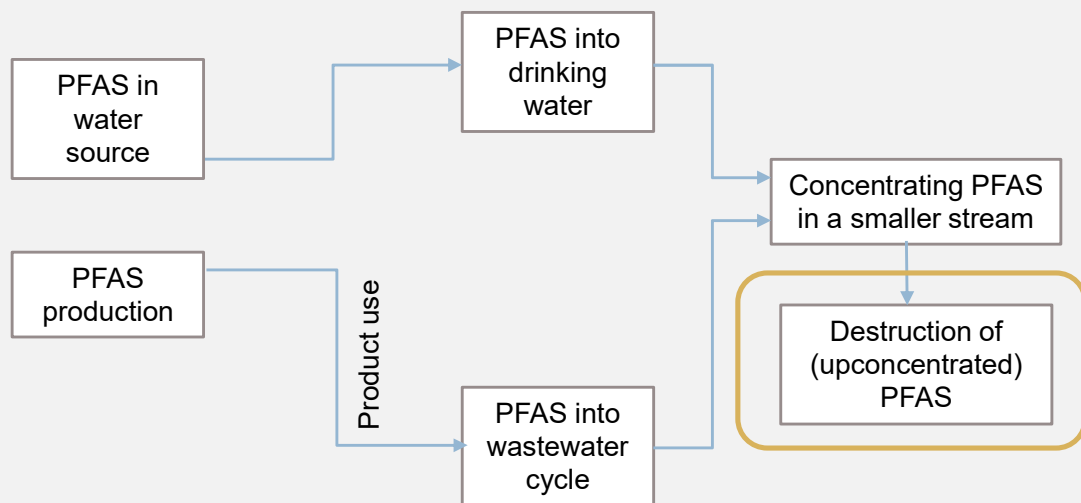
Regeneratiemogelijkheden (idealiter ter plaatse, laag afvalvolume)

Levensduur van het materiaal (veel regeneratiecycli)

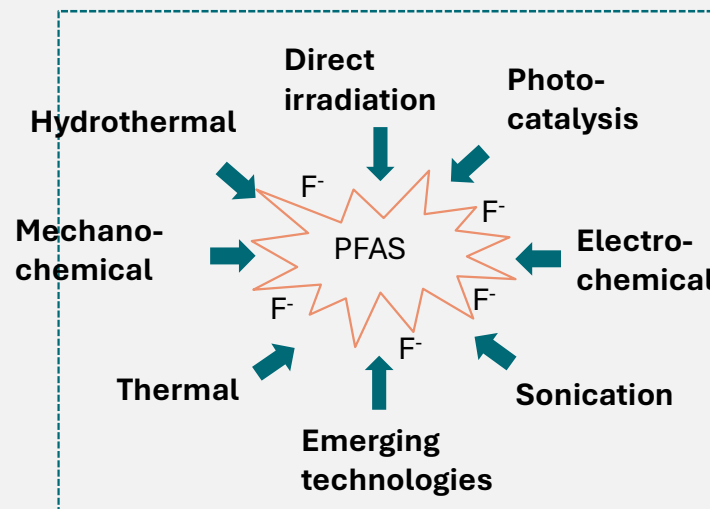
Granulair, poreus materiaal voor reactoropstelling met vast bed

→ Duurzamer dan GAC, dat wel short-chain PFAS afvangt

Destructietechnieken



Hoe en waarom?



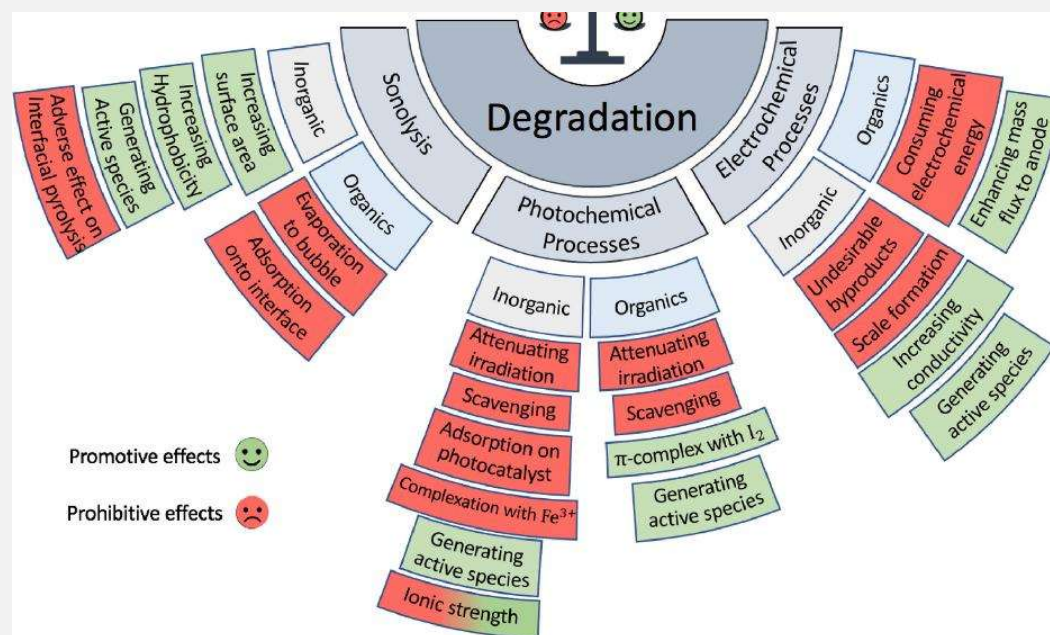
Doelen:

1. 100% defluorering
2. Effectief bij brede range PFAS
3. Hoge energie-efficiëntie
4. Effectief in verschillende watermatrices
5. Groen proces

Redrawn from Juve, J. M. A., Wang, B., Wong, M. S., Ateia, M., & Wei, Z. (2023). Complete defluorination of per- and polyfluoroalkyl substances—dream or reality?. Current Opinion in Chemical Engineering, 41, 100943.

Bekende technieken; let op matrix!

- Incineratie, pyrolyse
- eAOP
- Superkritische water-oxidatie
- Sonotreatment
- Plasmatreatment







PROMISCES

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PFAS DAG STOWA

17 APRIL – WAGENINGEN

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