FACULTEIT
BIO-INGENIEURSWETENSCHAPPEN

Alternatieve waterbronnen

de uitdaging van organica

Marjolein Vanoppen, Cameron Dierendonck // UGent/CAPTURE

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PaInT Particle and Interfacial Technology

PaInT
Particle and Interfacial Technology

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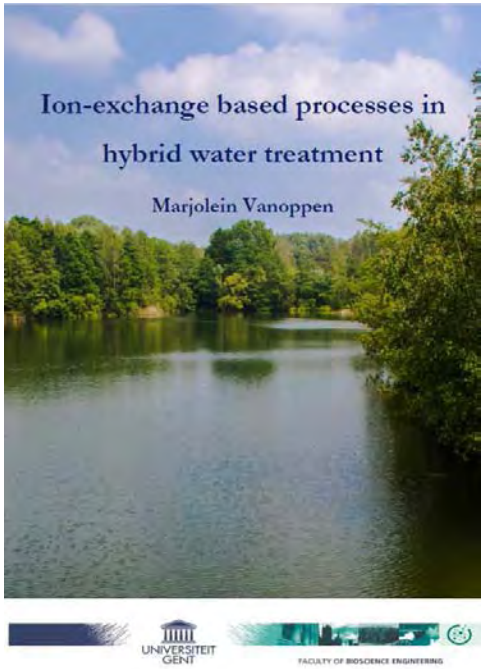

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CAPTURE

CAPTURE is a **platform initiative** that operates a physical and virtual place to help researchers and companies to co-create and interact with each other and exchange values under **three pipelines.**

- WATER FIT FOR USE
- PLASTIC TO RESOURCE
- CO_2 TO PRODUCT

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Powered by

Universiteit Antwerpen

GHENT UNIVERSITY

vito vision on technology

VUB

3 Pipelines

14 Programs

>60 research group leaders

>45 research groups

>300 researchers involved

2 business platforms

>25 business members

>100 companies we work with

11 staff members

22 supporting members

6 business developers

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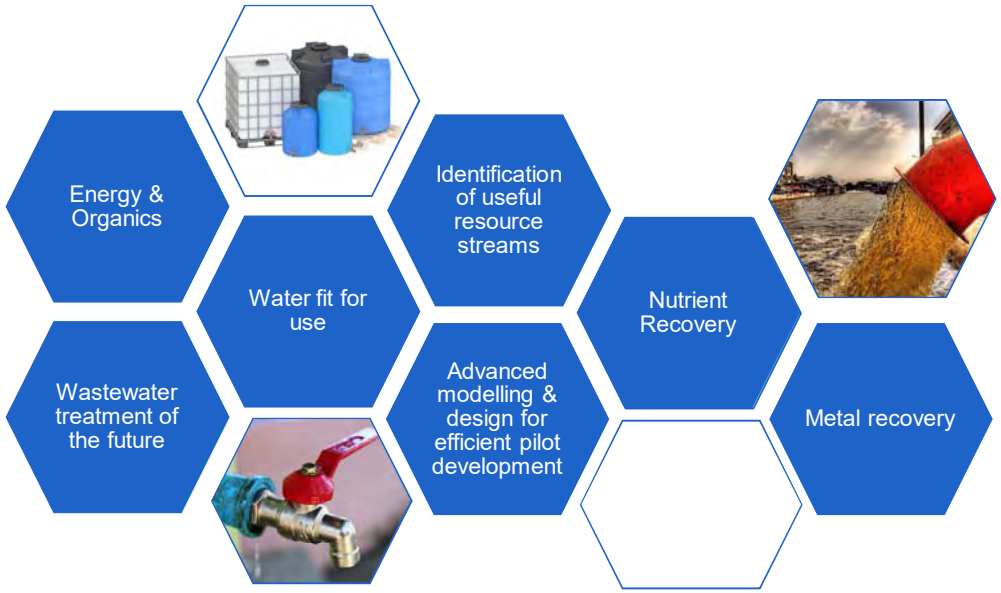
WATER ‘FIT-FOR-USE’



SMART WATER (RE-)USE IN SELECTED DOMAINS

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WATER ‘FIT-FOR-USE’

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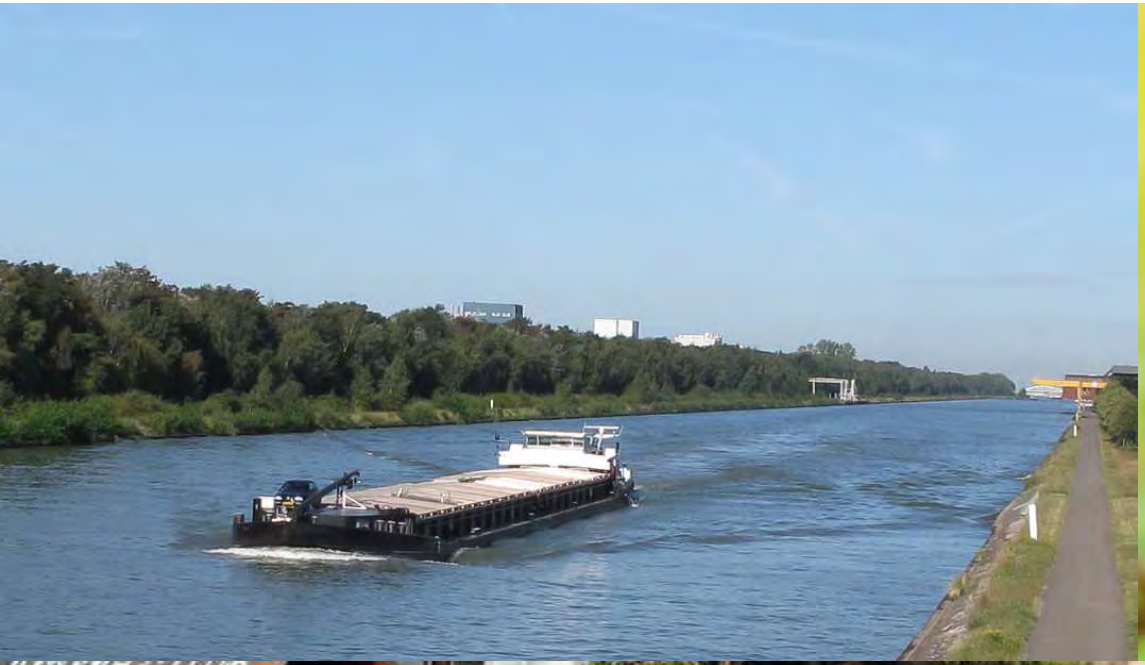
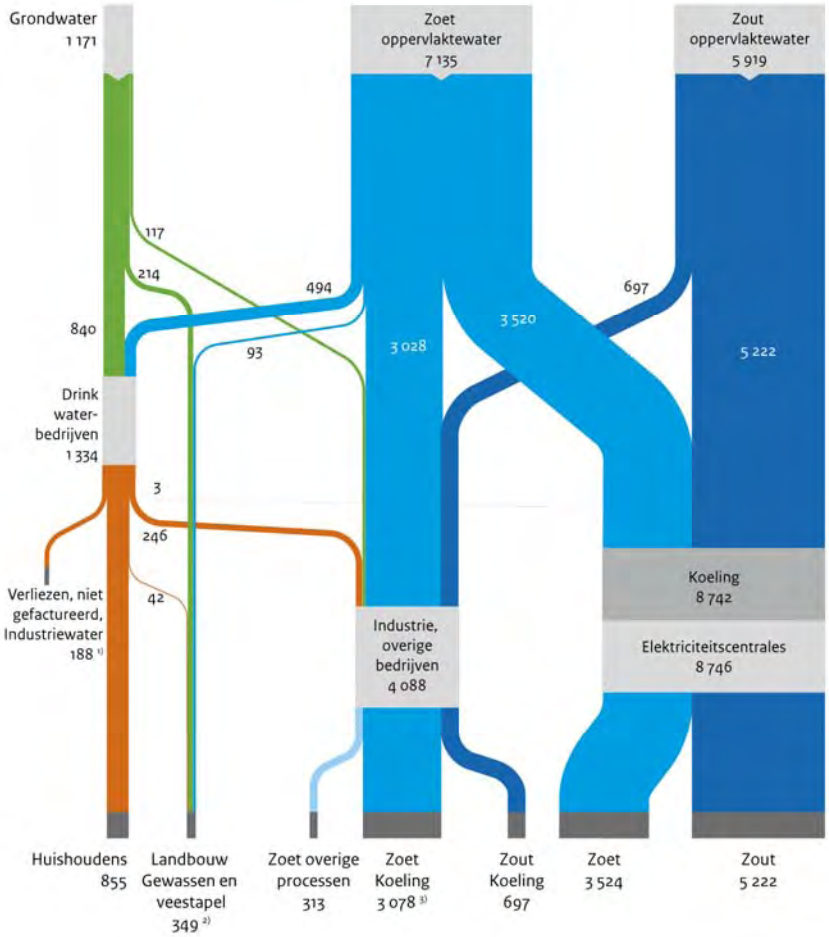


Winning en gebruik van water 2020

Eenheid: miljoen m³



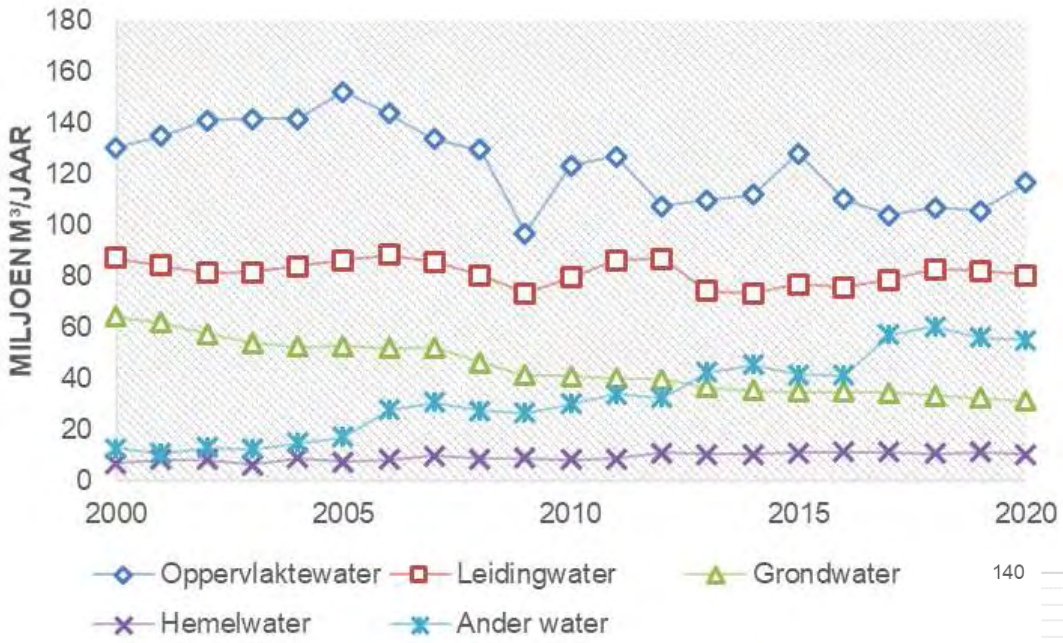
1) – Productieverliezen
– Niet gefactureerd
– industriewater -> dochterbedrijven

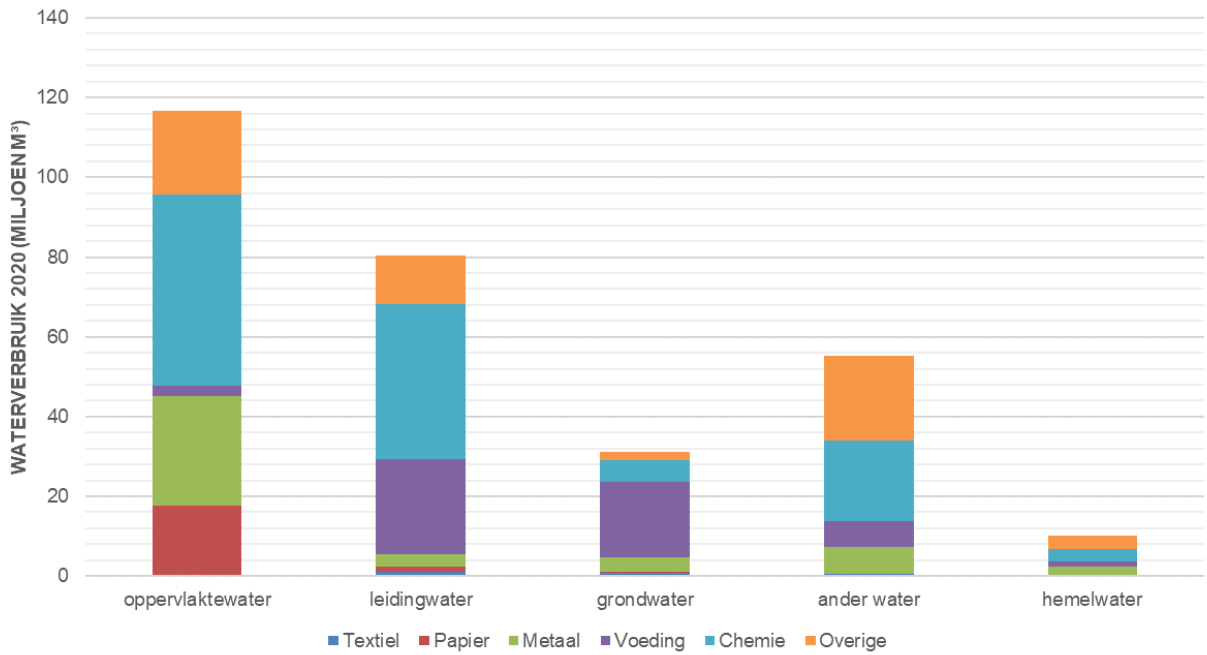
2) Exclusief het grote volume van de opname van bodemwater door gewassen. Orde grootte 15 miljard m³ (met name landbouw).

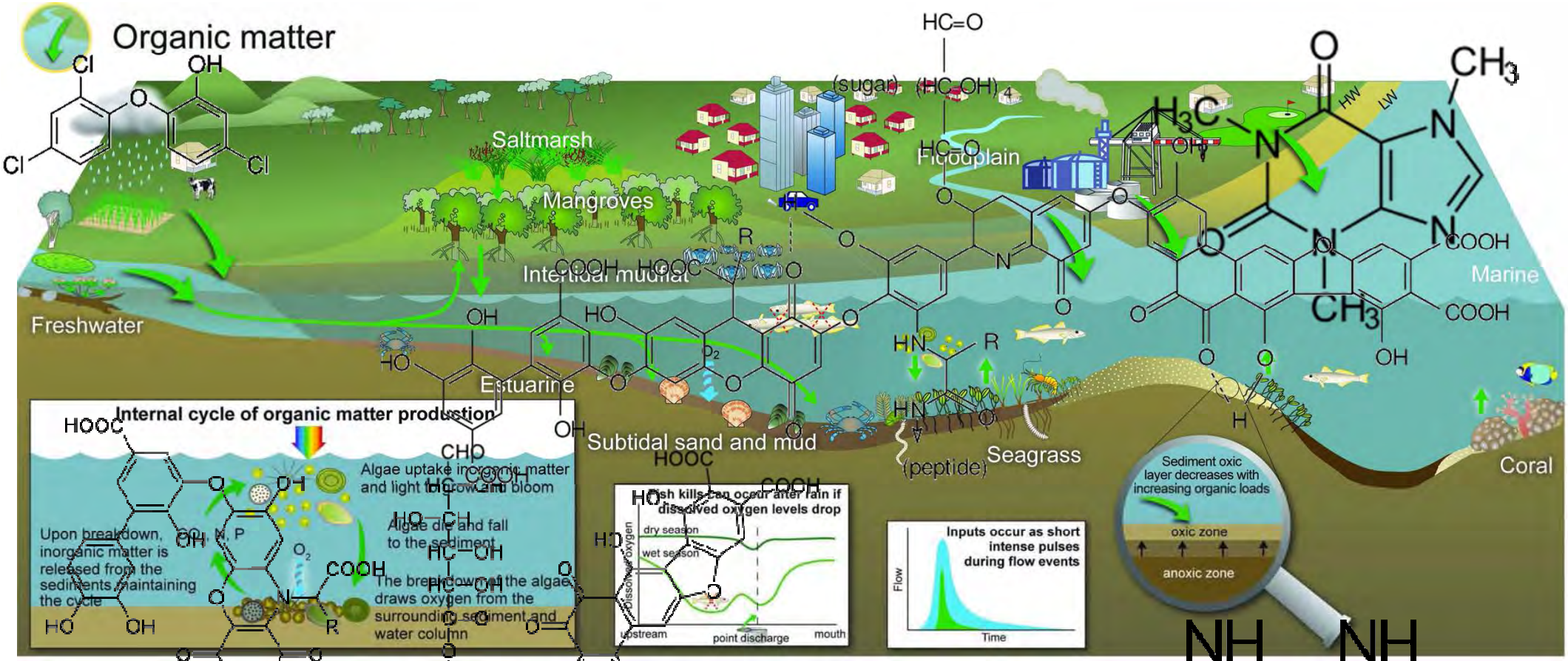
3) Afkomstig uit oppervlaktewater (3 028 mln m³) en grondwater (50 mln m³).

Bron: CBS

CBS/jun22
www.clo.nl/nl005716


MILJOEN M³/JAAR
180
160
140
120
100
80
60
40
20
0
2000
2005
2010
2015
2020
Oppervlaktewater
Leidingwater
Grondwater
Hemelwater
Ander water


WATERVERBRUIK 2020 (MILJOEN M³)
140
120
100
80
60
40
20
0
oppervlaktewater
leidingwater
grondwater
ander water
hemelwater
Textiel
Papier
Metaal
Voeding
Chemie
Overige



Legend:

Organic matter enters from diffuse land ( ), urban ( ) (e.g. stormwater), upstream aquatic (e.g. aquatic weeds ( )) and point discharge ( ) (e.g. sewage overflow and intensive animal production (e.g. dairy, feed lot)) sources

Internal production of organic matter from aquatic plants ( ) and phytoplankton ( ) occurs within the system

The breakdown of organic matter can result in low dissolved oxygen (i.e. hypoxia or anoxia) in the water which can cause mass mortality events

Sediment oxygen demand is higher when production is higher

Queensland Government
Environmental Protection Agency

Wat is het effect op waterkwaliteit?

Wat is het effect op behandelingstechnieken?

Welke organica hebben welk effect?

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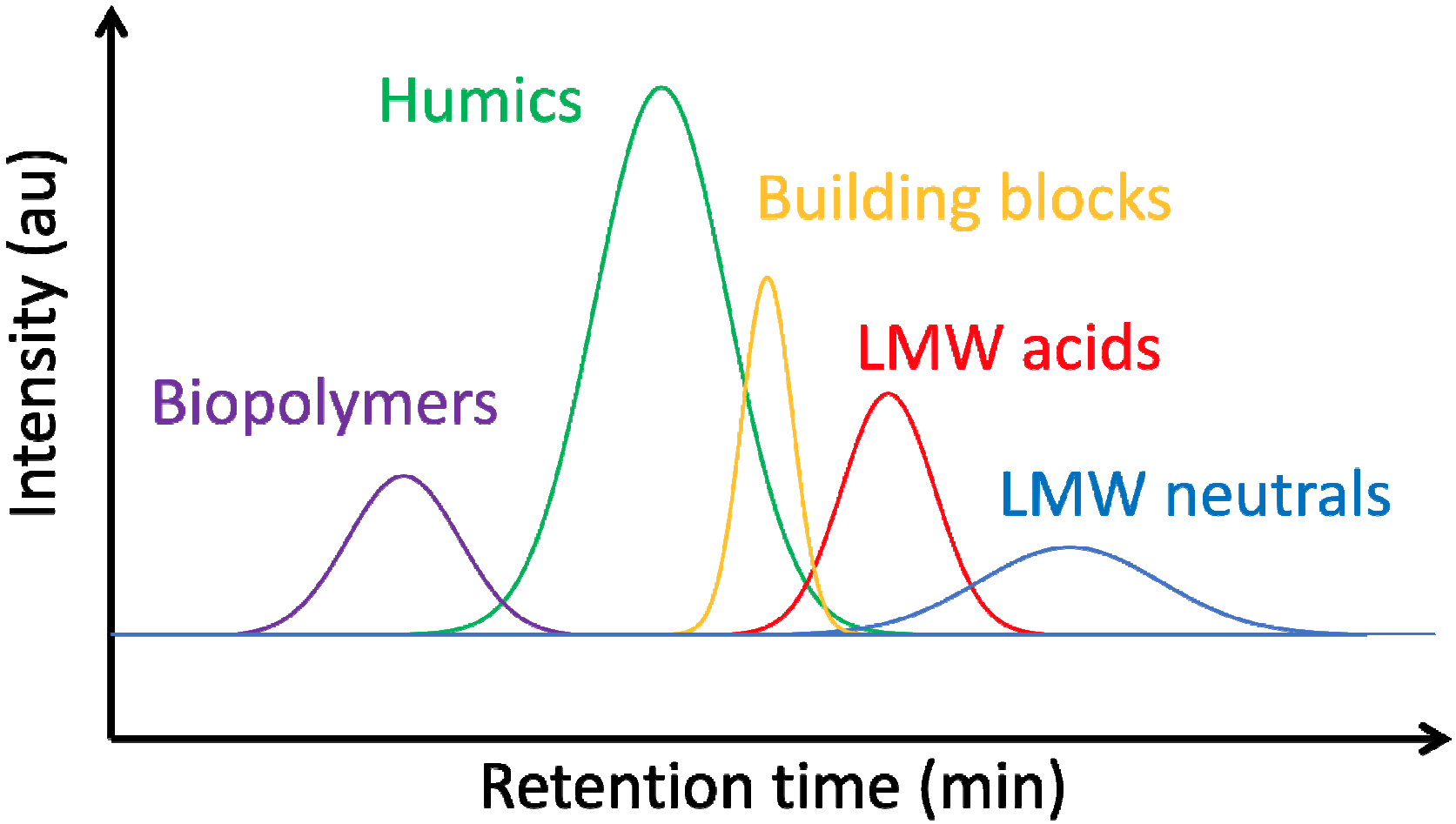
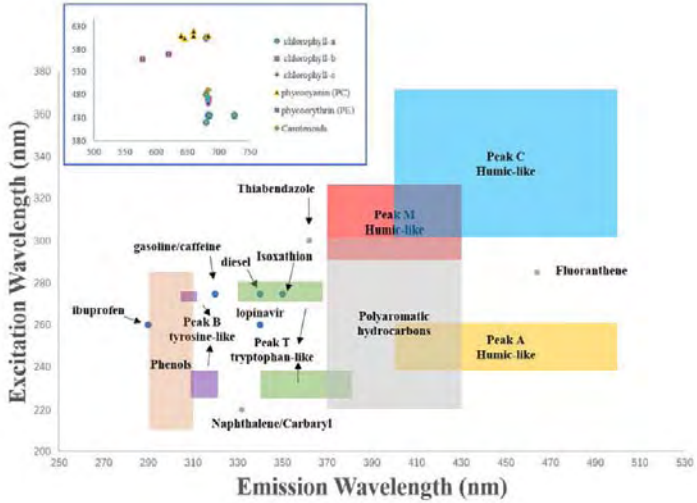
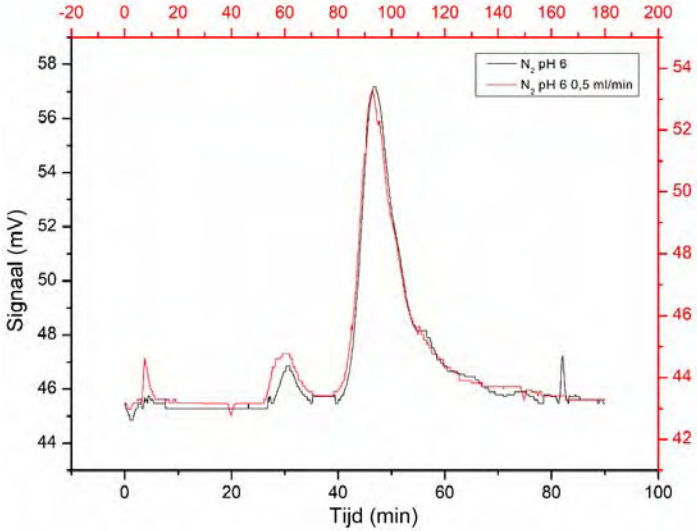

Humics
Building blocks
LMW acids
Biopolymers
LMW neutrals
Intensity (au)
Retention time (min)





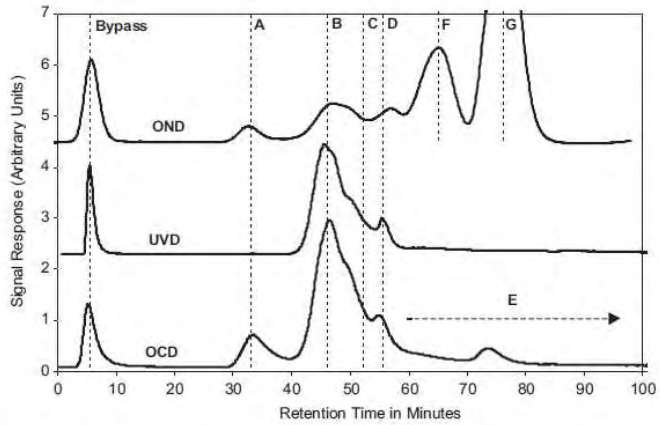
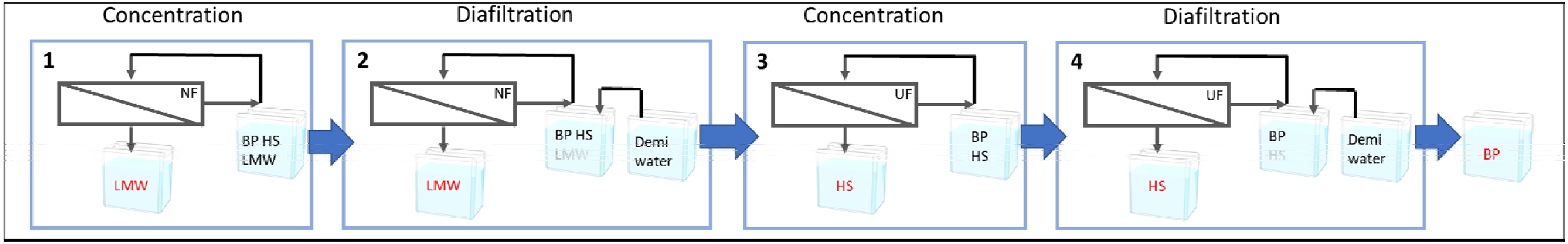
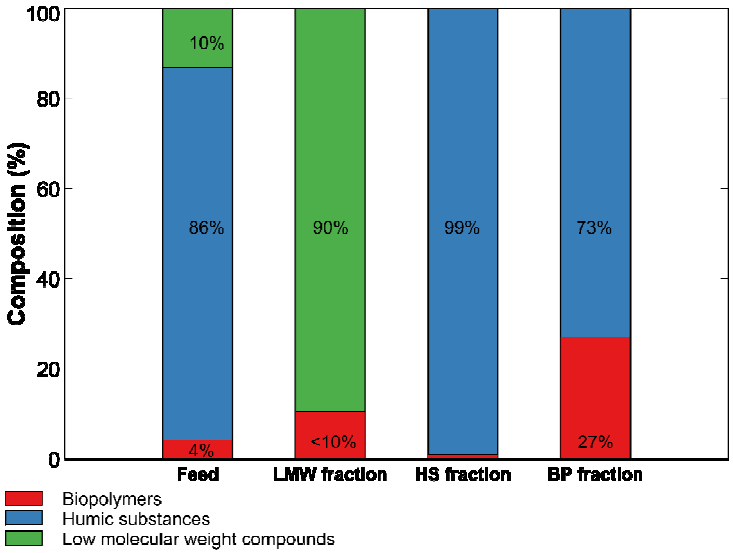


Fig. 2 – SEC-OCD chromatogram of a surface water (*River Pfinz*, Karlsruhe, Germany) with responses for organic carbon detection (OCD), UV-detection at 254 nm (UVD) and organic nitrogen detection (OND). Arbitrary assignment of fractions A–G prior to data processing.

FEEM **HPSEC-TOC** **LC-OCD**

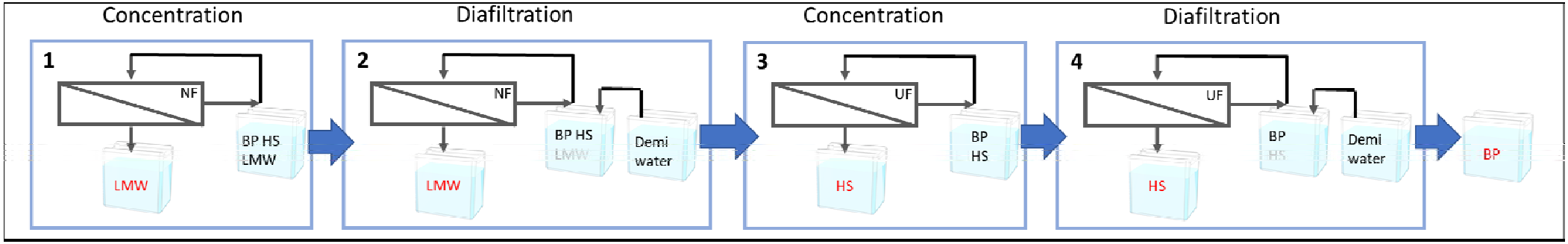


BP = biopolymers, HS = Humic substances, LMW = low molecular weight compounds

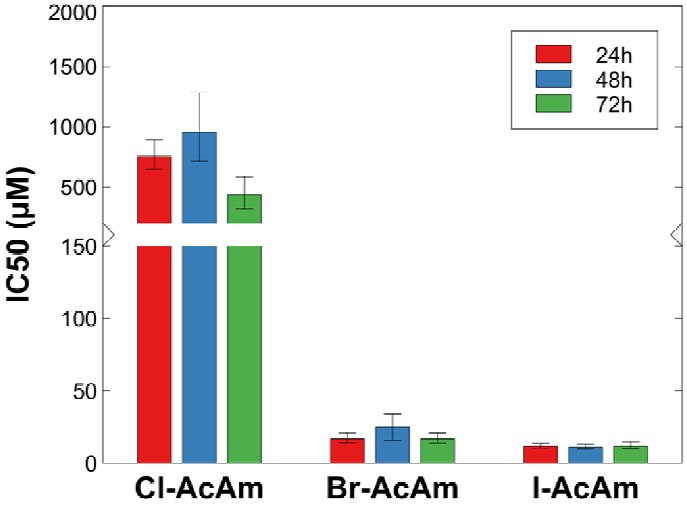


Desinfection

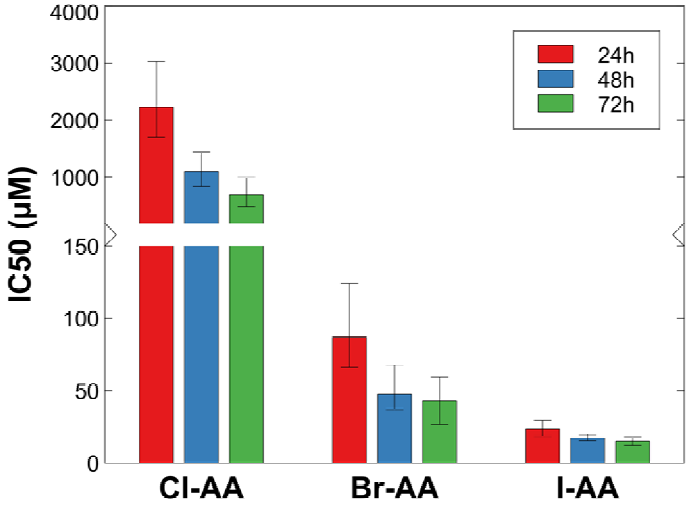
DBP formation & toxicity?



Haloacetamides (unregulated)

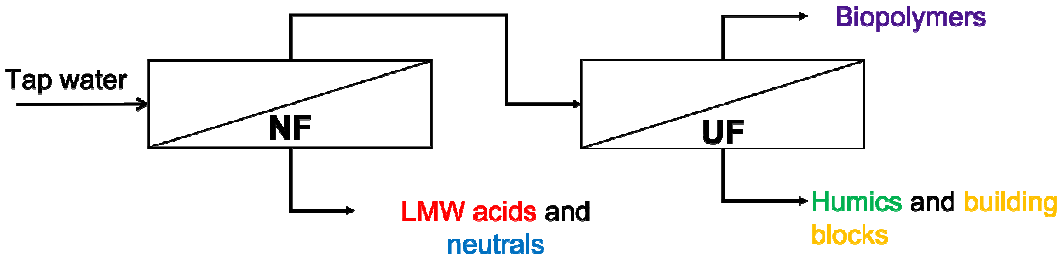


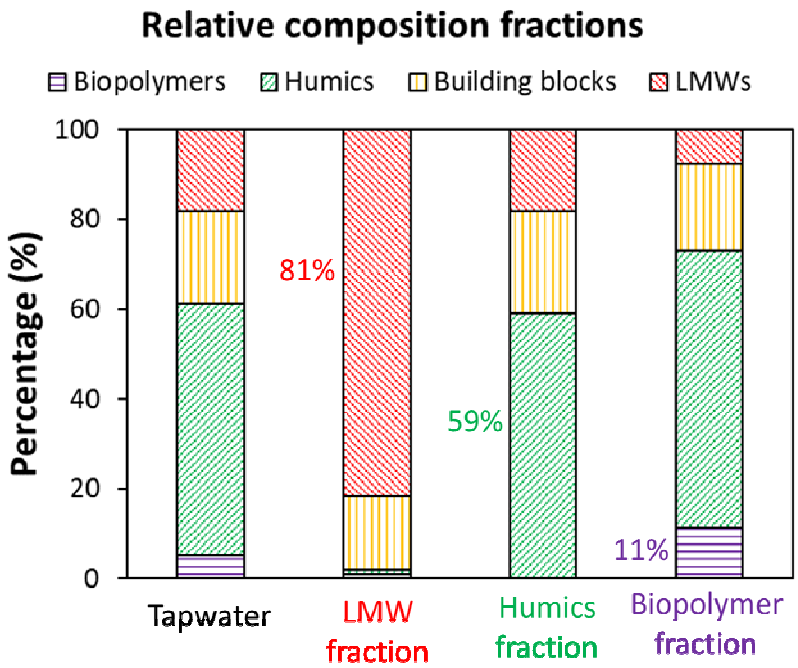
Haloacetic acids (regulated)

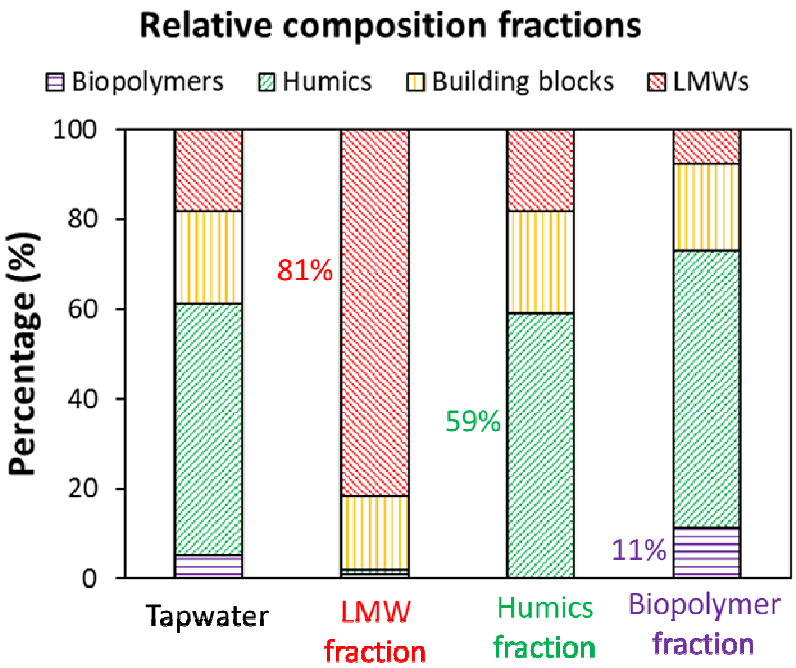


I-DBP > Br-DBP > Cl-DBP

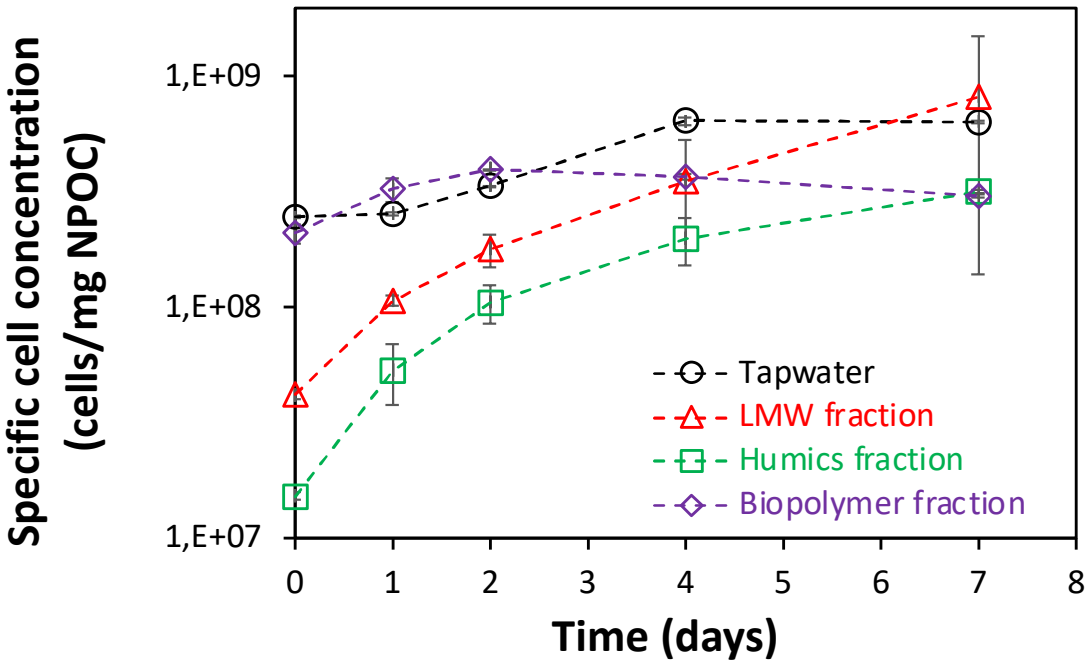
HAcAm > HAA

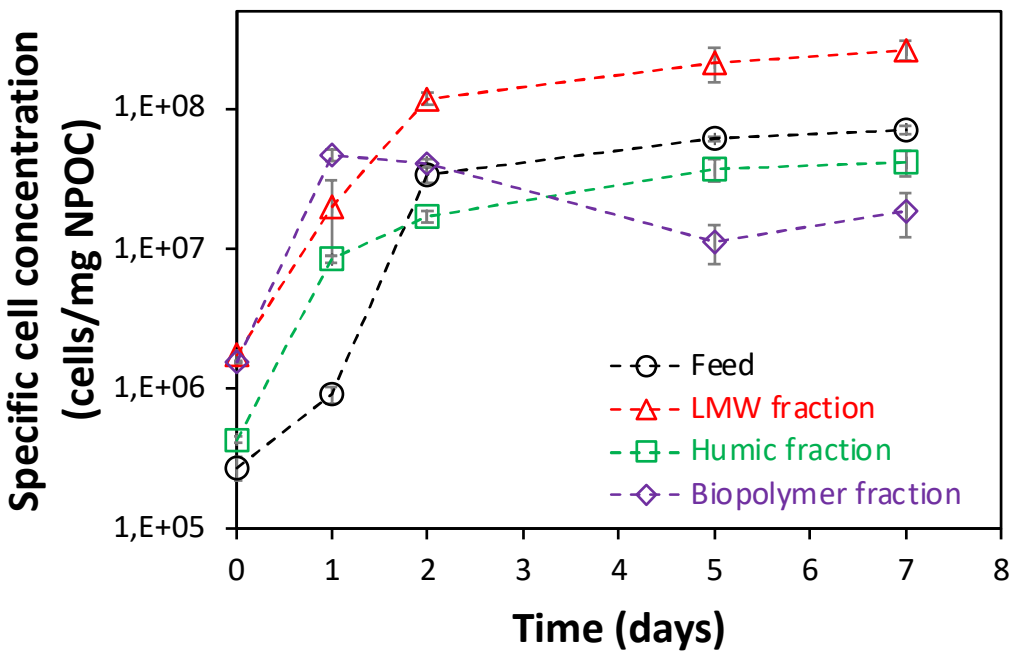




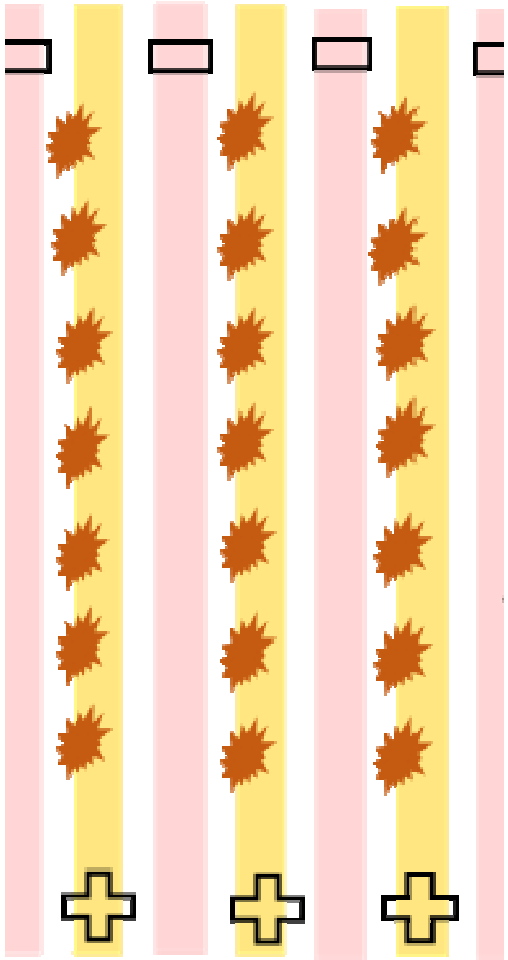


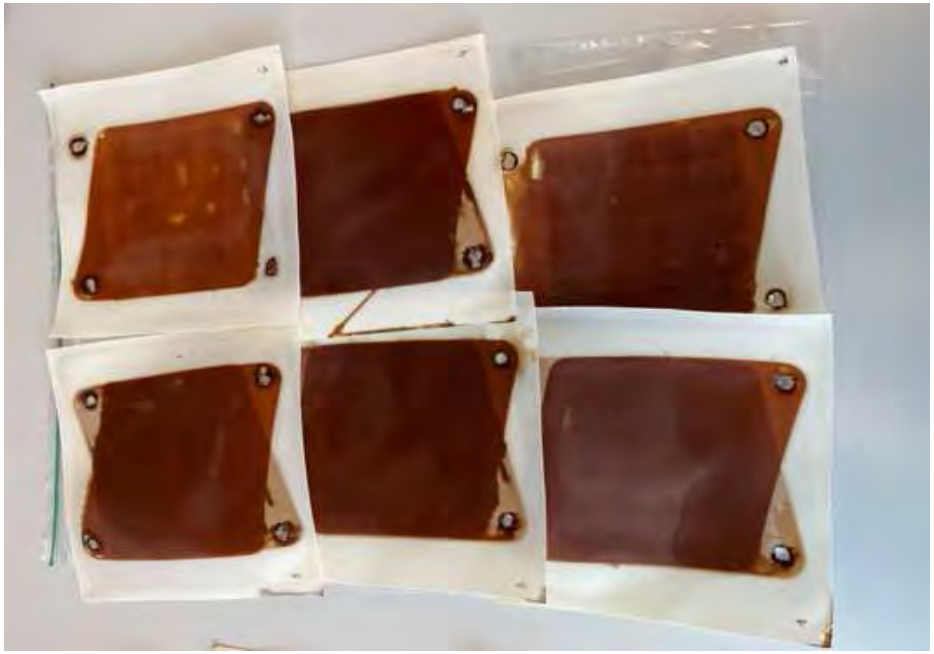
Drinking water **Ground water**

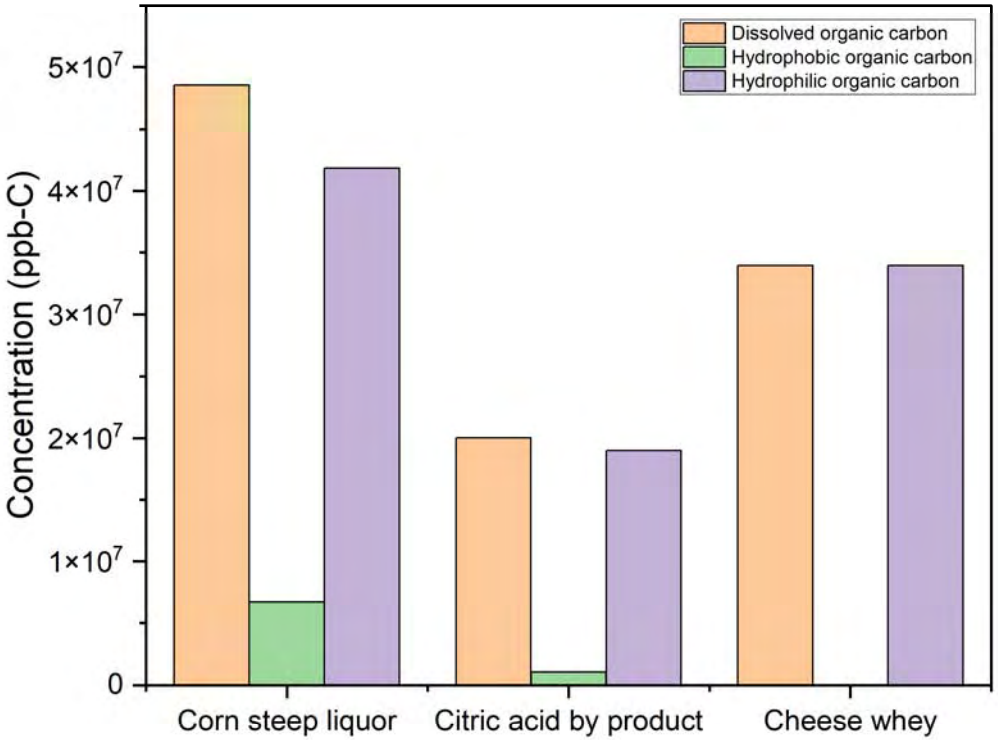


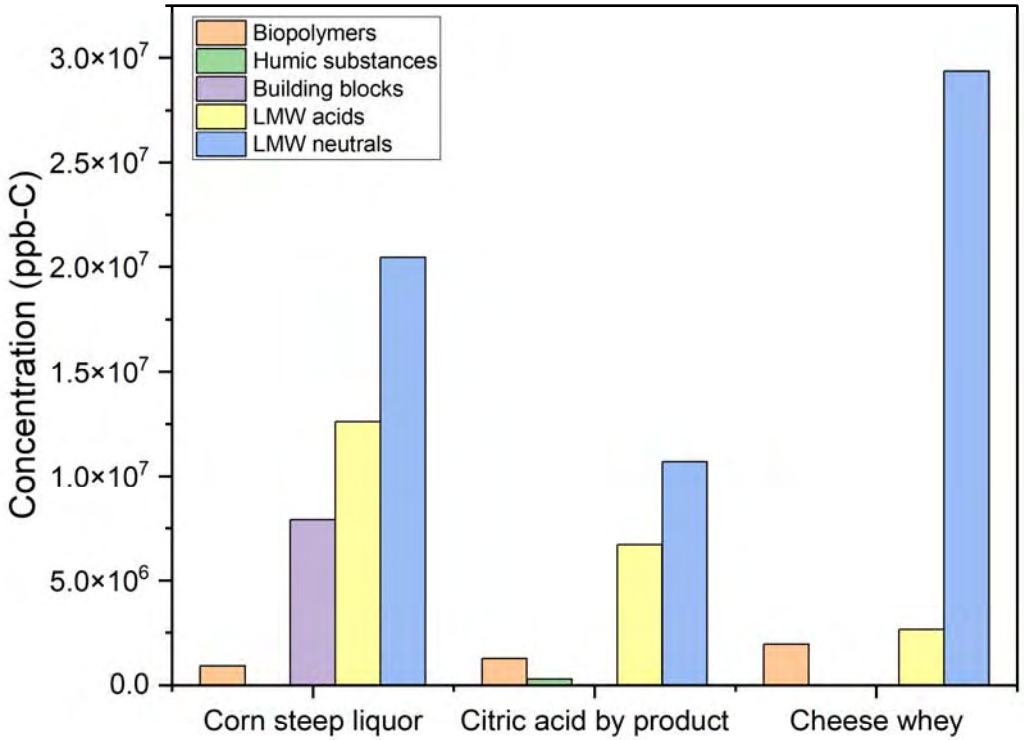


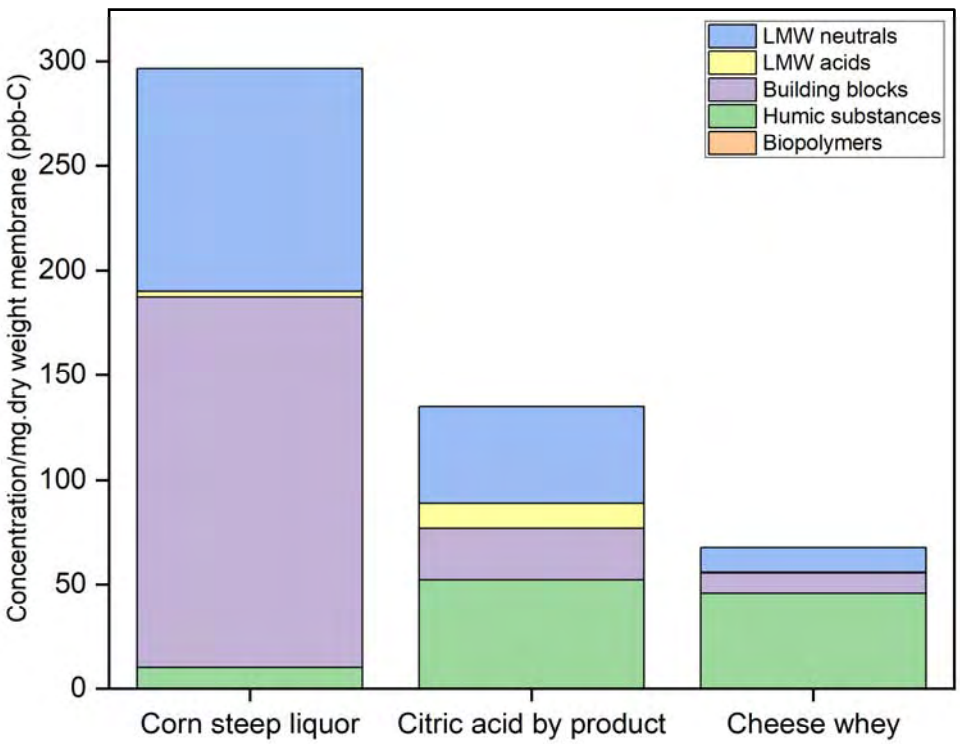
Drinking water | **Ground water**

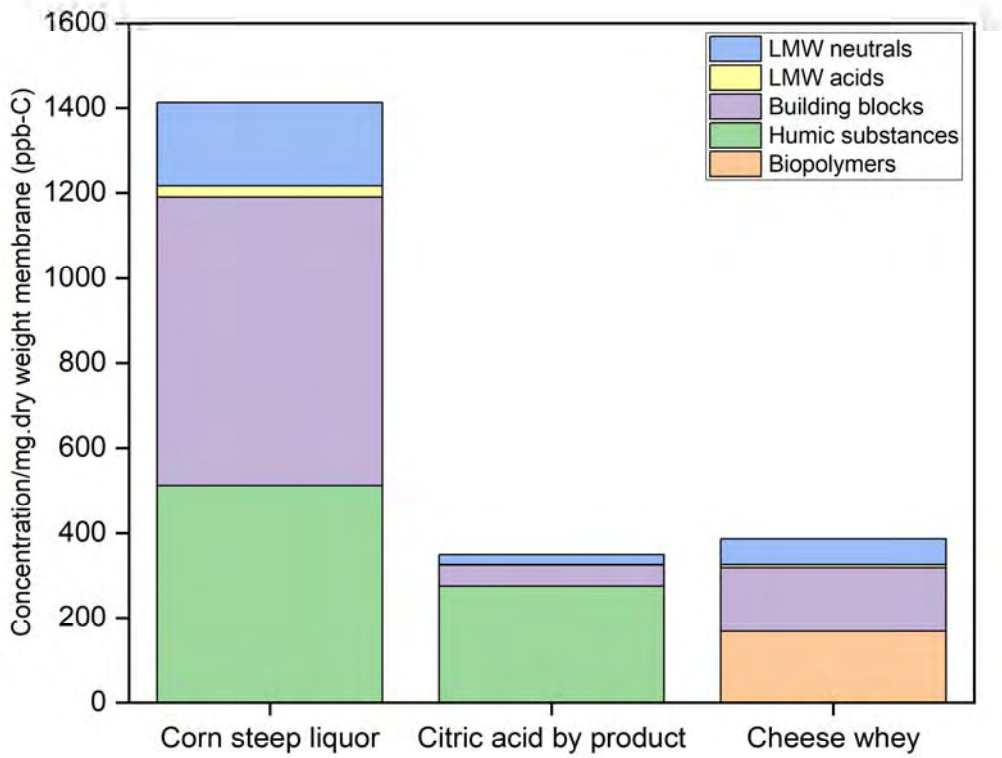





Dissolved organic carbon
Hydrophobic organic carbon
Hydrophilic organic carbon
Concentration (ppb-C)
5×10^7
4×10^7
3×10^7
2×10^7
1×10^7
0
Corn steep liquor
Citric acid by product
Cheese whey


Biopolymers
Humic substances
Building blocks
LMW acids
LMW neutrals
Concentration (ppb-C)
3.0×10^7
2.5×10^7
2.0×10^7
1.5×10^7
1.0×10^7
5.0×10^6
0.0
Corn steep liquor
Citric acid by product
Cheese whey





Homogeen membraan | **Heterogeen membraan**

Te onthouden

- Onderschat de samenstelling van de organica in het water niet

- Technieken voor organica karakterisatie zijn breed toepasbaar

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