



Adsorption through new materials

Affinity adsorption: CatchAmed

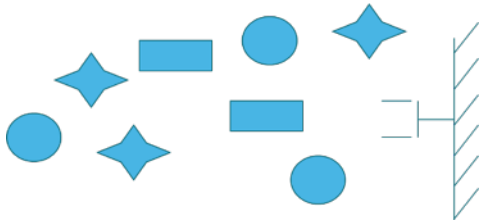
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**Dutch Innovation on Micropollutants
Removal from Municipal Wastewater
November 7th 2019 Aquatech Amsterdam**

Adsorption Technology

Principle:



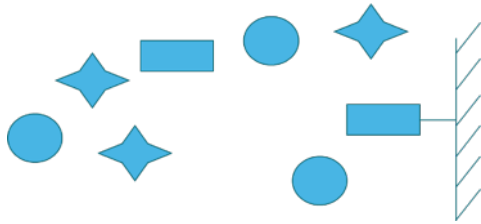
Adsorption based on specific interaction between functional groups in compounds and on surface.

Examples:

- Charge
- π - π stacking
- H-bridging
- C-C-interactions

Adsorption Technology

Principle:



Advantage:

- Proof of principle: less competition by e.g. NOM
- Commercial polymer and SiO₂ particles

Disadvantages:

- Removal of polymer particles from water
- Availability
- Expensive

Required:

Non-toxic, cheap carrier material with $\rho > 1$

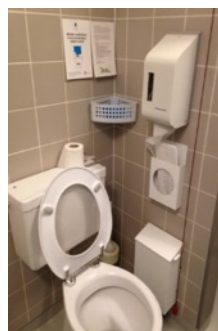
Alumino silicate,
modified with silanes



Feasibility Study

- Good removal of diclofenac and related compounds in Milli-Q, drinking water, artificial urine and wastewater

- Application in toilet



- Pilots in hospital and office building:

- People are willing to cooperate.

compound	Capacity (mg/g)	Capacity (mmol/g)
Diclofenac	28.0	0.095
Bezafibrate	0.4	0.001
Gemfibrozile	1.2	0.005
Sulfamethoxazole	0.6	0.002
Ketoprofen	0.6	0.002
Naproxen	0.5	0.002
Salicylic acid	0.9	0.006
Total but dicl.	4.2	0.018
Total inc. Dicl.	32.2	0.113
Only diclofenac	46.36	0.157

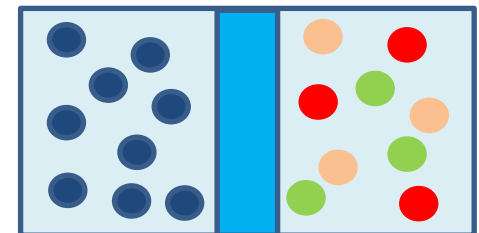
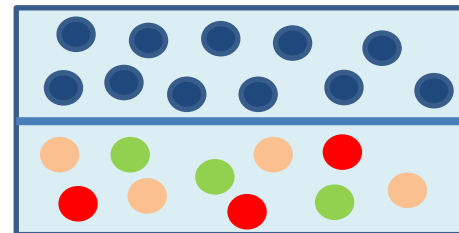
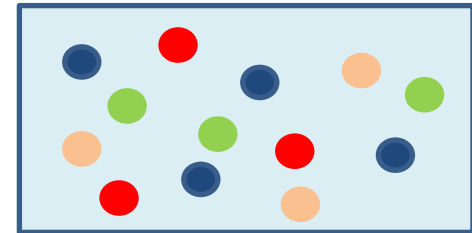
New research

- Idea:
- Sand filter remove phosphate and particles
- By adding CatchAmed to the sand, it may also remove organic contaminants.
- Development and testing of new adsorbent

compound	charge	π - π
Benzotriazole	+1	X
Metoprolol	+1	X
Sotalol	+1	X
Hydrochlorothiazide	+1	X
Sulfamethoxazole	-1	X
Trimethoprim	+0.5	
Propranolol	+1	x
Clarithromycine	+1	
Diclofenac	-1	X
4-methylbenzotriazole	+1	X
5-methylbenzotriazole	+1	x

New research

- Combination of sand and adsorbent
- TSS and phosphate removal
- Removal of organic micropollutants
- Filter bed:
 - Mixture
 - Double layer
 - Compartments
- Possibilities for regeneration?
- Biodegradation?





Thank you for your attention!

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