

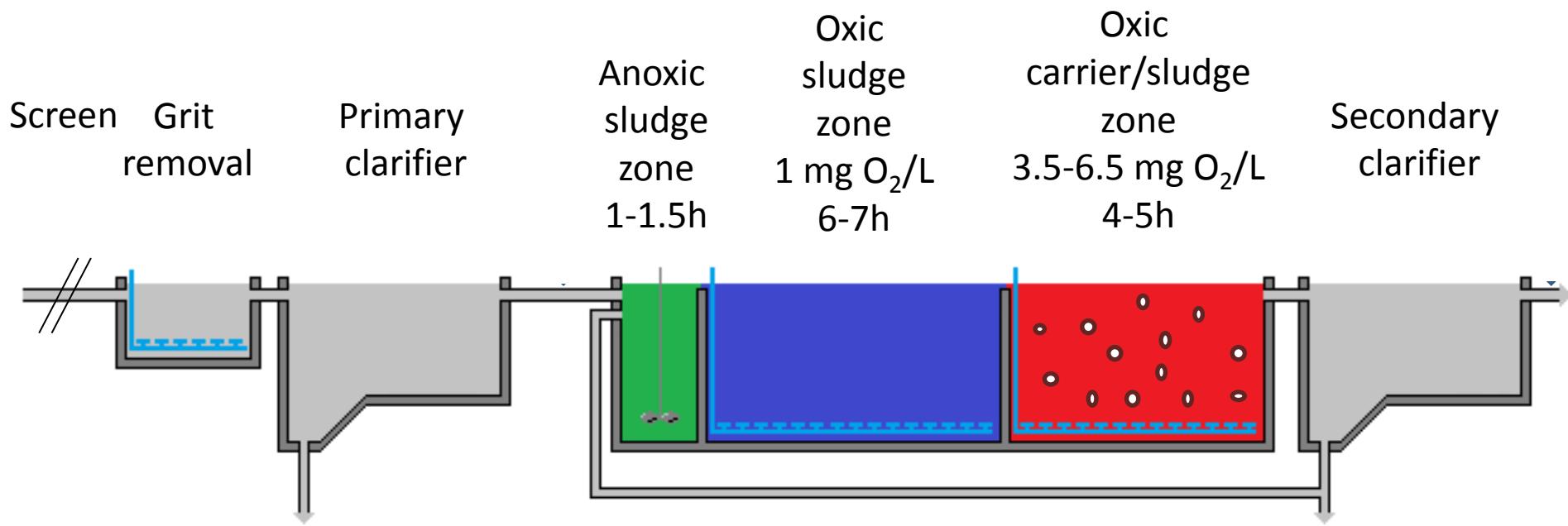
Nya biofilmsapplikationer

Rening av mikroföroreningar



Per Falås
LTH

Bad Ragaz WWTP



Sludge age: 3-4 days

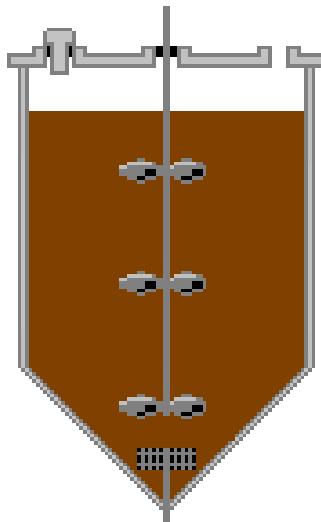
Filling ratio: 35% last compartment

Carriers: Bio-film Chip M

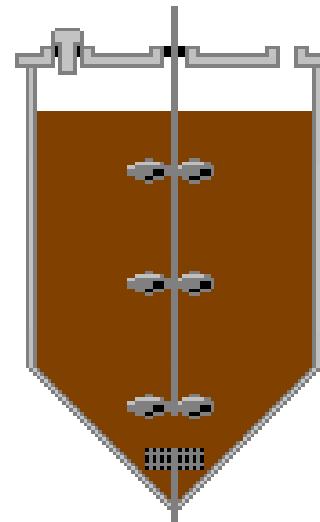


Three parallel batch reactors

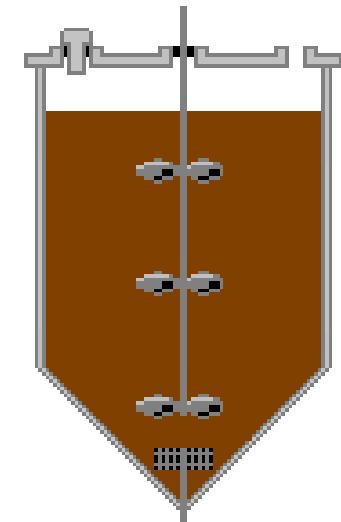
Anoxic sludge
and
effluent wastewater
 $\text{NO}_3\text{-N}$: 10-50 mg/L



Oxic sludge
and
effluent wastewater
 O_2 : 3.5 mg/L



Oxic carriers
and
effluent wastewater
 O_2 : 3.5 mg/L



Experimental Set up

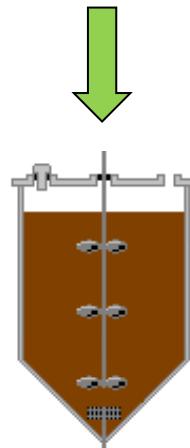
Activated sludge or Biofilm carriers

Alkalinity 4 mmol HCO_3^-/L

Ammonium 15 mg $\text{NH}_4^+ \text{-N/L}$

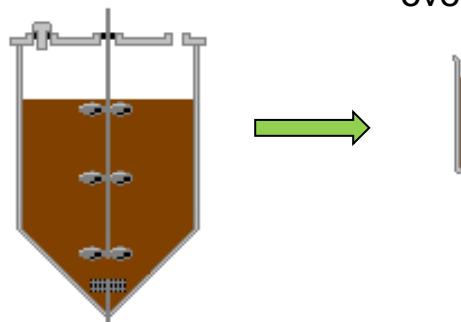
Micropollutants 1 $\mu\text{g/L}$

Batch reactor: 10L
Temperature: $16 \pm 1 \text{ }^\circ\text{C}$
pH: 7.2 ± 0.2

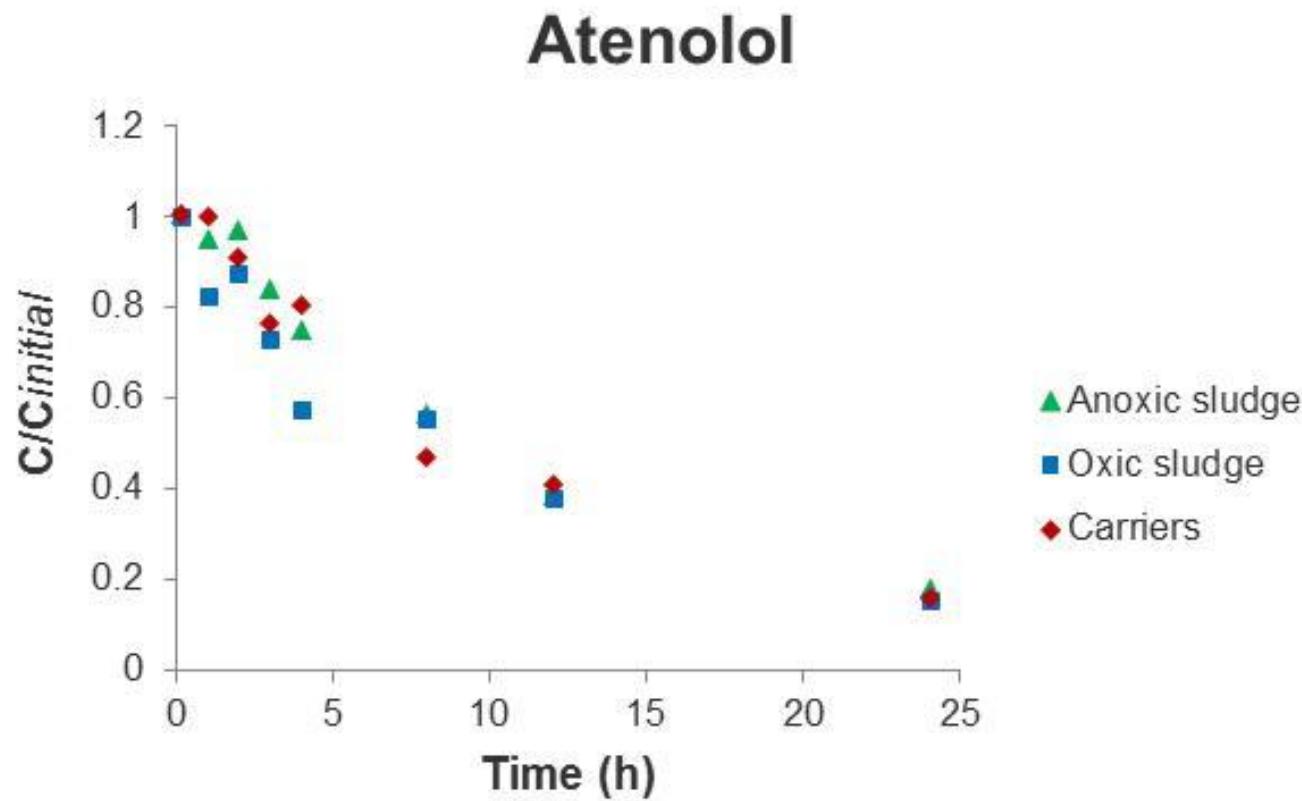


8 samples
over 24 h

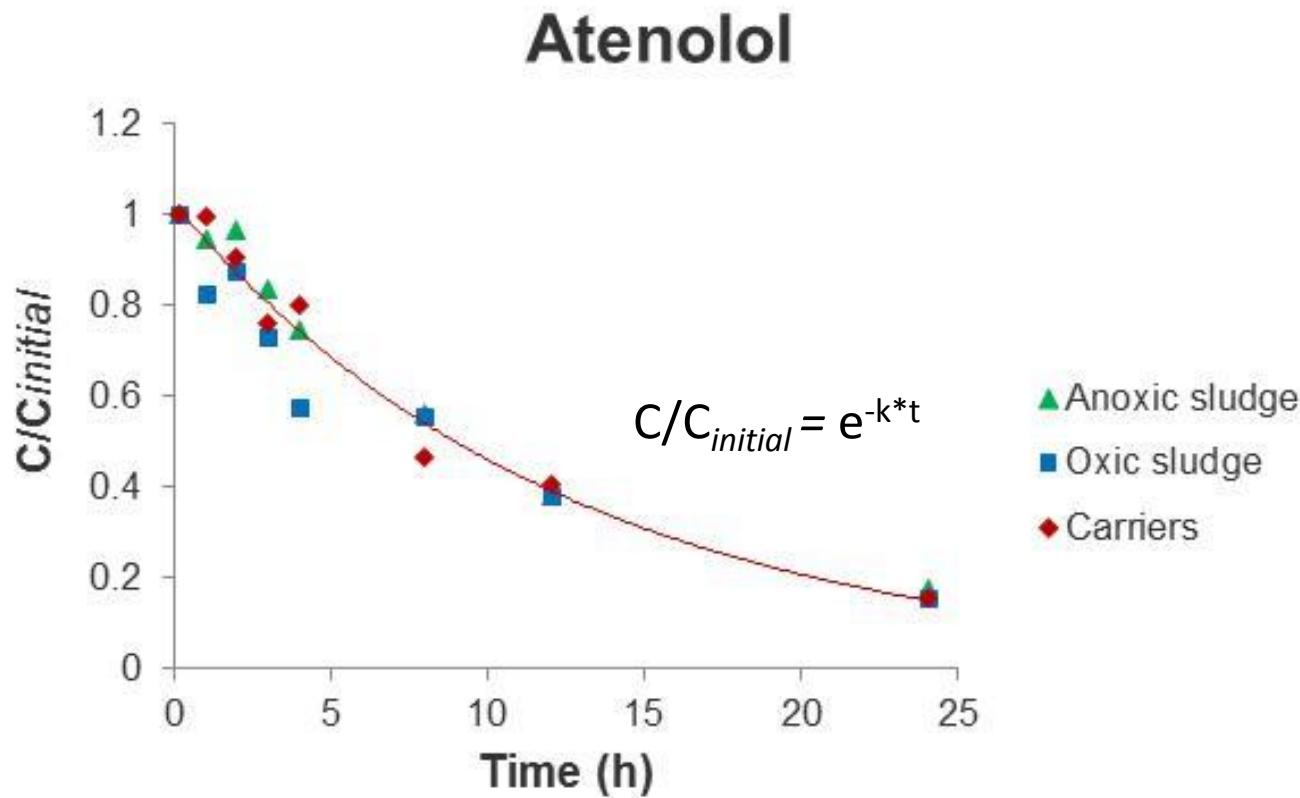
Sampling of
batch reactor



Micropollutant removal

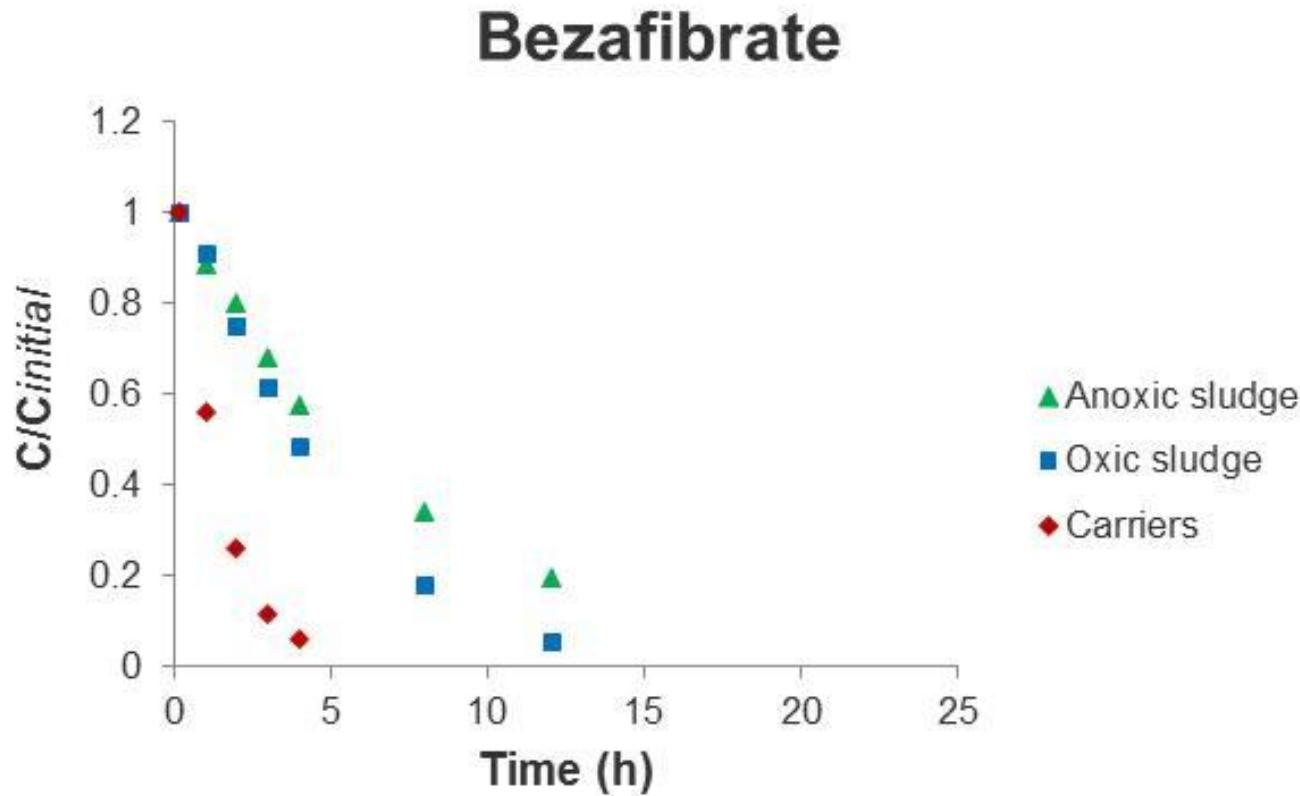


Micropollutant removal



Removal rate constant (L/g biomass*d)	
Anoxic sludge	0.8
Oxic sludge	0.8
Carriers	0.6

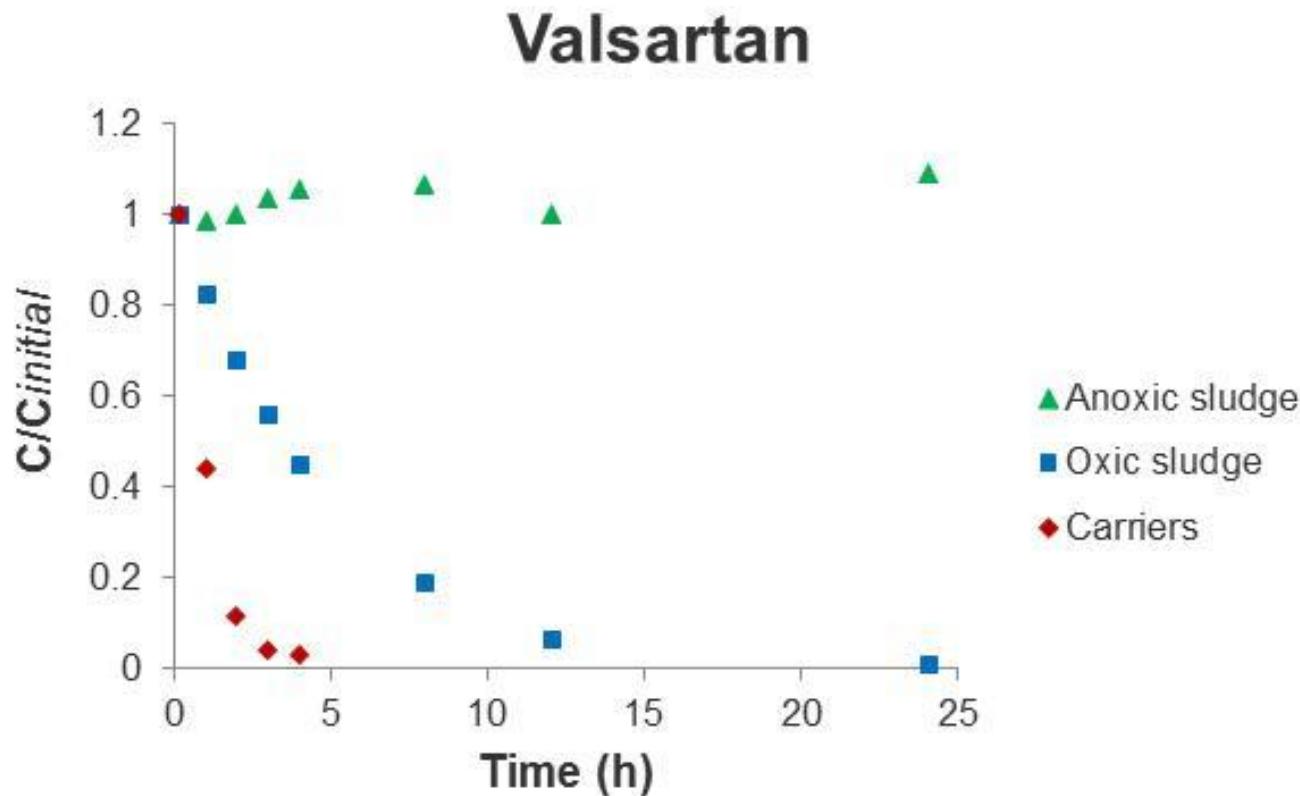
Micropollutant removal



Removal rate constant (L/g biomass*d)

Anoxic sludge	1.5
Oxic sludge	2.6
Carriers	5.6

Micropollutant removal

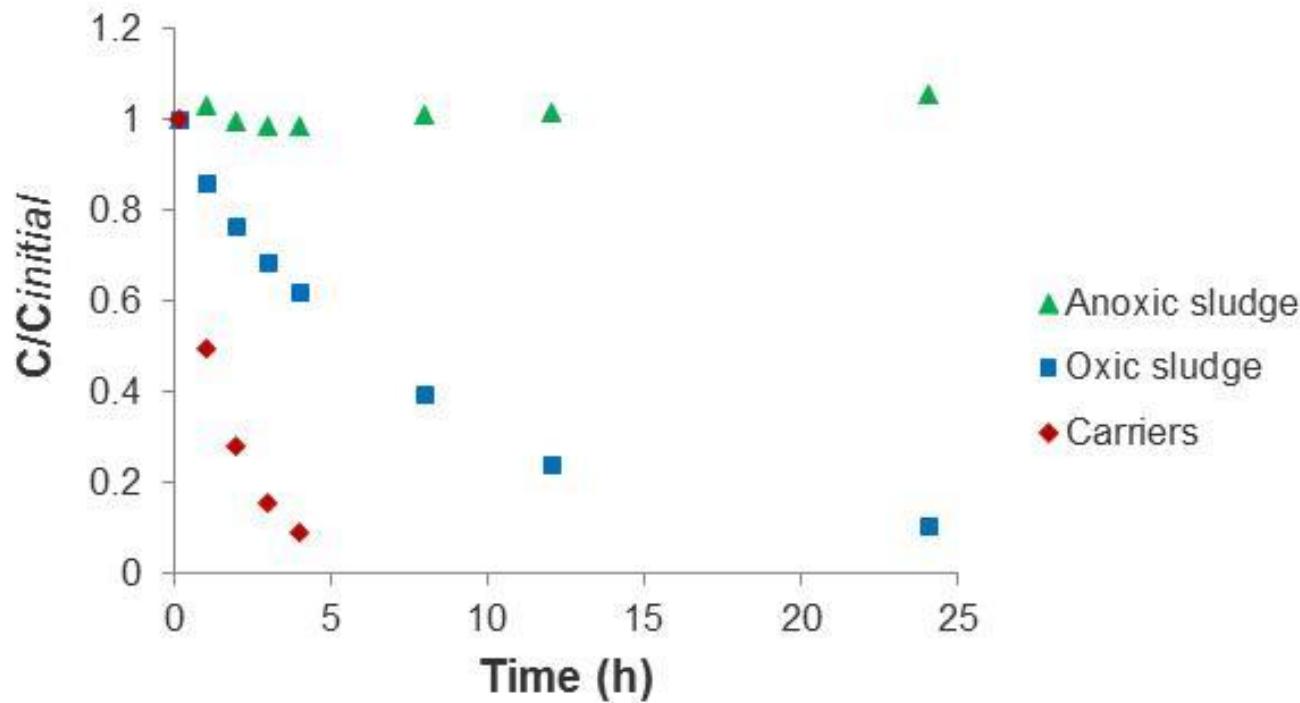


Removal rate constant (L/g biomass*d)

Anoxic sludge	0
Oxic sludge	2.0
Carriers	7.4

Micropollutant removal

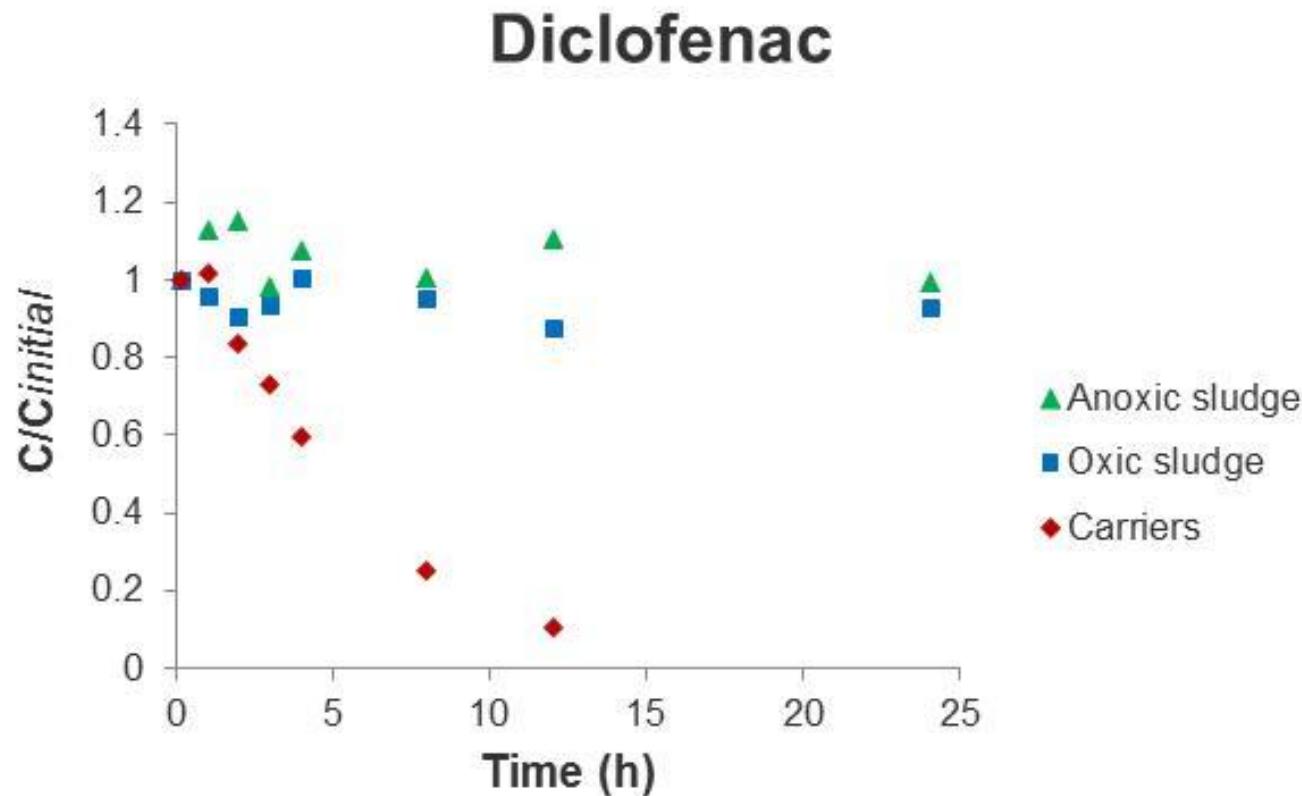
Mefenamic acid



Removal rate constant (L/g biomass*d)

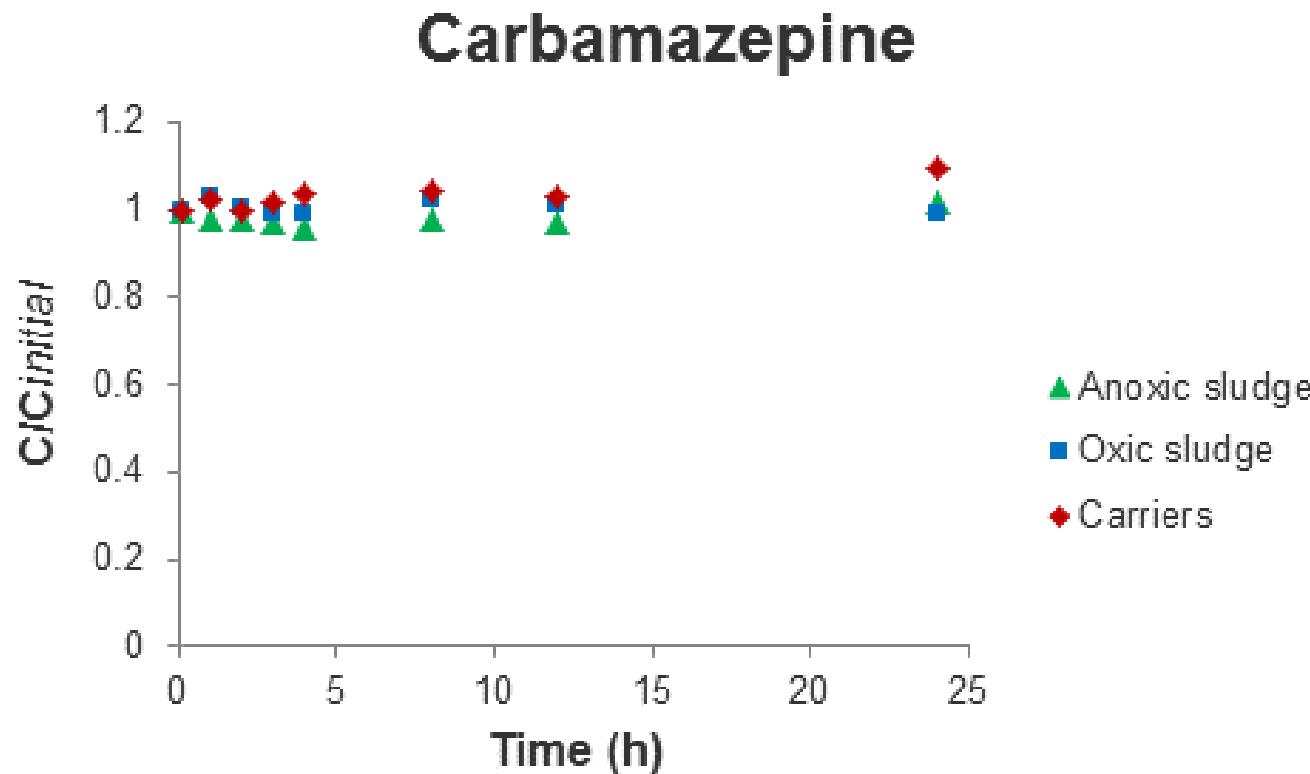
Anoxic sludge	0
Oxic sludge	1.0
Carriers	4.6

Micropollutant removal



Removal rate constant (L/g biomass*d)	
Anoxic sludge	0
Oxic sludge	0
Carriers	1.5

Micropollutant removal



Removal rate constant (L/g biomass*d)	
Anoxic sludge	0
Oxic sludge	0
Carriers	0

Conclusions

- Biological micropollutant removal rates depended on:
 - the compound properties
 - the redox conditions
 - the microbial composition of biomass
- Carrier-attached biofilms seem to have a higher degradation capacity for some micropollutants, but not all.

A microscopic image showing several large, irregularly shaped clusters of microorganisms against a dark background. The clusters are composed of numerous small, brightly colored cells in shades of blue, green, yellow, and orange. Smaller, individual microorganisms are scattered throughout the field of view.

Thank you for listening!