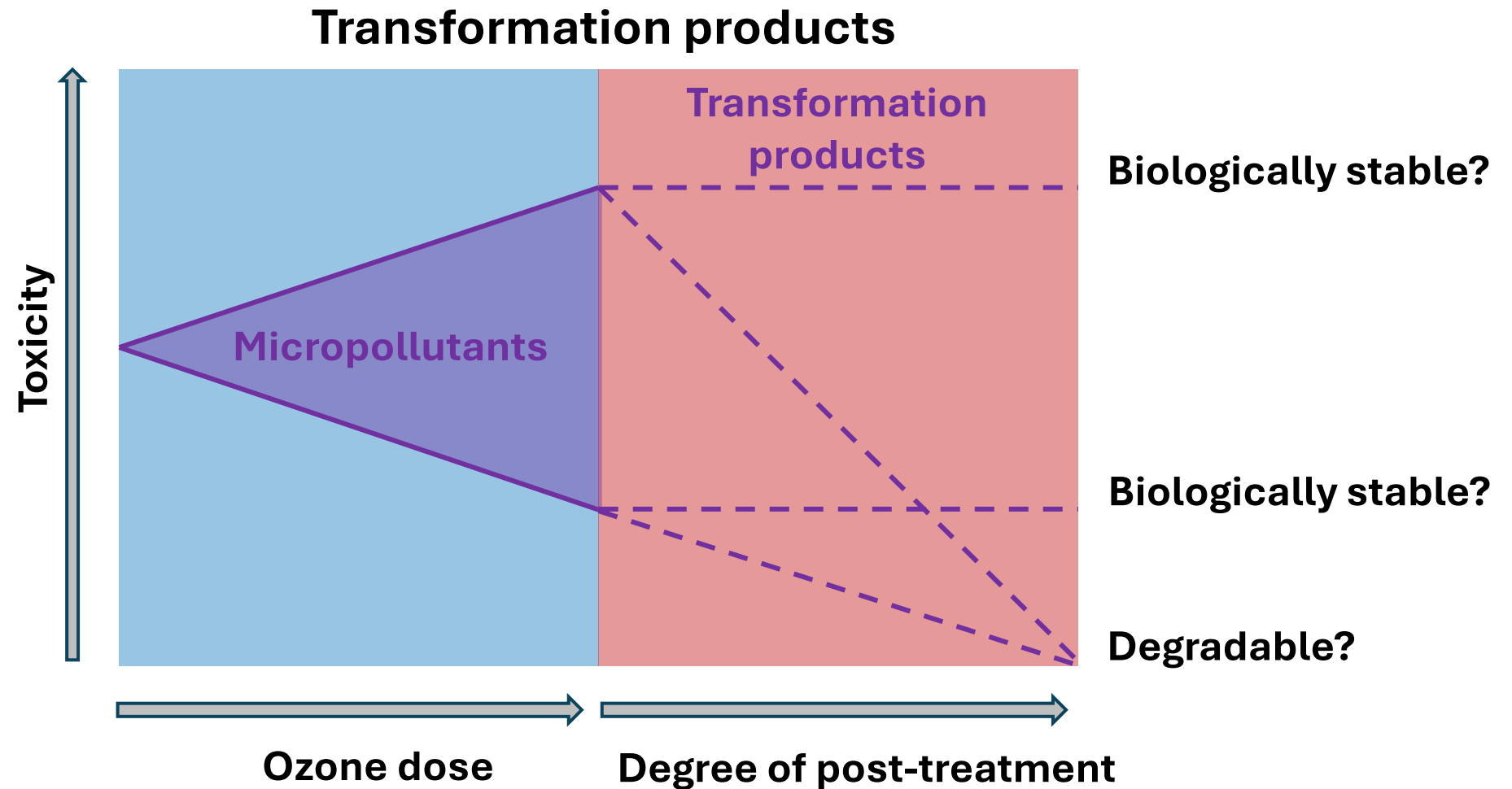


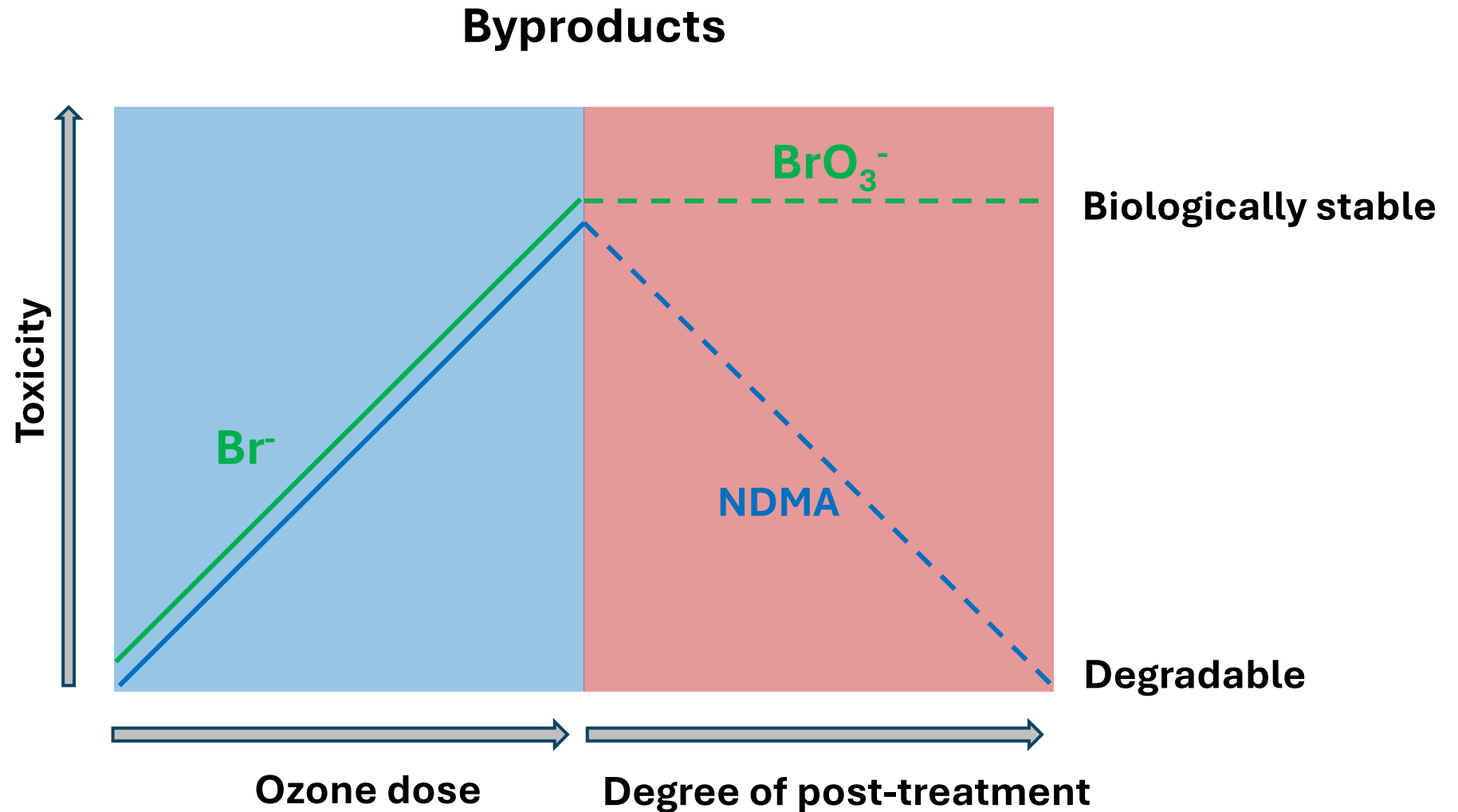
# Formation and degradation of ozone transformation products



# Transformation products during ozonation

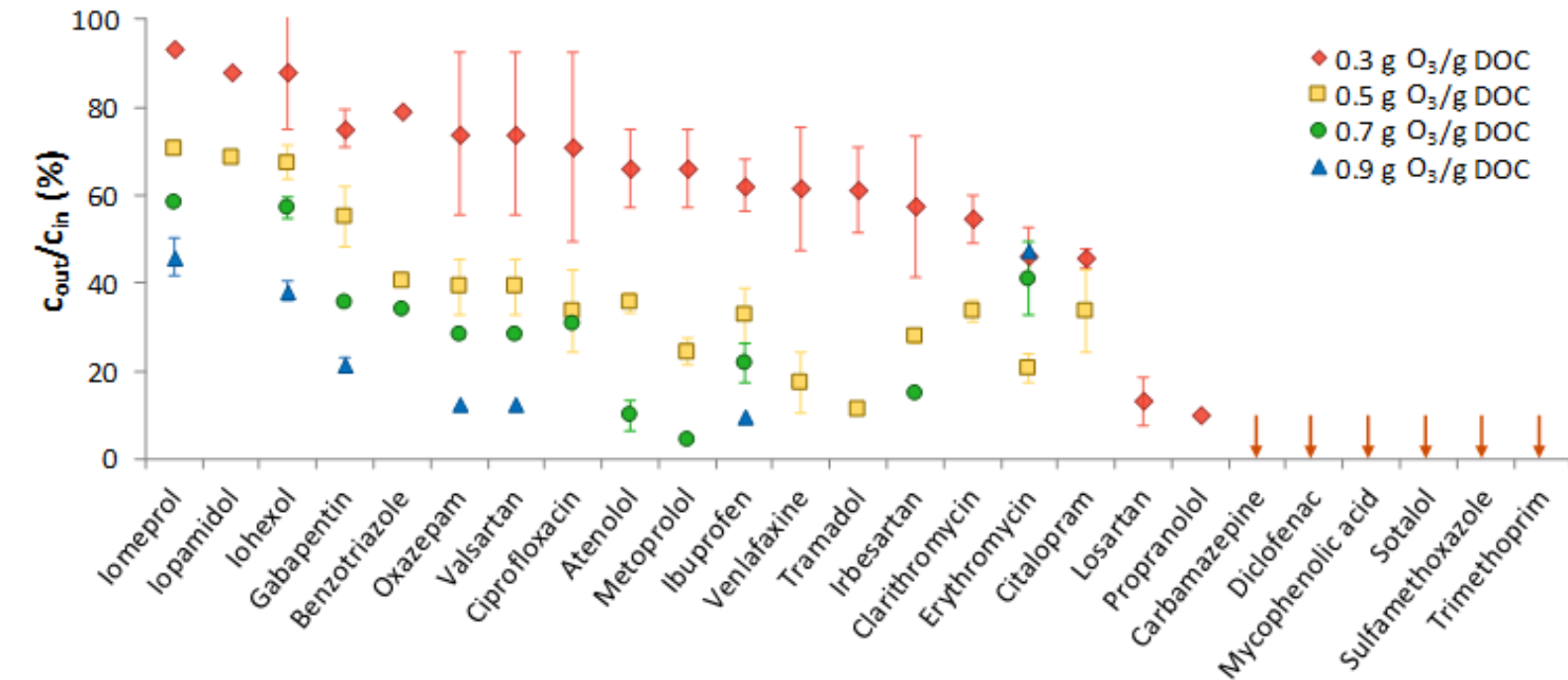


# Byproducts during ozonation



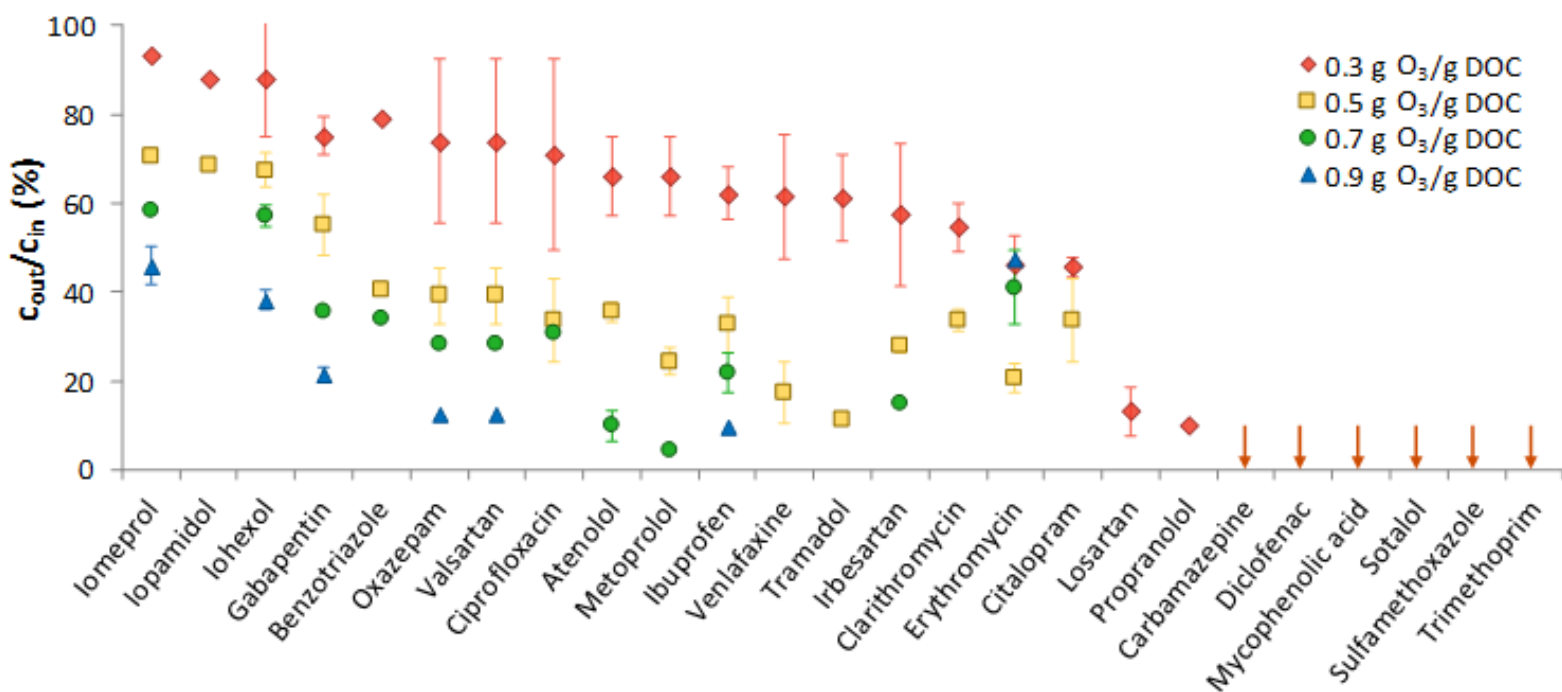
# Removal of micropollutants and formation of transformation products

## Removal of micropollutants



# Removal of micropollutants and formation of transformation products

## Removal of micropollutants



Edefell et al., 2021

## Transformation products

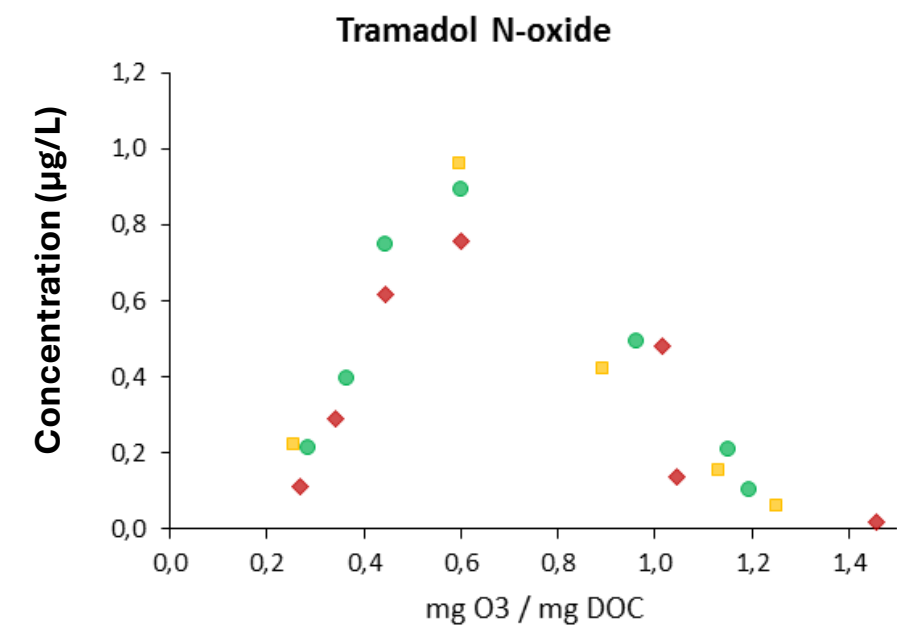
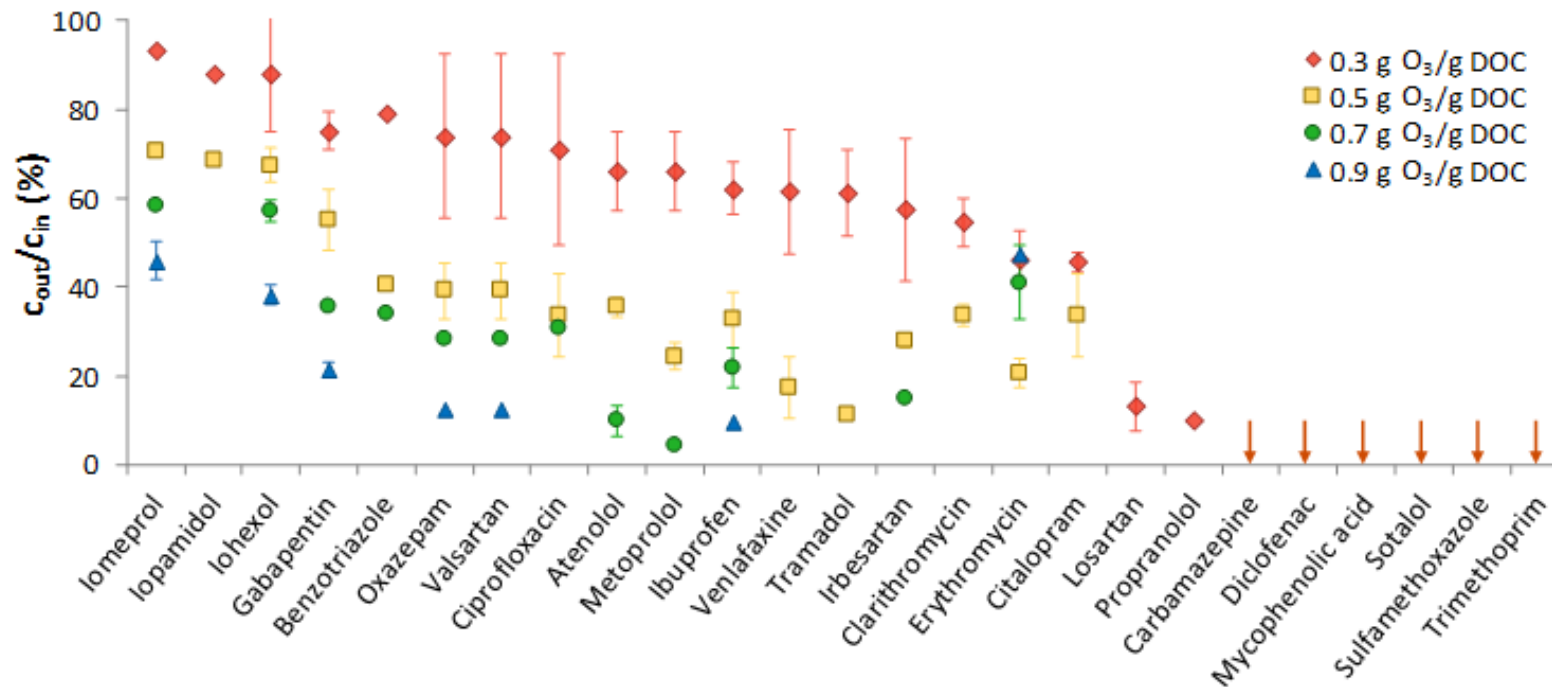


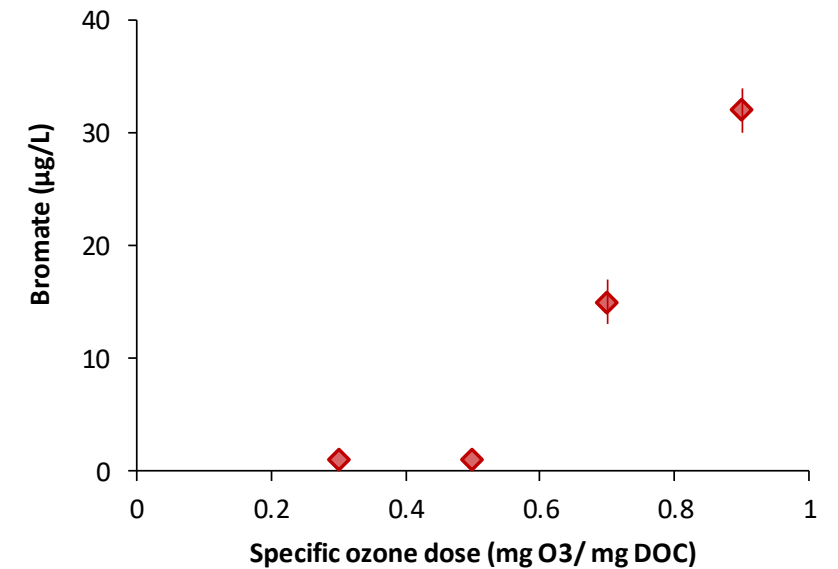
Figure from Suman Kharel

# Removal of micropollutants and formation of bromate

## Removal of micropollutants



## Formation of bromate



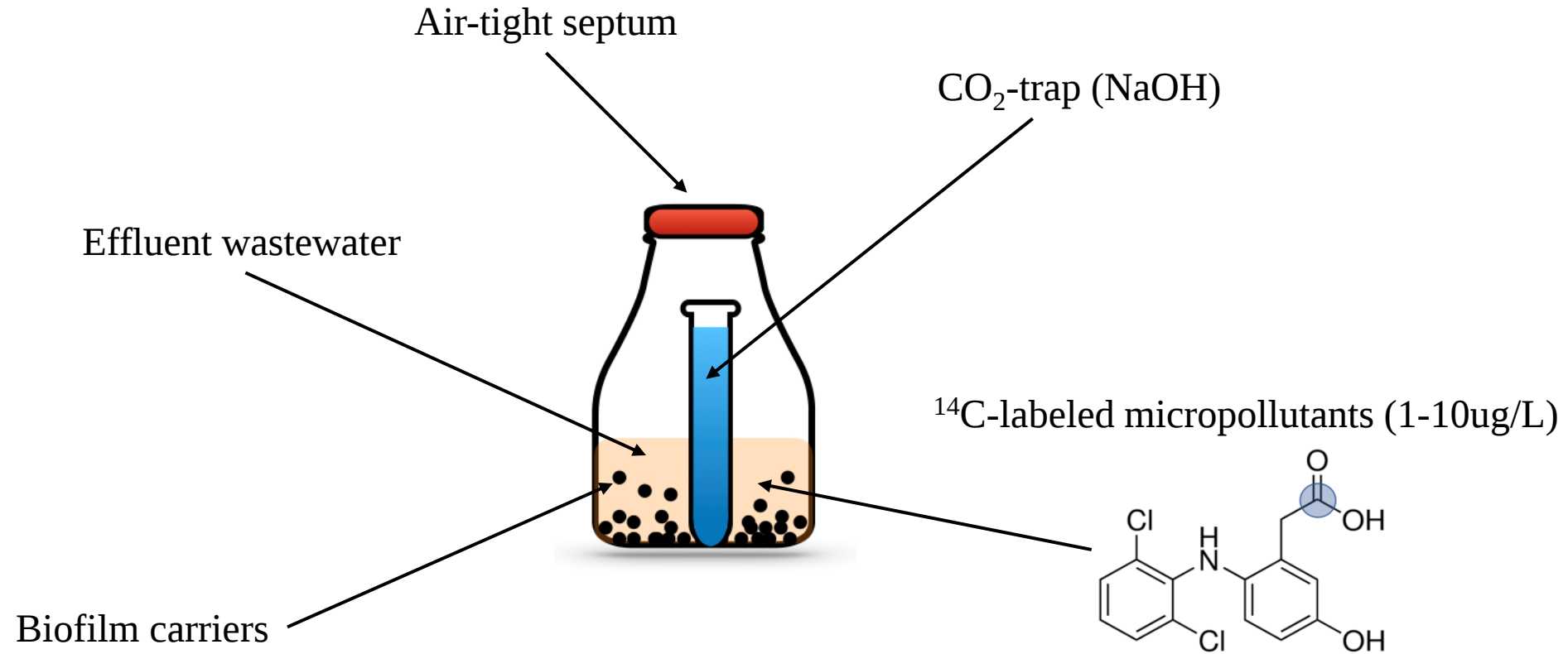
# Degradation of $^{14}\text{C}$ -labeled micropollutants

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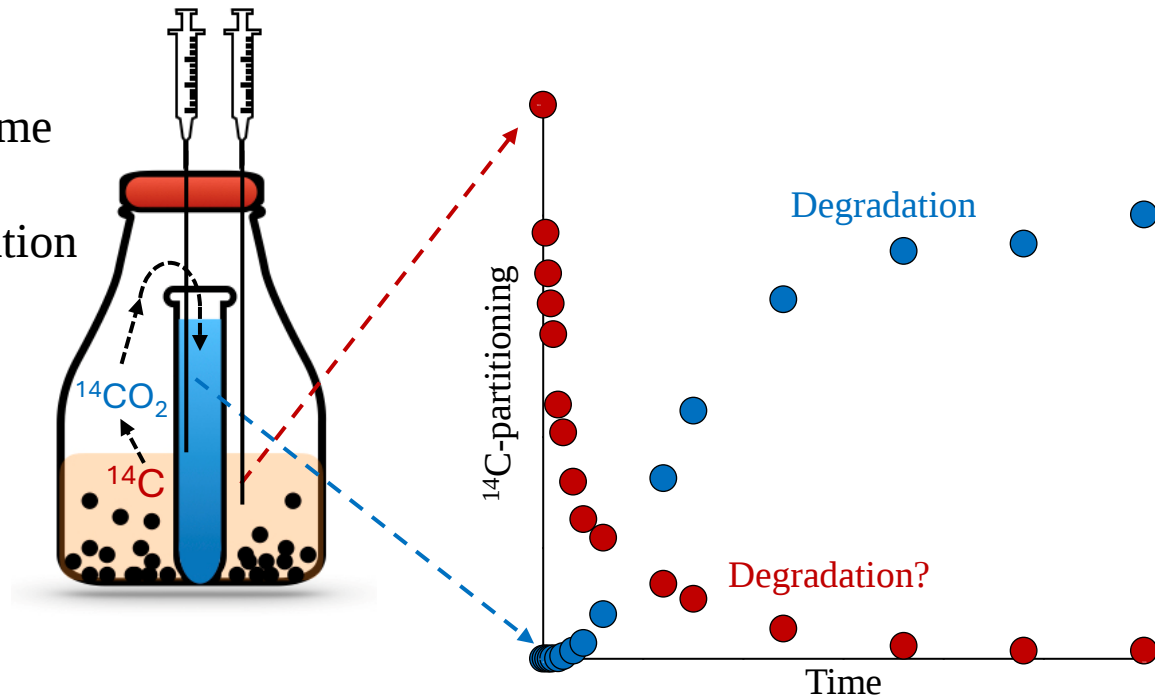
- Measurement of biological degradation ☺
- Show potential degradation pathway ☺
- Does not reveal potential transformation of other moieties ☹

# Experimental set-up

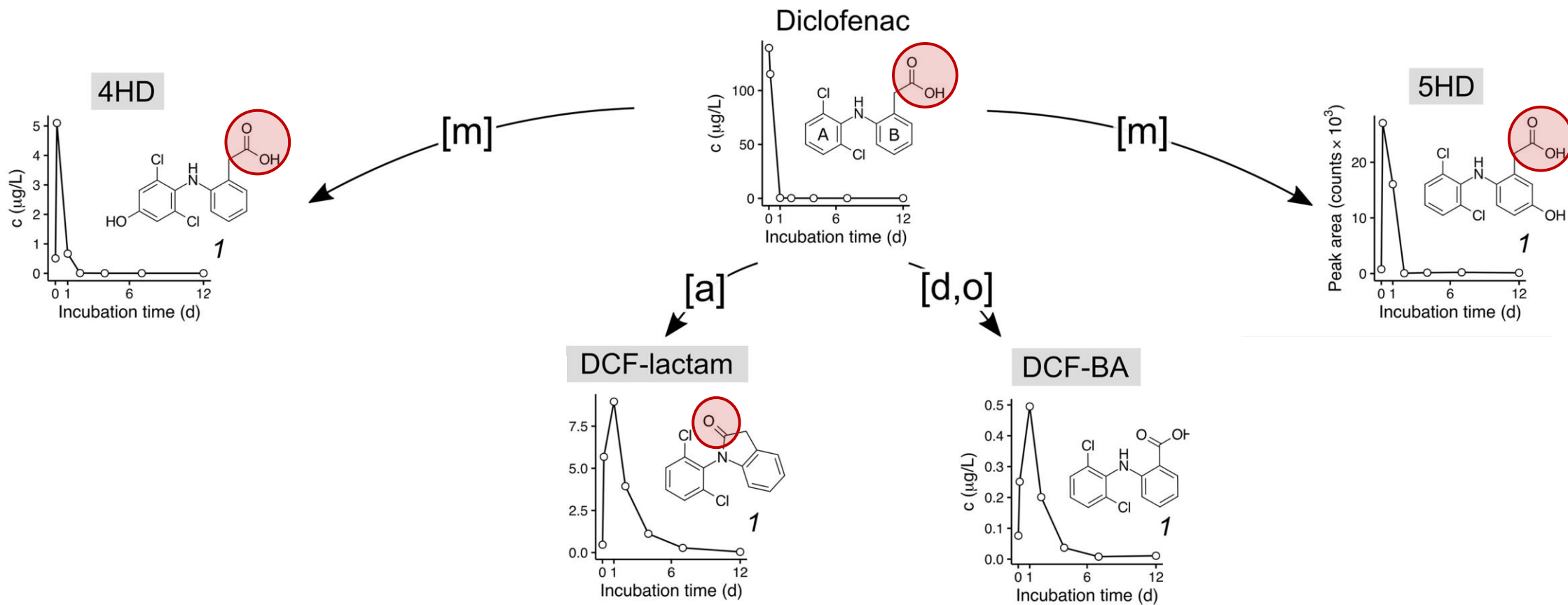


# Experimental set-up

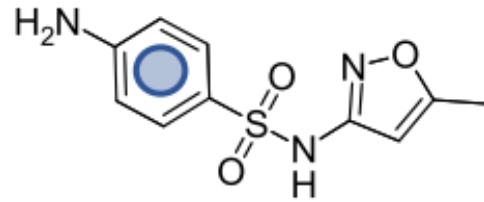
- Incubation
- Measurement of  $^{14}\text{C}$ -activity over time
- Samples analyzed by liquid scintillation



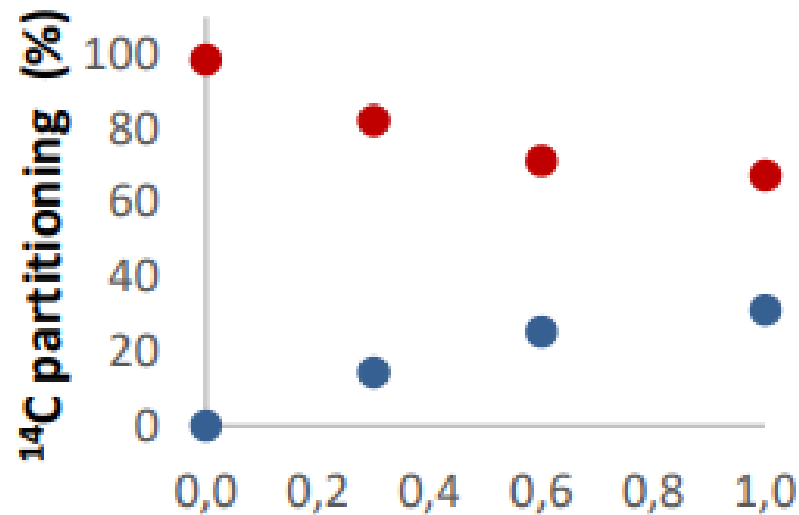
# Primary transformation of diclofenac [carboxyl-14C]



# Ozonation of $^{14}\text{C}$ -labeled micropollutants

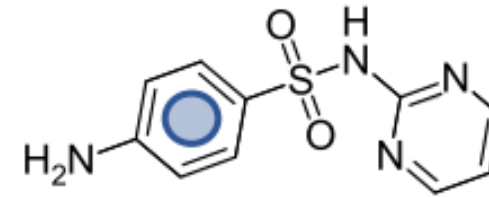


Sulfamethoxazole

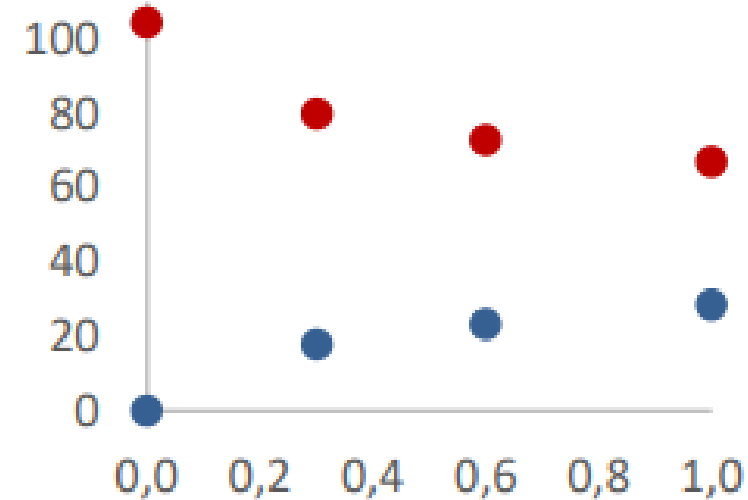


Ozone dose (mg  $\text{O}_3$ /mg DOC)

● Liquid ● Gas



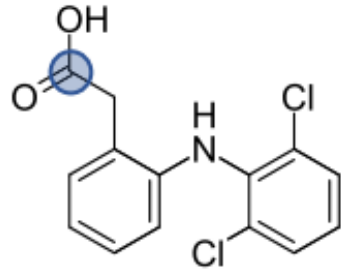
Sulfadiazine



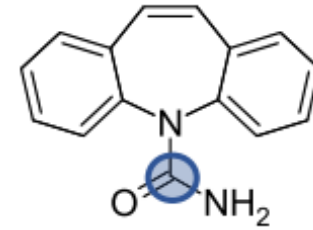
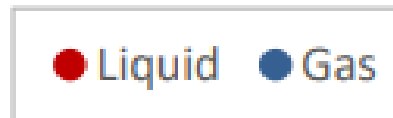
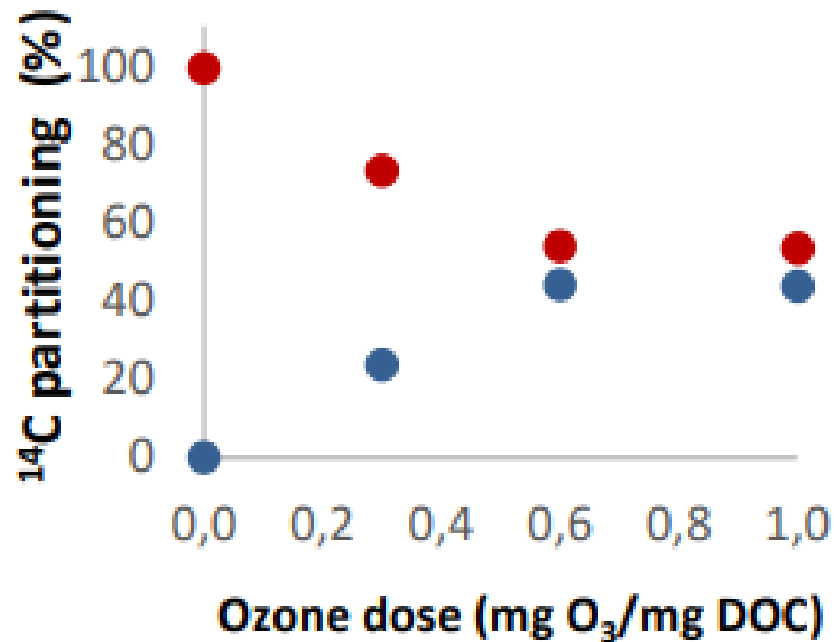
Ozone dose (mg  $\text{O}_3$ /mg DOC)

● Liquid ● Gas

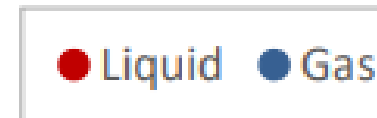
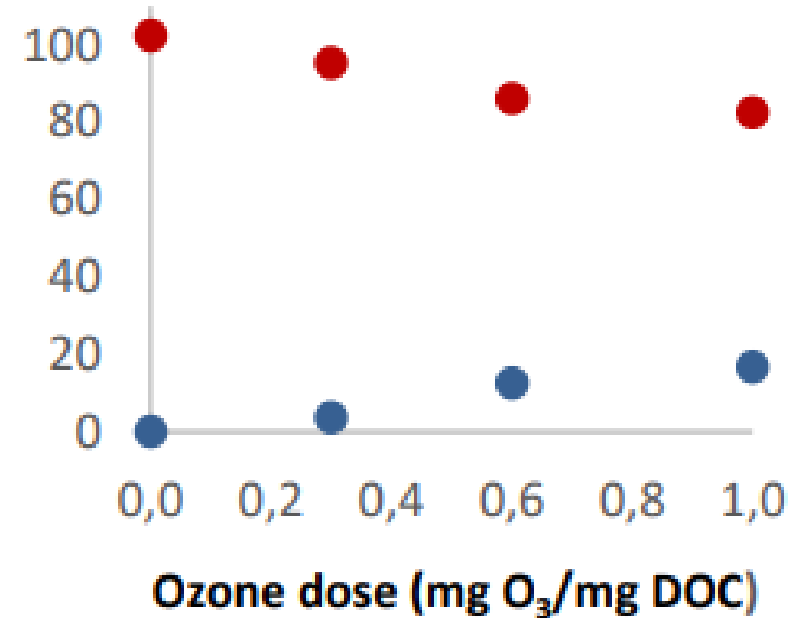
# Ozonation of $^{14}\text{C}$ -labeled micropollutants



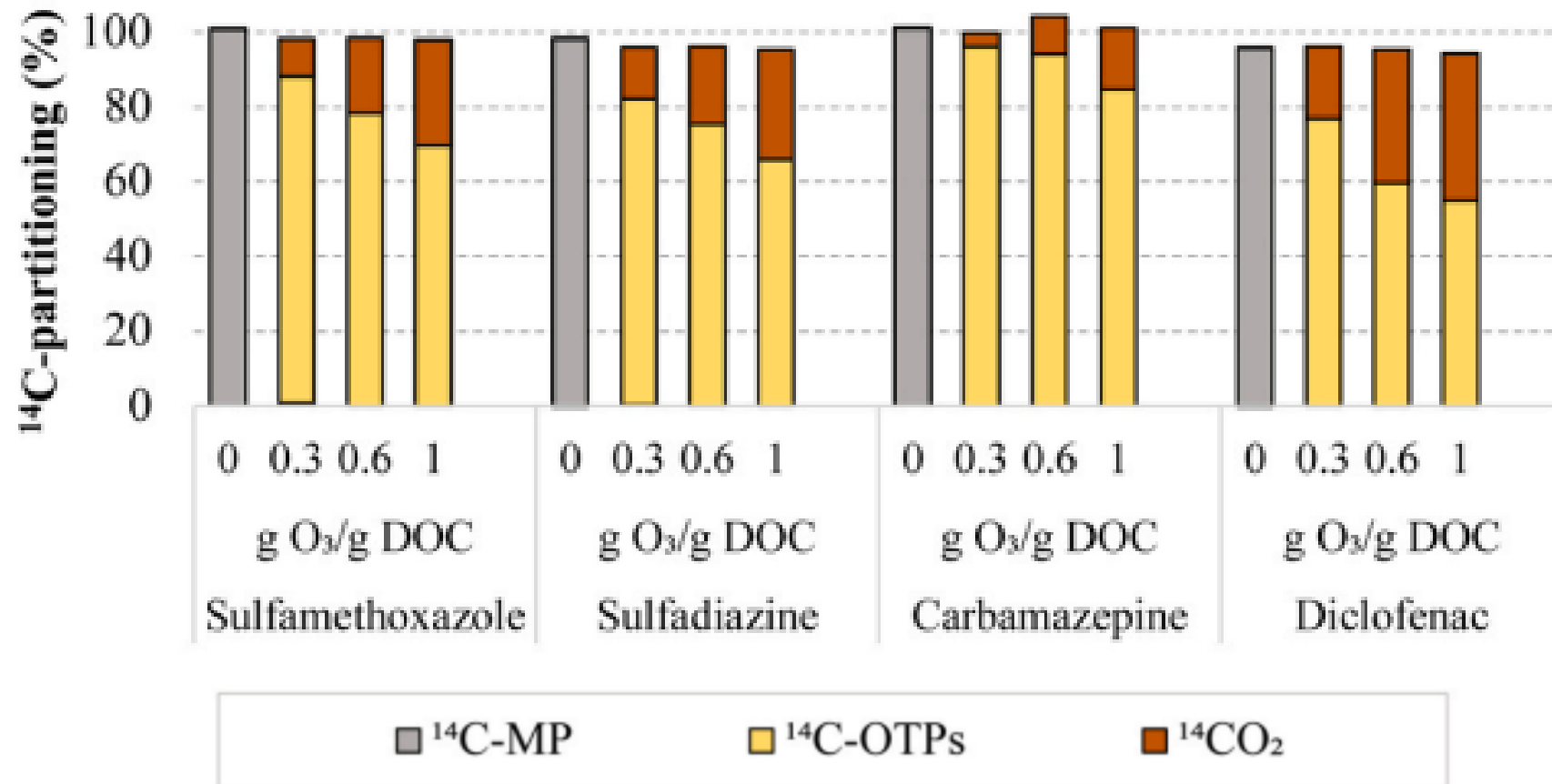
Diclofenac



Carbamazepine

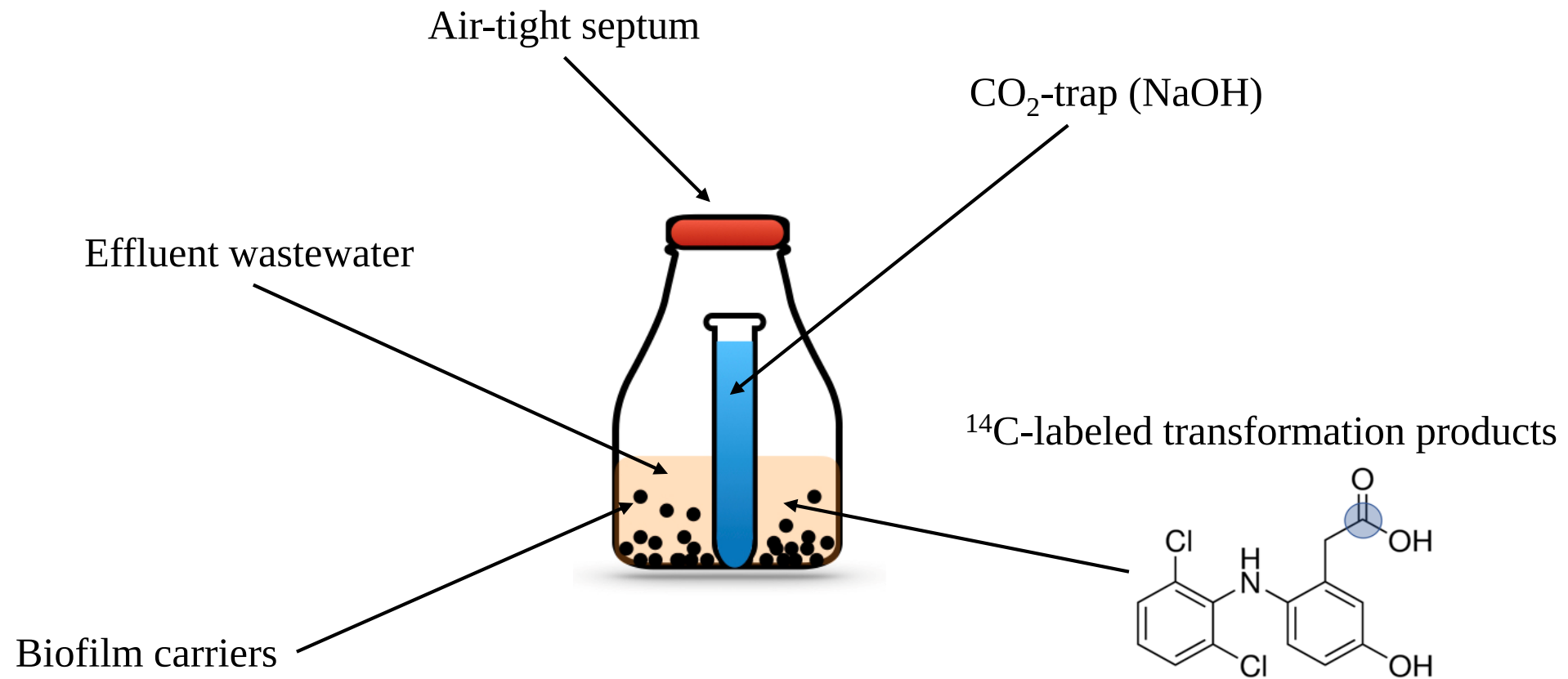


# Ozonation of $^{14}\text{C}$ -labeled micropollutants



# Biological degradation $^{14}\text{C}$ -labeled transformation products

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# Biological degradation $^{14}\text{C}$ -labeled transformation products

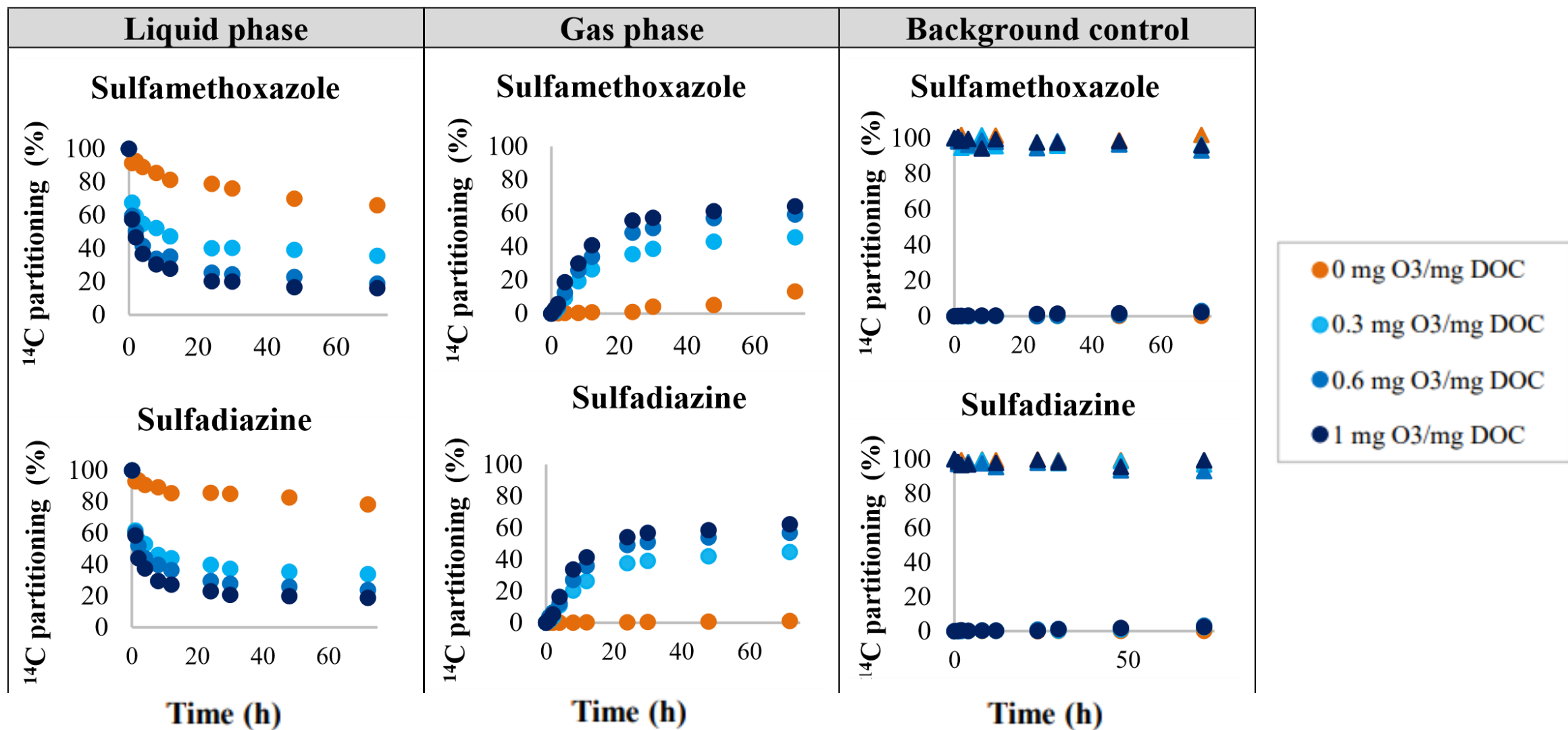


Figure: Mathilda Busck 2024

# Biological degradation $^{14}\text{C}$ -labeled transformation products

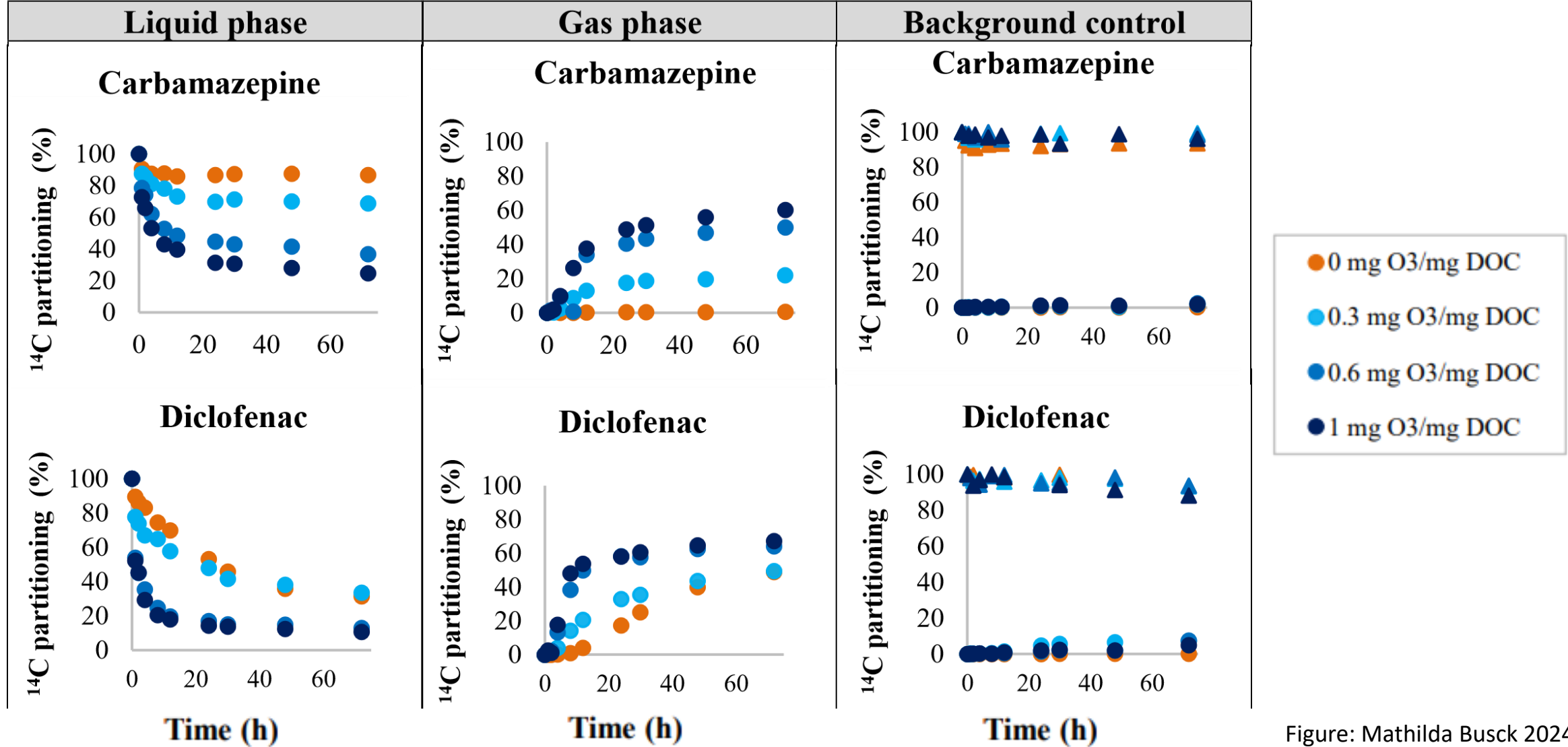


Figure: Mathilda Busck 2024

# Svenskt Vatten: Bästa examensarbete inom VA-området 2024

Vinnare är **Mathilda Busck** med ***Biological degradation of C14-labeled micropollutants and their transformation products in ozonated wastewater*** (LTH, Lunds Universitet) och Lisa Lundgren med *Vägen mot en hållbar hantering av vatten och avlopp i en urban miljö år 2070, under ett förändrat klimat* (Uppsala Universitet).

