



Triclosan emissions and transformations through wastewater treatment plants

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Introduction

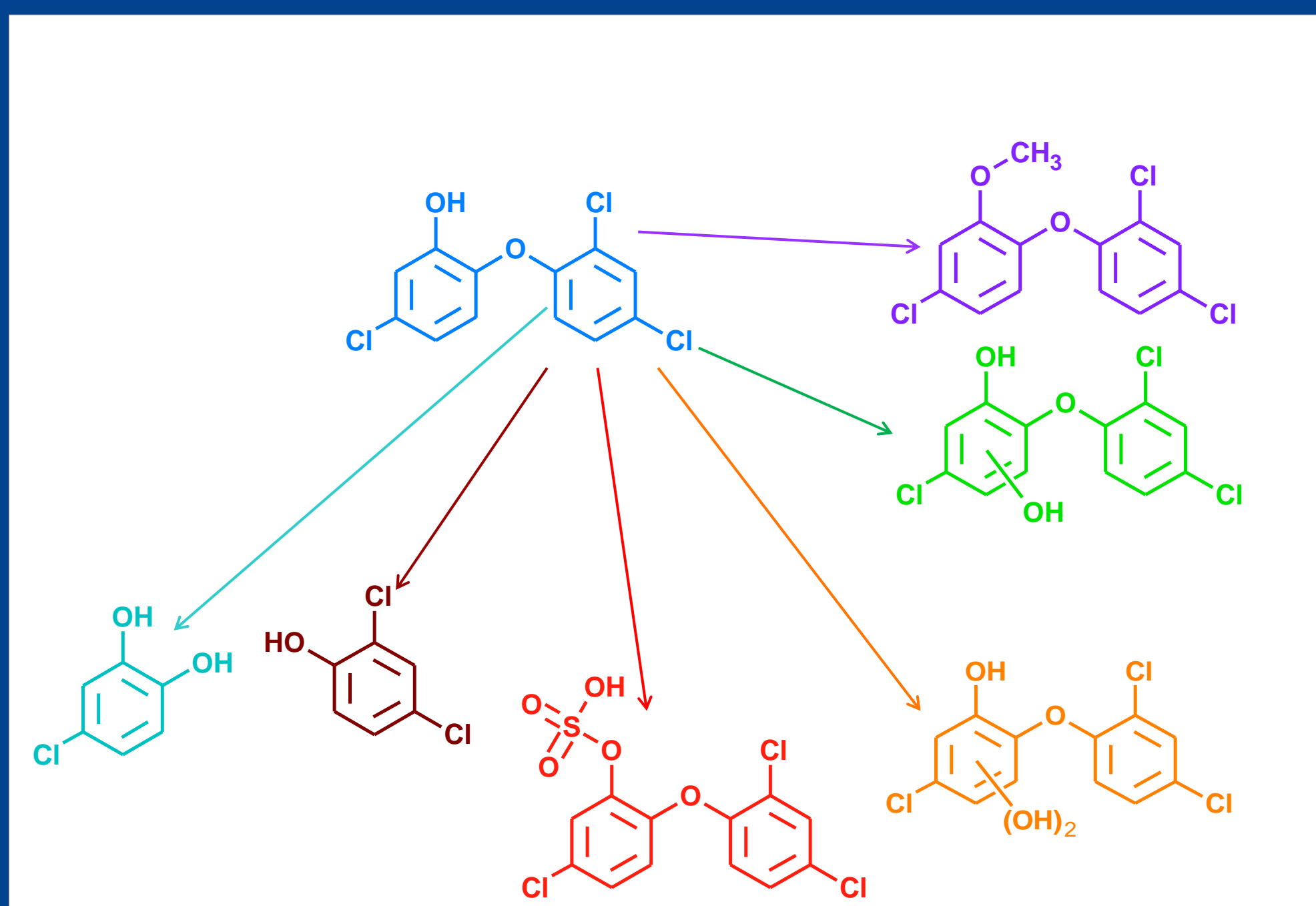
Triclosan is used in toothpaste, polymeric cutting boards and functional clothes against bacteria. About 500 t/a are used in Europe. After use triclosan ends in wastewater and thus wastewater treatment plants need to tackle considerable concentrations of triclosan (1-10 µg/L) in raw wastewater.

Removal of Triclosan in activated sludge is high 85-95%, one third of that can be attributed to sorption to sludge, the residual has been assessed to be biodegradation.

Objectives

- Elucidate degradation pathways
- Determine metabolites.
- Reassess emission of Triclosan.

Figure 1: Aerobic transformations of Triclosan in activated sludge



Several Isomers of Hydroxy- and Di-Hydroxy-Triclosan are formed. 5-Hydroxy-Triclosan was isolated and its structure was proven by NMR. Additionally bound residues are formed.

Figure 2: Diverse Isomers of Hydroxy-Triclosan

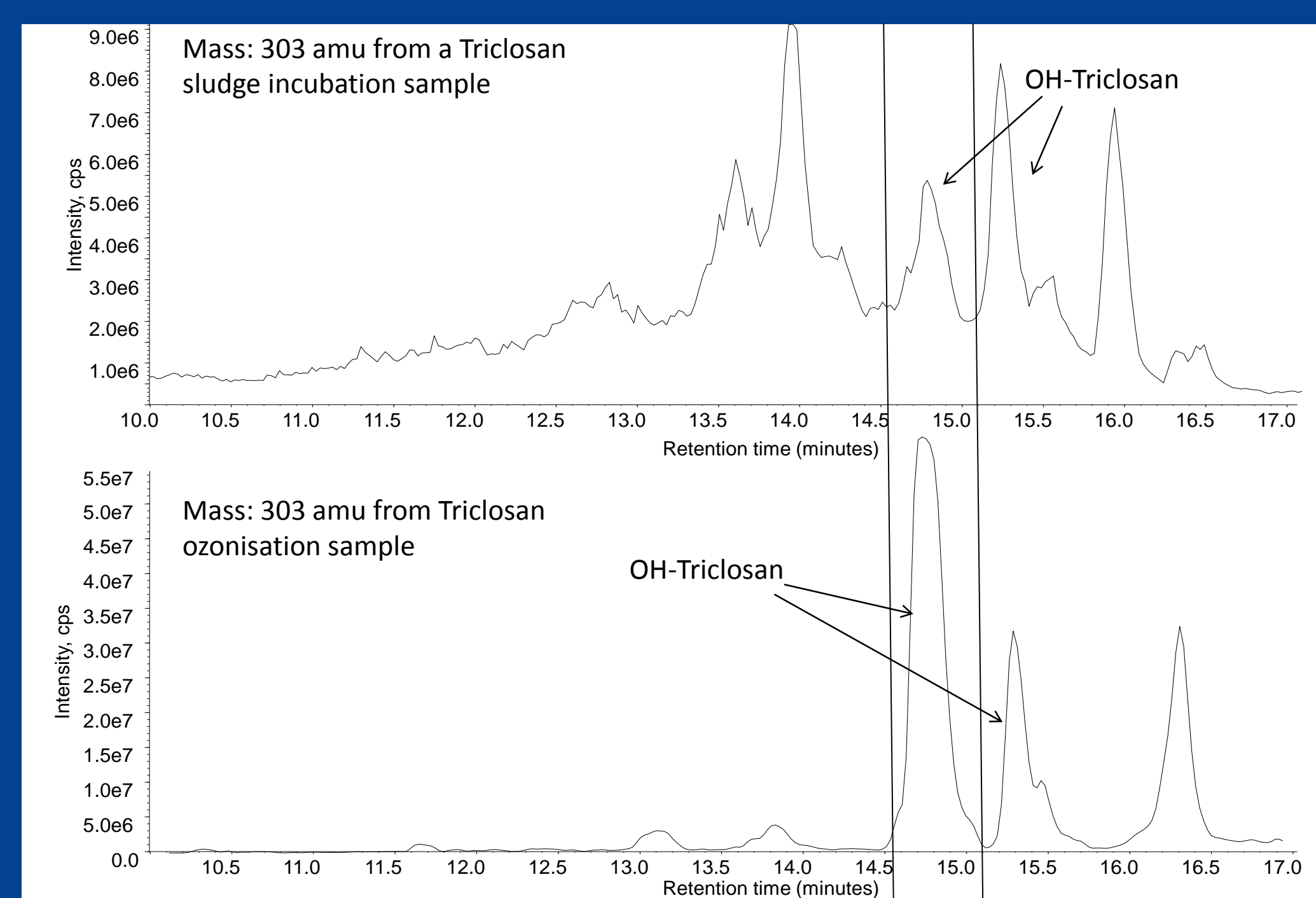


Figure 4: Formation of Metabolites of TCS during incubation II

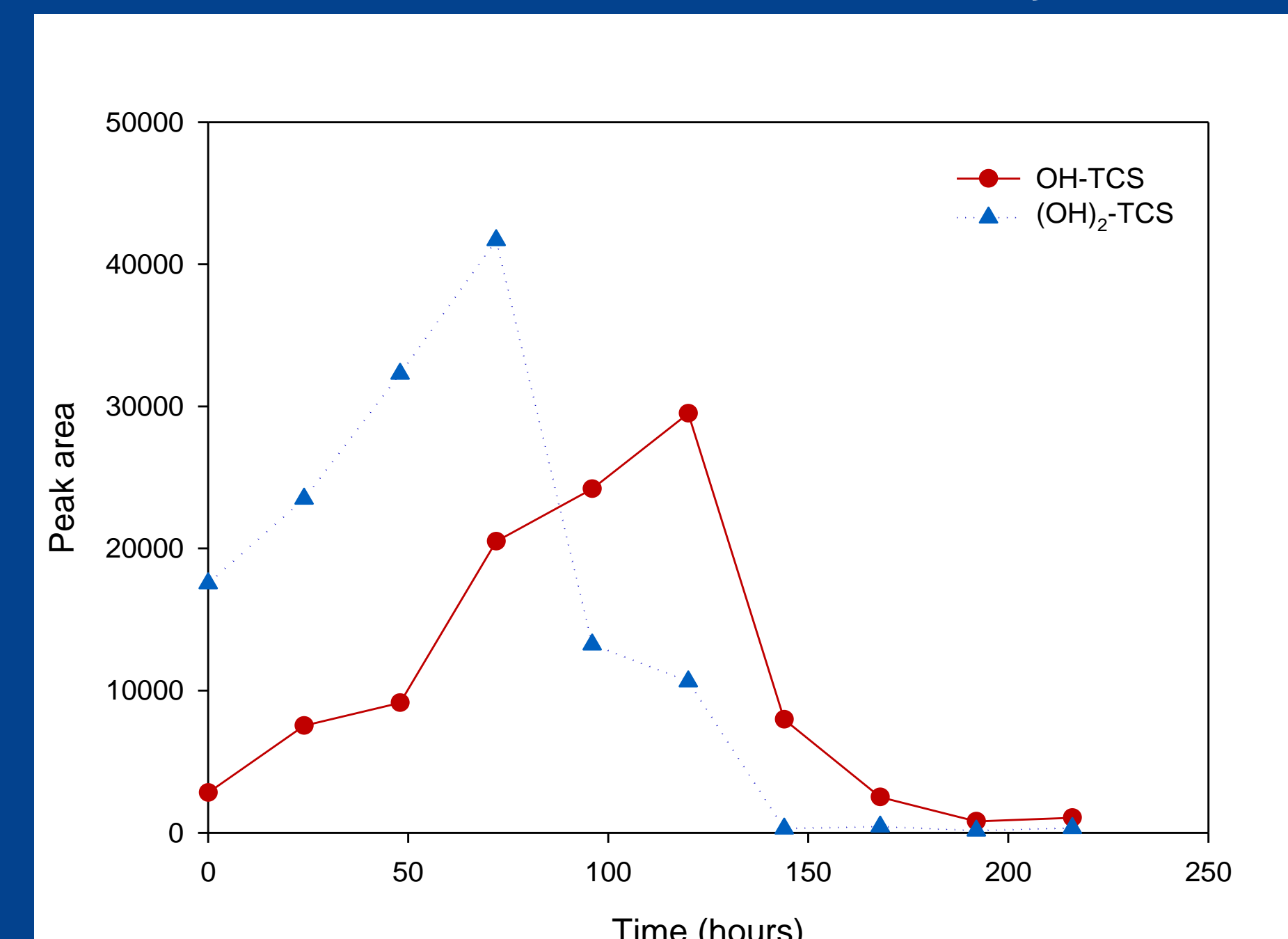
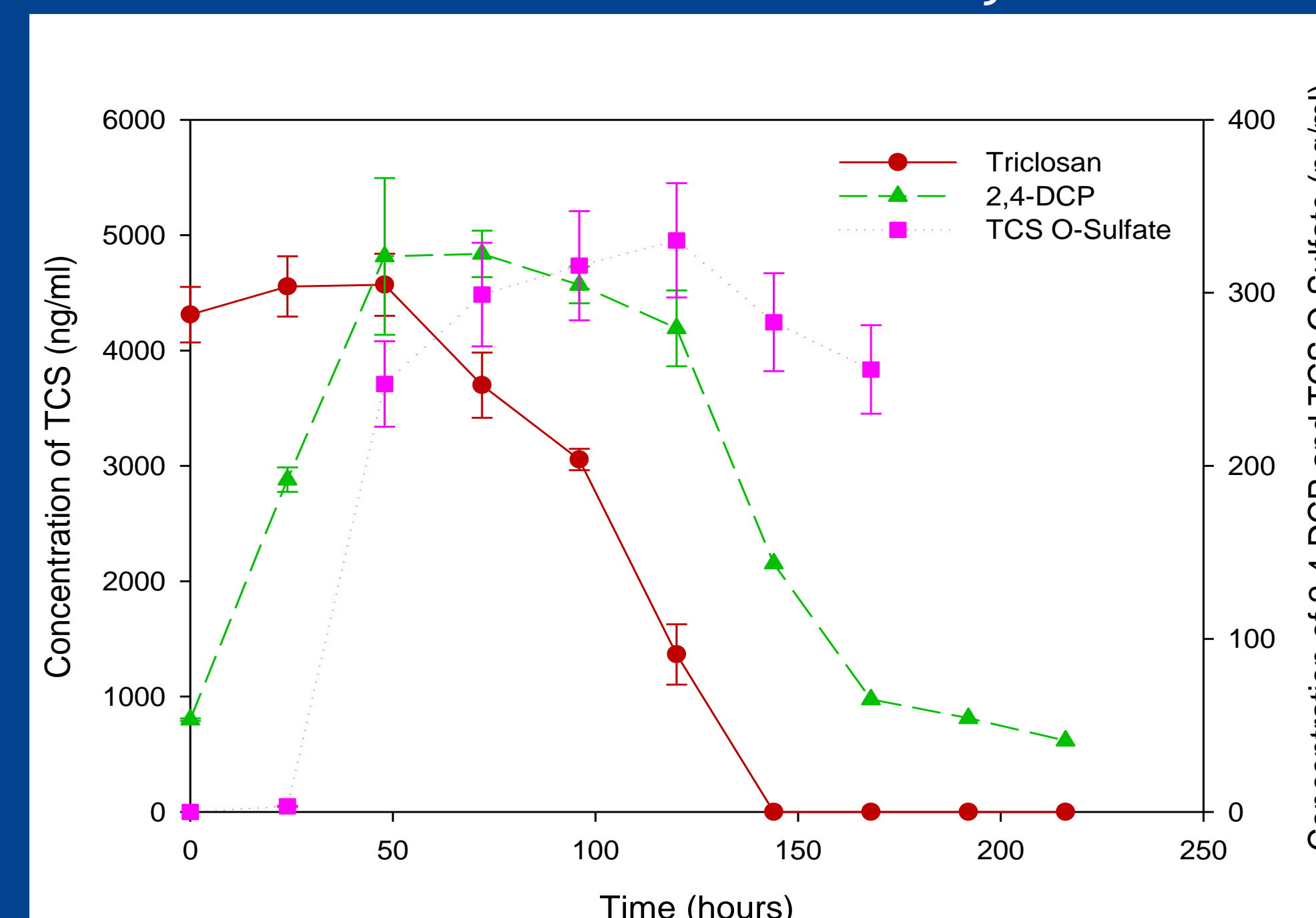


Figure 3: Formation of Metabolites of TCS during incubation I



Conclusions

- Significant fractions of Triclosan are transformed to metabolites in activated sludge experiments.
- The transformation products are of concern as they themselves are prioritised compounds.
- The half-lives of the metabolites are so high that serious emissions should be taken into account.
- Emissions of Triclosan and Metabolites differ, as regional agreements in Sweden led to a discontinuation of use of Triclosan and thus the concentrations in effluent wastewater were reduced to below 1 ng/L, while they are between 100 and 1000 ng/L in the rest of Europe.

References

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