



MSc Thesis in Environmental Chemistry

Title of Thesis: Identifying potential trifluoroacetate precursors

Description / Project:

Trifluoroacetate (TFA) is a major environmental pollutant of concern. As a very persistent and highly mobile substance, it easily enters the water cycle, where it accumulates over time. To date, there are no real practical and economical solutions for the subsequent removal of TFA. Thus, reducing the input of TFA precursors into water cycle is an important measure for a sustainable water management. However, knowledge of where TFA exactly comes from, and which sources lead to elevated concentrations is currently still limited. It has been reported that TFA can be formed from chemicals whose molecular structure includes a C-CF₃ moiety. Of relevance are chemicals, including pesticides, biocides, and pharmaceuticals, that are released into the environment in significant quantities during their use. Therefore, in this study we aim to investigate the biotransformation of 15 blockbuster chemicals (herbicides and pharmaceuticals with C-CF₃ moieties) to understand whether TFA is produced as dead-end metabolite. The selected, potential TFA precursors will be provided as carbon sources to a representative panel of aquatic and soil bacteria with or without additional non-fluorinated carbon sources to investigate their metabolic and co-metabolic biotransformation.

Methods:

Ion and liquid chromatography/mass spectrometry will be used to quantify parent compounds removal, as well as the formation of fluoride, TFA and other transformation products. Furthermore, gene expression analysis of selected strains will be conducted to identify key enzymes which are expressed during the biotransformation of these chemicals into TFA.

What we expect from you:

Analytical chemistry lab experiences are required. In addition, microbiology lab experience would be helpful, but not obligatory.

Starting date: As soon as possible

Responsible IfC professor: Prof. Kathrin Fenner (Universität Zürich und Eawag)

Supervisor / Contact:

Dr.-Ing. Sema Karakurt-Fischer / Dr. Serina Robinson

kathrin.fenner@eawag.ch, ++41 58 765 5085