

Section Strategy for Environmental Chemistry and Toxicology 2023-2026

1. Introduction

The focus of the section is to obtain a better understanding of organic contaminants, their transport, emissions, distribution and use, bioaccumulation and transformation ("fate") in the environment, mainly based on analytical measurements and specific process studies, as well as their toxicity. This also includes risk assessments of chemicals, as well as the optimization of technical and biological processes in order to reduce emissions. High competences in analytical chemistry at trace levels play a strong role for the research. All research aspects also include human exposure to chemicals.

The section has the following main focus areas and holds a strong position within these, both nationally and internationally, which is reflected in the publication record and list of projects.

These focus areas are:

- Environmental analytical chemistry
- Risk and fate of organic contaminants of emerging concern
- Environment and Health - from sources to effects
- Transformation processes and degradation products of organic contaminants
- Contaminants in the Arctic
- Solutions and technologies for a contaminant-free environment (e.g. soil, water)

The section consists of 2 professors, 5 senior scientists/associate professors, 6 technicians, 7 postdocs and 4 PhD students. Further, around 10 visitors among research guests, Phd students and master students, work in the section per year.

The section has fully equipped state-of-the-art laboratories for sample preparation and analysis of environmental contaminants, including GC-MS, GC-MS/MS, LC-MS, LC-MS/MS, LC-QToF, LC- and GC-Orbitrap. The section also has equipment for toxicity studies. Further, the section is equipped with lab reactors for process studies in the field of advanced wastewater treatment.

2. Mission and Vision

Mission: is to advance research within Environmental Chemistry and Toxicity of organic contaminants. Specifically, we want to provide knowledge to meet challenges in the society concerning organic pollutions and the green transition. This includes a better understanding of the fate of organic contaminants, risk evaluations, measures in emission and exposure reductions and technical solutions to clean water and soil from organic contaminants.

Vision: The section will be one of the leading research institutions in the field of Environmental Chemistry and Toxicology. We will define and respond to new developments in this field. The section will be an attractive, first-choice research partner in the focus areas. Furthermore, we will be a close collaborator for environmental and health authorities in relation to research based advisory.

3. International position and strength

The section is internationally recognized for its research in environmental chemistry and has a high publication rate in reputable journals

The section has strong international collaboration with partners from the Nordic countries, the European Union (EU), and worldwide.

The projects include EU funded projects (H2020. Horizon Europe, BONUS etc.), Nordic research programs. The section has the co-lead role for Environmental and Multisource Monitoring in the newly started Horizon Europe partnership PARC.

The section is also involved in a number of international networks, such as NORMAN, PEER, WHO CRAN (<https://www.who.int/groups/chemical-risk-assessment-network>); HESI (<https://hesiglobal.org/>), SETAC (<https://www.setac.org/>), and IWA (<https://iwa-network.org/>)

The section's focus area on Contaminants in the Arctic is closely linked to activities under the Arctic Council, for example the Arctic Monitoring and Assessment Programme (AMAP). The section holds a co-lead function on AMAP's Expert Group for Persistent Organic Pollutants (POPs) and is represented on AMAP's Litter/Microplastic Expert Group.

4. Strategy

Focus area	Strategic goals
Research and talent development	
Environmental analytical chemistry	Keep the position as state-of-the-art laboratory for trace level analysis of organic chemicals. research
Risk and fate of organic contaminants of emerging concern	Further, develop the field of screening technologies and combine these approaches with target analyses. Use and develop risk assessment tools for emerging contaminants
Environment and Health - from sources to effects	Increase knowledge of the entire pathway of a chemical, from emission sources to exposure and potential effects. Develop the environmental toxicology part of the section, to facilitate both exposure side and effect side of chemicals, to address larger risk related questions facing society.
Transformation processes and degradation products of organic contaminants	For in depth understanding of transformation and toxicity of enantioselective processes and their impact on the fate and effects. Increase the multidisciplinary research work by combining various aspects of environmental chemical processes with other fields: biodegradation microbial processes and dynamics; metabolomics and imaging
Contaminants in the Arctic	Expand the leading role in the field of organic contaminants in the Arctic, including POPs and contaminants of emerging Arctic concern, addressing climate and long range transport

Solutions and technologies for a contaminant-free environment (e.g, soil, water)	<p>Enhance the development of environmentally friendly technologies to a ready to use level.</p> <p>Provide new solutions for better products (surface coatings, materials etc.) to improve on indoor air contamination and exposure</p> <p>Expand capabilities to provide solutions (technical and societal) to clean up contaminated environments (such as wastewater and soil) from organic micropollutants., including Transformation processes of organic contaminants</p>
- Talent development	Expand to 7 PhD students and 10 postdocs and support their carrier development
- International research leadership	Take leadership in international research projects
- Digitalisation	Enhance digitalisation on datatreatment and dataintegration on micropollutants.
Public sector consultancy and industrial collaboration	
- national and international consulting	<p>Extend the dialogue direct scientific exchange with MIM concerning different chemical and toxicological aspects</p> <p>Expand existing collaborations with municipalities, utilities and regions on purification on polluted water</p> <p>Provide essential information on emissions and concentrations of compounds of emerging concern</p> <p>Participate in monitoring programs such as NOVANA and AMAP.</p> <p>Deliver high quality consulting</p>
- industrial collaboration	<p>Collaborating with technology providers on establishing new and innovative technologies to Remove organic micropollutants from contaminated water</p> <p>Aim at increasing research activities via e.g. European Projects and Innovation Foundation projects.</p> <p>Collaborate with engineering companies, where we can deliver research-based expertise in specific projects they consider.</p> <p>Aim to expand the possibility of further inclusion of Industrial PhDs and Postdocs.</p>
Education	
- AU's bachelor and master programs	Contribute to bachelor and master courses at AU-TECH
Other master programs	Continue the developing of e-learning based international MSc course related to environmental risk assessment and management in collaboration with the University of Saskatchewan, Canada.

	Contribute to various educations outside AU.
-	Contribute to continued education outside the University
- PhD courses and continued education	<p>Implement a permanent PhD seminar (Environmental Chemistry) and offer PhD courses, one summer school per year.</p> <p>Expand the field of environmental chemistry and toxicology into continuing education courses.</p> <p>Actively contribute to ENVS PhD education and are actively participate in Marie Curie (ITN) networks.</p>