PhD COURSE

Venue: Aarhus University, Roskilde, Denmark
Time: August 28th - September 3rd 2011

DETERMINATION OF PRIORITY POLLUTANTS, TRANSFORMATION PRODUCTS AND TRANSFORMATION PROCESSES IN THE ENVIRONMENT

Priority compounds (such as endocrine disrupting compounds, pharmaceuticals, biocides) are present in the environment such as water, soil, air. A lot of environmental processes are accompanied with transformation reactions. Thus, not only the parent compounds but also their transformation products are relevant to determine.

Typical transformations include: biodegradation or biotransformation, photooxidation, chemical transformation, hydrolysis, and formation of bound residues. All transformation reactions may also occur or be used in technical processes such as soil cleaning, waste water treatment etc.

However, analysing the priority compounds is not trivial, nor is the prediction of which transformation products and transformation reactions to expect.

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This course will address at PhD level

1) How to determine the respective compounds (extraction procedures, clean ups, detection methods with hands-on experience).
2) What transformation reactions to expect and how to determine new reaction products (set up of experiments, determination, identification, verification)
3) How to determine transformation reactions (reaction kinetics, what to learn from them)
4) Instrumental techniques (demonstrated and used for exercises).

The course will combine lectures and seminars in combination with laboratory experiments and exercises.

ISSUES COVERED

Environmental chemistry

- Oxidation reactions of priority pollutants in environmental systems
- Hydrolysis reactions of priority pollutants in environmental systems
- Reduction reactions of priority pollutants in environmental systems
- Formation of bound residues
- Transformation reactions in vertebrates

Analytical chemistry

- Methods to analyse priority pollutants in soil, water, sludge etc. GC-MS, HPLC-MS/MS, HR-MS, NMR
- Methods to assess transformation reactions
- Methods to assess (identify and quantify) transformation reaction products

Tentative course schedule

Sunday August 28th

Evening/afternoon: Welcome and get together party

Monday August 29th

a.m. – Relevant instruments for analysing priority pollutants a) theory b) exercise
p.m. – Extraction procedures a) theory b) exercise

Tuesday August 30th

a.m. – Reactions of priority pollutants in principle
p.m. – Transformation reactions: Case studies in soil

Wednesday August 31st

a.m. – Transformation reactions: Case studies in water
p.m. – Transformation reactions: Case studies in the air

Thursday September 1st

a.m. – Transformation reactions: Case studies in vertebrates
p.m. – Transformation reactions: Case studies in technical systems (e.g.: waste water treatment)

Friday September 2nd

a.m. – Performing a model experiment
p.m. – Data evaluation

Saturday September 3rd

a.m. – Data evaluation
p.m.– PhD students forum

Background of participants

The PhD-students should have a background in: Either Environmental engineering, soil science, environmental chemistry, analytical chemistry or environmental science.

Responsible Scientists
Kai Bester
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Environmental Chemistry and Microbiology

Administration
Naja Møller

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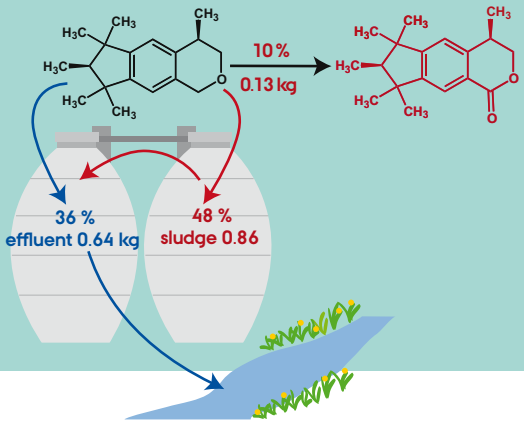
Registration
https://webshop.dpu.dk/default.aspx?id=5084

Web page
http://prioritypollutants.dmu.dk

Example for results

HHCB mass balance in a WWTP (5d)



- HHCB is partially transformed
- The balance is mostly influenced by sorption processes in this WWTP
- HHCB and AHTN can be detected in surface and marine waters

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RECETO
Environmental Chemistry, Microbiology and Toxicology

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