

Micropollutant biodegradation

How dissolved organic matter sources can improve the process?

Type of project: MSc thesis

Research field: Environmental technology, Bioremediation

Duration: Minimum 6 months

Start date: February/March 2020 (flexible)

Location: Wetsus, Leeuwarden, the Netherlands

Project background: Groundwater, the largest body of freshwater in the European Union (EU), supplies drinking water to about 75 % of its residents. Nevertheless, micropollutants, such as pesticides, pharmaceuticals and industrial substances, are detected in European groundwater above the concentration limits set by the EU. Moreover, the current technologies for micropollutants removal are costly and can generate toxic by-products. Biodegradation could be a cost-effective and sustainable solution. However, groundwater has low nutrients and is anaerobic, which limits groundwater microbial activity and thus micropollutant biodegradation. Recent studies have shown that amendment with dissolved organic matter (DOM) can enhance biodegradation^[1,2]. However, little is known about the mechanism through which DOM supports micropollutants biodegradation.

Project description: The aim of this research is to identify promising DOM sources in improving micropollutant biodegradation. Different DOM sources (e.g. compost, humus and groundwater humic acids) will be tested in batch experiments to assess how DOM consumption relates to micropollutants biodegradation. These DOM sources will be tested together with different mixed microbial cultures obtained from aquifer, agricultural soil or municipal and industrial waste water treatment plants. Furthermore, degradation is evaluated under aerobic and anaerobic redox conditions. The results will help to understand how DOM can enhance micropollutant biodegradation, a first step towards developing an *in situ* micropollutant bioremediation technology.

Your profile:

- Either EU citizenship or international student registered at a Dutch university
- Enrolled in graduate (MSc) studies
- Specialization in biotechnology/biochemistry/environmental engineering/microbiology or equivalent
- Experience in laboratory (e.g. analytical work, media preparation)
- Fluency in English both spoken and written
- Good organization skills

Our offer:

- Allowance of 350 €/month
- Working in an international and multidisciplinary environment
- Developing laboratory skills and critical thinking
- Being part of the leading European research center in sustainable water technology



How to apply: For questions about the project please contact Rita Branco (rita.branco@wetsus.nl). Interested students are invited to send a CV (max. 2 pages) and a motivation letter (max. 1 page) to the same address.

[1] Luo, Y.; Atashgahi, S.; Rijnaarts, H. H. M.; Comans, R. N. J.; Sutton, N. B. *Influence of Different Redox Conditions and Dissolved Organic Matter on Pesticide Biodegradation in Simulated Groundwater Systems*. *Sci. Total Environ.* **2019**, 677, 692–699. <https://doi.org/10.1016/j.scitotenv.2019.04.128>.

[2] He, Y.; Langenhoff, A. A. M.; Comans, R. N. J.; Sutton, N. B.; Rijnaarts, H. H. M. *Effects of Dissolved Organic Matter and Nitrification on Biodegradation of Pharmaceuticals in Aerobic Enrichment Cultures*. *Sci. Total Environ.* **2018**, 630, 1335–1342. <https://doi.org/10.1016/j.scitotenv.2018.02.180>.