

## EMISSION MANAGEMENT INTERNSHIP M/F

### Are you looking for an interesting internship assignment?

For the Emission Management department in Assendelft, we are looking for an intern to start immediately. At the water treatment plant, you will research what modifications are required to prevent deposits from forming on the plates of our electrocoagulation system.

### Who are we looking for?

You are in the final year of your master's in Chemical Engineering, Water Technology or a similar degree. You are good at working independently.

### What can Afvalzorg offer?

This internship offers flexibility, includes adequate supervision and you will also be able to work from home. You will receive an internship allowance and travel expenses will be reimbursed. The water treatment plant is located in Assendelft.

### Are you interested?

For more information, please visit [www.afvalzorg.nl/werken-bij](http://www.afvalzorg.nl/werken-bij) or call Remco Top, Technical Systems Manager, on +31 (0)6 8257 7818 or John Smit, Senior Technical Installations Manager, on +31 (0)6 2363 5979.

**Are you the right  
person to conduct this  
research?**

**Working for Afvalzorg** means helping make the Netherlands cleaner and more beautiful. As a major player in the waste management market, our 120-strong workforce provides storage, recycling and landfill services. Our specialists also handle the aftercare of contaminated sites. We give closed landfill sites a safe and sustainable second life. Any waste-related challenge is in good hands with Afvalzorg.

**AFVALZORG**



## EMISSION MANAGEMENT graduation assignment M/F

### Are you looking for a challenging (graduation) internship?

In our Water Management department in Assendelft, there is an internship position (for a graduation assignment) available right now. Are you the right person to conduct this research?

### Your graduation assignment at Water Management

Within Afvalzorg, the Water Management department is responsible for emissions from Afvalzorg's landfill sites. We use our biological water treatment system including an innovative and eco-friendly electrocoagulation system to clean leachate (wastewater). These latest treatment techniques enable us to continue meeting discharge requirements.

### Research question:

The hydrodynamic optimisation of an electrocoagulation system for the removal of metals (including heavy metals) from wastewater.

### Why this research?

Our electrocoagulation system consists of two units, each of which can treat 12.5m<sup>3</sup>/h of contaminated water. One street consists of around 150 iron plates with 2m<sup>2</sup> electrodes positioned 1cm apart. Aeration dishes create a flow of water between the plates. We have found our current method does not promote enough flow, and is causing deposits to form between the plates. Consequently, the efficiency of the treatment process is reduced and some of the plates fail. We need to make modifications to prevent the formation of deposits on the plates.

### Background information research

Our Water Management department is responsible for all emissions from Afvalzorg's landfill sites. This includes wastewater, or leachate, which is contaminated with substances from the waste package. To clean this wastewater so that it meets discharge requirements, we operate a biological water treatment plant that uses the latest purification techniques. Once its quality complies with current permits, it may be discharged into the surface water.

This is how we remove metals/heavy metals from wastewater. These metals are dissolved in the water as colloidal particles. The conventional disposal technique requires the addition of a coagulant and flocculant. These substances reduce the electrostatic repulsive force between the particles, causing them to form flakes that can easily be separated. Because this system is very chemical intensive, Afvalzorg opted to use [an innovative and more eco-friendly electrocoagulation system](#). This system uses an anode that releases metal ions into the water while on the cathode, water is hydrolysed into OH<sup>-</sup> and H<sub>2</sub> groups. The produced OH<sup>-</sup> groups complex with the non-soluble metal ions in the water to form flocs which can then be removed to a settling tank. Owing to the polarity of these complexes, they entrain other contaminants from the water, which reduces the load on the subsequent biological treatment stage.

The current electrocoagulation system consists of two units, each capable of treating 12.5m<sup>3</sup>/h of contaminated water. One unit consists of around 150 iron plates with 2m<sup>2</sup> electrodes positioned 1cm apart. Aeration dishes create a flow of water between the plates. However, this method does not enhance turbulence enough. This creates deposits between the plates, reducing the efficiency of the purification process and causing some plates to fail. The flow profile between the plates therefore needs optimising.

A computational fluid dynamics (CFD) model can be used to optimise the configuration and any modifications that promote turbulence. Besides the promotion of turbulence, other process parameters such as temperature, pH and salinity affect the conductivity of water and the electrical double layer of the colloidal particles. Because there are two parallel units, during your research you can simultaneously test two different situations at operational scale to validate the model's hypotheses.



**Are you interested?**

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**Previous research projects**

Sanne Smith, a student at TU Delft Civil Engineering and Geosciences and TU Delft Water Management went before you. In 2020 she wrote a thesis during her master's on PFAS removal from leachate water using electrocoagulation. Download the research: [PFAS removal from leachate water using electrocoagulation](#).

**About Afvalzorg**

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**About Water Management**

Afvalzorg's Water Management Department consists of nine people. Together, the team is responsible for emissions from Afvalzorg's landfills. There is plenty of flexibility in how you organise your internship. Your colleagues will make sure you are given appropriate supervision during your research assignment.

