



## **Master project in chemistry / chemical engineering (30 ECTS or longer; preferred start Q1 2022)**

EasyMining is an innovation company dedicated to closing nutrient cycles. We are owned by the Swedish environmental company Ragn-Sells. EasyMining is passionate about inventing new technologies that use intelligent chemical solutions to close nutrient cycles. Our objective is to create new circular material flows in an efficient commercial way. EasyMining is currently working on developing processes for recycling of phosphorus, iron, aluminium and other elements from sewage sludge ash. We are looking for an enthusiastic Master student who is interested in performing their Master degree project with us.

### Project description

The aim of the project is to optimize the recovery of iron from sewage sludge ash as high purity ferric chloride. Ferric chloride is used as coagulant in wastewater treatment to produce sewage sludge, which is afterwards incinerated to obtain sewage sludge ash. Recycling of ferric chloride from this ash creates circularity and promotes sustainability. EasyMining's solution recovers ferric chloride using hydrometallurgy, specifically chemical leaching and solvent extraction separation. The work in this project includes:

- The optimization of the solvent extraction step (for example the chemical composition of the leachate, organic phase and stripping solution; and the extraction conditions); and understanding how the extraction parameters influence the quality of ferric chloride.
- Chemical analysis of samples (pH monitoring, titrations, spectrophotometric analysis, ICP-MS analysis etc.).
- Performing solvent extraction and stripping experiments in batch mode and continuous mode (mixer-settlers).
- Interpretation and documentation of the results
- A literature study including the comparison of the results with existing data from within the company

### We offer

- Experience working in a fully equipped chemical laboratory in Uppsala
- The state of the art in hydrometallurgy, circular economy and recycling of valuable products from waste streams like sewage sludge ash
- Access and experience in using our analytical instruments
- Participation in topic related lectures and presentations
- Working together with experienced chemists from the R&D department as well as experienced process engineers from the Engineering department

### Requirements

- Experience working in a wet chemistry laboratory with acids, bases and other corrosive chemicals. The project involves working with concentrated acids, bases and organic compounds; and will require a significant amount of experimental work at EasyMining's Uppsala laboratory.
- An interest in circular economy and resource recovery.

## Contact

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