

Master's Thesis

Use of a mobile X-ray fluorescence device for the determination of the elemental composition during phosphorus recovery

For the implementation of phosphorus recovery from sewage sludge ash, practical solutions for the operation have to be found. In chemical analysis, optical emission spectrometry with inductively coupled plasma (ICP-OES) is the standard method used for elemental determination. A less established method is X-ray fluorescence analysis (XRF). Compared to ICP analysis, XRF has the advantage of being mobile and providing measurement results immediately. This opens up new application possibilities for field use at pilot plants for phosphorus recovery, e.g. in order to use fluctuations in input and output materials directly for the best possible operating settings even without available online measurement technology. However, limitations of the significance due to possible inaccuracies have to be considered and evaluated in advance for all relevant elements. The aim of the master thesis is to highlight the added value of XRF analysis for the control of phosphorus recovery and to identify possible limitations.

Following aspects should be included in the thesis:

- Explanation of the basic principles of phosphorus recovery from sewage sludge ash using the Parforce process
- Description of relevant material flows in the wet-chemical phosphorus recovery from sewage sludge ash
- Presentation of energy dispersive XRF for the application in elemental analysis
- Performance of XRF analyses of two material streams under variable measuring conditions (e.g. pressed/unpressed samples)
- Evaluation of the XRF measurement results in comparison with results from ICP elemental analysis
- Evaluation of the possible applications in the implementation of phosphorus recovery

Duration: 5/ 6 months
(in dependence on course of study)
Start: from now

Supervision:
Jan-Hendrik Ehm
Hiep Le
Tel. 0241/80 915 34
ehm@isa.rwth-aachen.de