

Master's or Bachelor's Thesis

Innovative methods for the characterization of secondary raw materials from recycling of plastic waste

Motivation

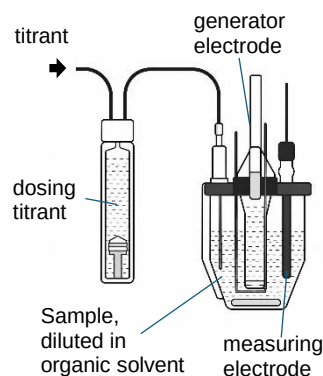
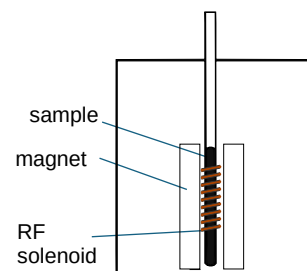
The production and use of plastics made from fossil raw materials continue to rise globally – and with them, the volume of plastic waste. To sustainably address this issue, large-scale processes are needed to convert the waste into new feedstocks for the chemical industry. At the ITC, pyrolysis is being researched as one such process. Among other things, the implementation of this process on a large scale is hampered by a lack of simple methods for continuous quality control for the products.

A critical parameter for product quality is the content of double bonds. The established measurement method, determination of the so-called bromine number is unsuitable for continuous monitoring because it requires manual preparation steps and generates chemical waste. One potential alternative method is nuclear magnetic resonance (NMR) spectroscopy, which requires no reagents and allows for quasi-continuous measurement. The results of both methods should be equivalent in theory – however, the complex composition of the products could cause interference, so the suitability of the new method must be verified.

Tasks

- Review of the literature on the presented methods
- Development of a method for quantitative NMR measurement
- Test of precision and robustness of the standard method and the created method, using a mixture of pure substances and model samples
- Demonstration of the method for real samples

The scope of this work can be adapted to accommodate a master's or a bachelor's thesis.



Schematic drawing of NMR (top) and bromine number (below) apparatus



We offer:

- ✓ Ongoing personal supervision
- ✓ A fully equipped analytical laboratory with modern instruments



Your profile:

- Student of Chemical and Process Engineering, Chemistry or equivalent
- Safe and efficient work in the chemical laboratory



Sounds interesting?

If you have any further questions, please feel free to contact me by email or phone. If you're interested in taking on this task, please send me an email with your major, a current transcript, and your preferred start date.

Start date:

As soon as possible

Contact / Advisor:

Paul Schell (Mail: paul.schell@kit.edu, [More about me...](#))