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Energy from waste and biomass

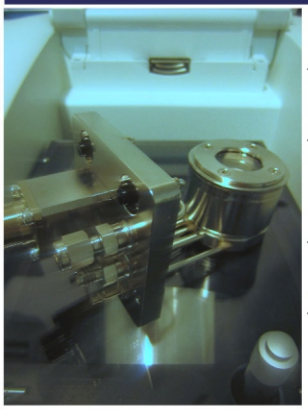
We implement research studies, which are necessary for planning and proper development of processes for efficient utilisation of biomass and organic waste materials. R&D services and long lasting industrial cooperation are based on the use of advanced research equipment, long-term experiences and competitive prices.

Basic analysis



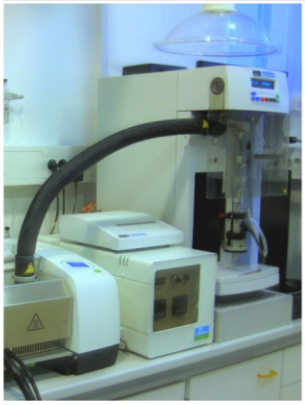
- dry and organic matter (DM and OM)
- chemical oxygen demand (COD)
- biochemical oxygen demand (BOD)
- calorific value (GCV)
- total organic carbon (TOC)
- total nitrogen (TN)
- content of anions and cations (IC)
- content of volatile fatty acids (GC)
- titrimetric methods (alkalinity, etc.)
- various kit-methods (protein content, enzyme activity, ATP, ...)
- pH value, ...

Advanced characterization



- determination of C,H, N and S contents in solid and liquid samples (CHNS)
- IR spectroscopy of complex sample components in gaseous, solid and liquid state (FTIR/ATR, FTIR/DRIFTS)
- monitoring of UV-active substances in solutions (UV-vis DRS)
- structural properties of solid samples (specific surface area, porosity, density), ...

Thermal conversion



Measurements in thermogravitmeric cell may be performed in inert, oxidative or reductive environments:

- study of pyrolysis and gasification
- thermal stability of materials
- various temperature programmed techniques

Product identification via coupled FTIR, micro-GC and MS techniques
Temperature interval from RT to 1000 °C

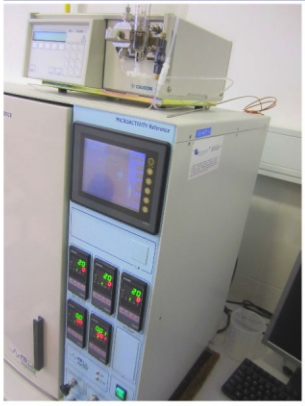
Biogas



Determination of biogas and biomethane potential:
- low reactor organic loadings in waste water experiments (0.1 - 0.5 g COD)
- high reactor organic loadings for testing of organic broths and biodegradable solid wastes (10 - 20 % DM)
- wide range of agitation regimes, operating temperatures, working volumes, various reactor types (CSTR, UASB) and supporting analytical techniques

Scale-up pilot studies

Catalysis



Temperature programmed processes with or without catalyst use.

- simultaneous introduction of up to six individual gases and one liquid stream
- operation at temperatures from RT to 950 °C and pressures up to 100 bar
- coupled to GC and HPLC for gas- and liquid-phase product identification

Two or three phase operation:
- tubular fixed-bed reactor
- trickle-bed reactor

EnviroEng

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In the Laboratory for Environmental Sciences and Engineering we conduct basic and applied research on national and international level in the field of environmental heterogeneous catalysis (wastewater treatment, energy production from biomass and waste solids).
We develop and design novel chemical processes and technologies or parts of technologies. We advise domestic and foreign industrial partners and end-users on solving environmental problems, develop sustainable processes for wastewater and waste management, as well as conduct environmental impact assessment and other projects in the field of environmental protection. We are engaged also in the development and validation of analytical procedures for various instrumental techniques.