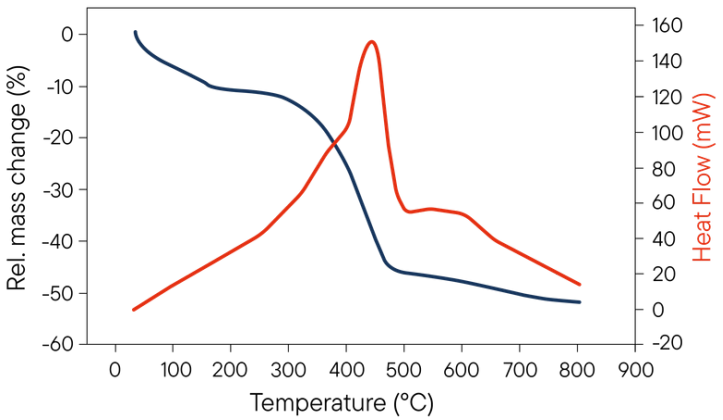
Thermogravimetric Analysis of Oil Palm Empty Fruit Bunch Ash for Potassium Recovery

Mass Loss Characterization Using the Linseis TGA L83 (former designation: TGA PT 1100)

Thermogravimetric Analysis (TGA) enables the precise measurement of mass changes as a function of temperature and atmosphere. In this application example, oil palm empty fruit bunch (OPEFB) char was investigated using the former instrument designation TGA PT 1100, now known as the Linseis TGA L83.
The measurement reveals the thermal decomposition behavior of the biomass and supports the identification of suitable ashing conditions for efficient potassium recovery from the resulting ash.

Measurement Setup

- Instrument: Linseis TGA L83 (former designation: TGA PT 1100)
- Sample: Oil Palm Empty Fruit Bunch (OPEFB) Char
- Atmosphere: Air
- Heating: Continuous heating from ambient temperature to ~850 °C
- Measurement: Thermogravimetric mass loss analysis



The TGA measurement reveals the thermal decomposition behavior of OPEFB char.
Key observations include:

- Moisture release below approximately 150 °C
- Major decomposition between 230 °C and 500 °C
- Strong reduction of volatile matter and fixed carbon
- Stable residual ash above approximately 500 °C

The measurement provides the basis for selecting suitable ashing conditions for potassium recovery.

Interpretation

The observed mass loss can be attributed to:

- Moisture evaporation
- Volatile release
- Carbon combustion

This results in:

- Formation of mineral-rich ash
- Identification of optimum ashing temperatures

Industrial Relevance

TGA measurements are widely used for:

- Biomass characterization
- Waste valorization
- Fertilizer development
- Process optimization
- Thermal stability analysis

Conclusion

The measurement performed with the Linseis TGA L83 demonstrates the suitability of thermogravimetric analysis for evaluating biomass decomposition and ash formation. The results support the identification of optimal processing conditions for potassium extraction from OPEFB ash and subsequent fertilizer production.

Source:
Samadhi, T. W., Wulandari, W., Tirtabudi, K. R.
"Oil Palm Empty Fruit Bunch Ash Valorization Through Potassium Extraction"
IOP Conference Series: Materials Science and Engineering, Volume 823, 2020
DOI: 10.1088/1757-899X/823/1/012035
Adapted and extended with measurements performed on a Linseis TGA L83 (former designation: TGA PT 1100).