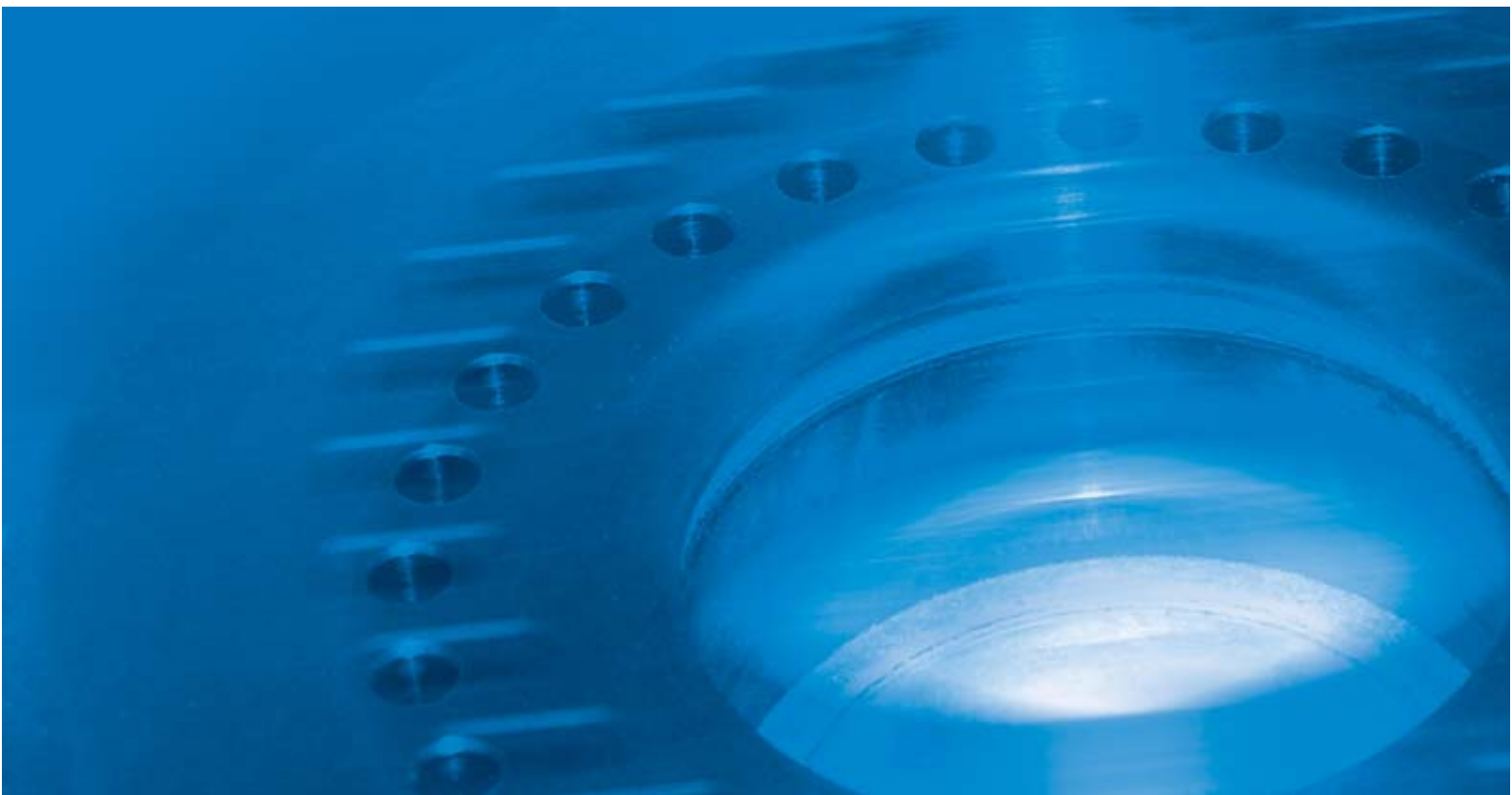


***LINSEIS***  
***DSC PLATINUM SERIES***



Differential Scanning Calorimetry, DSC, is well-known as a fast and easy-to-operate thermo analytical measuring technique according to industrial standards such as ISO, ASTM, DIN ... for research & development, quality management, failure analysis, and process optimization.

### Heat Flux DSC

A technique in which the temperature of the sample unit, formed by a sample and reference material, is varied in a specified program and the temperature difference between the sample and the reference material is measured as a function of temperature. Many industrial standards provide a guideline of how to calibrate the equipment for specific material-, product- and characteristic-referred applications, result evaluation and interpretation.

### LINSEIS DSC – PT10

This product was developed to provide a DSC with a broad temperature range (-150 – 700°C) for all common applications. Furthermore emphasis was placed on an extremely stable baseline and high reproducibility. The conception of the cell guarantees a high mechanical and chemical resistance. It is a highly precise instrument and the principle of operation is based on heat flux between the sample and the reference.

The thermal analysis requirements of testing and quality-control laboratories, as well as those of universities and higher education, mean that the instruments on offer must be of highest performance, but simple to operate and maintainable for a reasonable cost.

#### Features:

- Temperature range -150°C up to +700°C
- Forced air cooling standard
- Low temperature model with LN2 cooling or with Intercooler

#### Features:

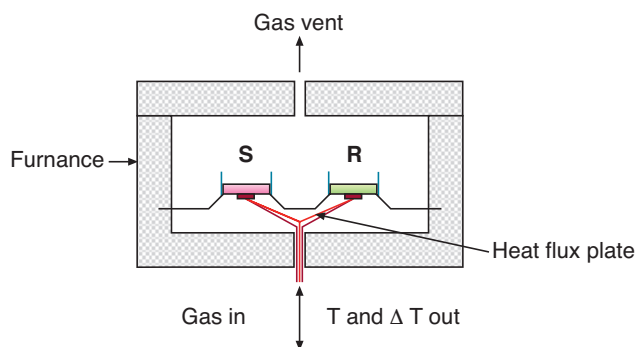
- The DSC – PT10 houses within the same structure the transducer and the controller for easier installation and operation.
- Due to its low-thermal-inertia furnace the DSC – PT10 moves very quickly over the entire temperature range.
- The system is easy to operate, especially for people unskilled in thermal analysis.

#### The DSC measurement principle is used typically for:

- Research & Development
- Quality control
- Quality assurance
- Process optimization
- Failure analysis

#### The main user groups of Differential Scanning Calorimetry (DSC) are:

- Plastic industry/rubber industry
- Pharmaceutical industry
- Food industry



PRODUCT

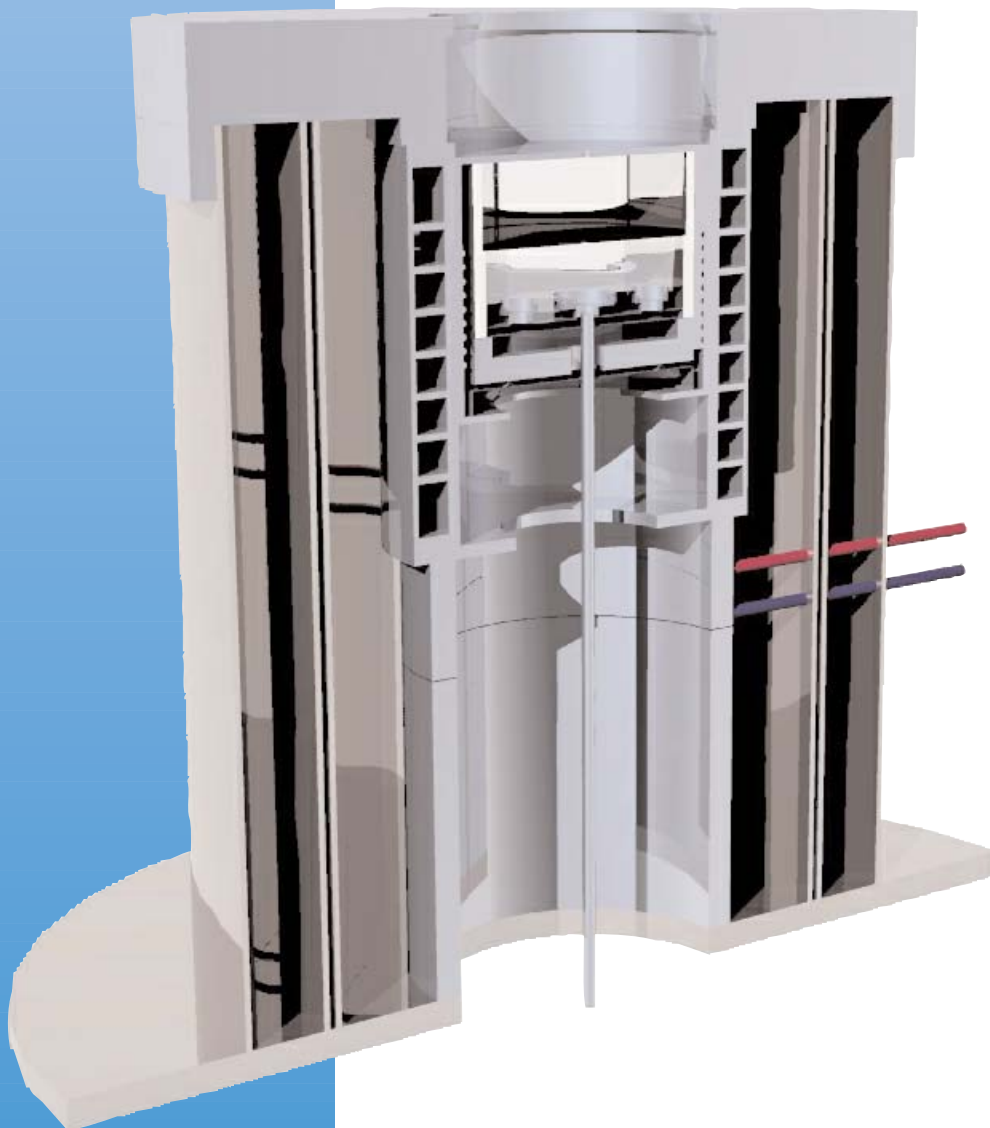
**The following characteristics can be determined by DSC measurements:**

- Enthalpy, melting energy
- Specific heat
- Glass point
- Crystallinity
- Reaction enthalpy
- Thermal stability
- Oxidation stability
- Aging
- Purity
- Phase transformation
- Solidus / liquidus - relationship
- Eutecticum
- Polymorphs
- Product identification

**LINSEIS accessories:**

The versatility of the LINSEIS DSC is supported by a large selection of crucibles. Select for your application and samples the ideal crucible material, the best form and kind of sealing.

Crucibles made of metal; precious metal, graphite and oxide ceramics are available in different dimensions. Aluminum crucibles can be sealed gas-tight in a handy locking press, so that samples can be protected from the influence of the Environment atmosphere and that gas splitting off from the samples is suppressed.



FEATUURES

## Software

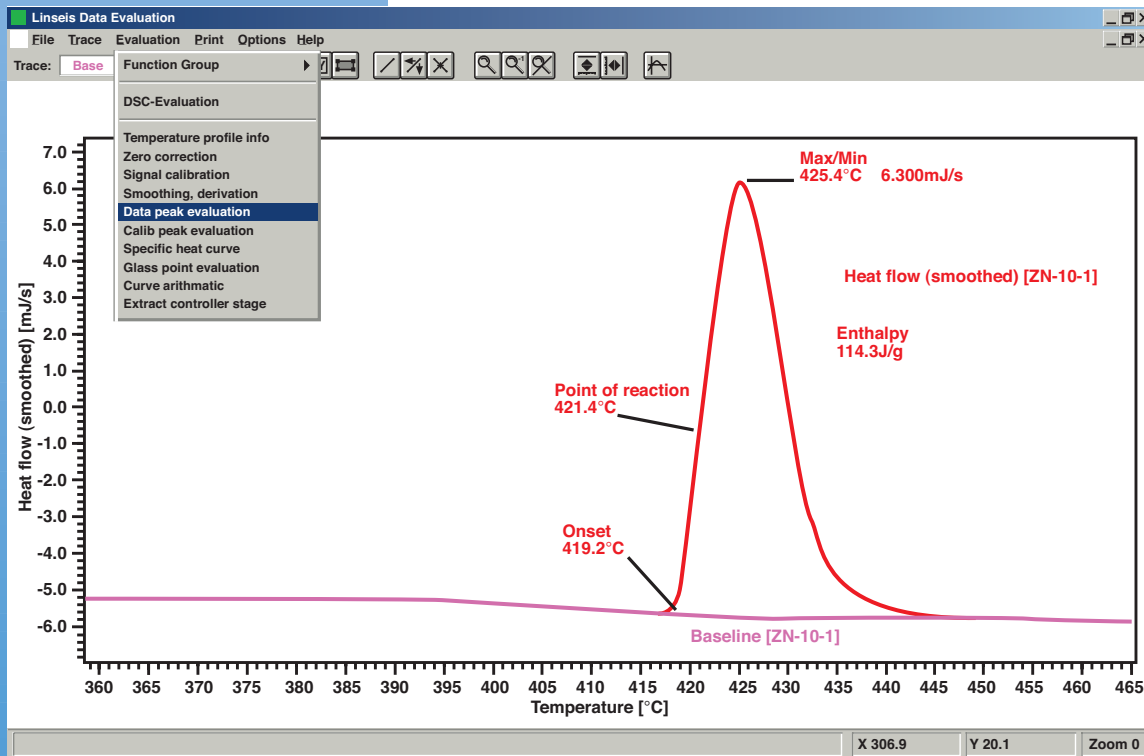
All thermo analytical devices of LINSEIS are PC controlled, the individual software modules exclusively run under Microsoft® Windows® operating systems. The complete software consists of 3 modules: temperature control, data acquisition and data evaluation. The Linseis 32 – bit software encounters all essential features for measurement preparation, execution and evaluation with a DSC run, just like with other thermo analytical experiments. Due to our specialists and application experts LINSEIS was able to develop this easy understandable and highly practical software.

## Features:

- Program capable of text editing
- Repetition measurements with minimum parameter input
- Evaluation of current measurement
- Curve comparison up to 32 curves
- Curve subtraction
- Multi-methods analysis (DSC TG, TMA, DIL, etc.)
- Zoom function
- 1. and 2. Derivative
- Complex peak evaluation
- Multipoint calibration for sample temperature
- Multipoint calibration for change of enthalpy
- Cp calibration for heat flow
- Storage and export of evaluations
- Export and import of data ASCII
- Data export to MS Excel
- Signal-steered measuring procedures
- Zoom in function

The following interesting physical properties of materials can be measured:

- enthalpy, melting energy
- specific heat
- glass point
- crystallinity
- reaction enthalpy
- thermal stability
- oxidation stability
- aging
- purity
- phase transformation
- eutectics
- polymorphs
- product identification



## Advanced Software

Enhance your collected information by adding unique software features:

### Thermokinetics Software:

The main goal of LINSEIS-Thermokinetics Software Package is to facilitate kinetic analysis of DSC, DTA, TGA, EGA (TG-MS, TG-FTIR) data for the study of raw materials and products within the scope of research, development and quality assurance.

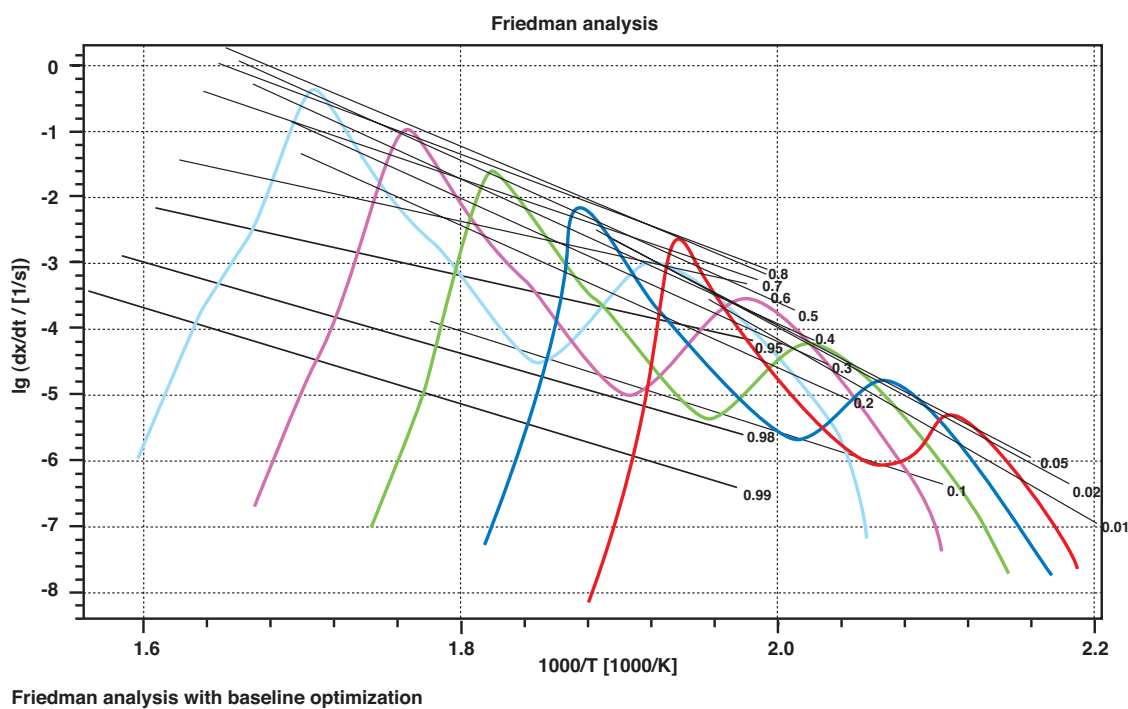
### Model-free Kinetic Analysis

#### Some Features:

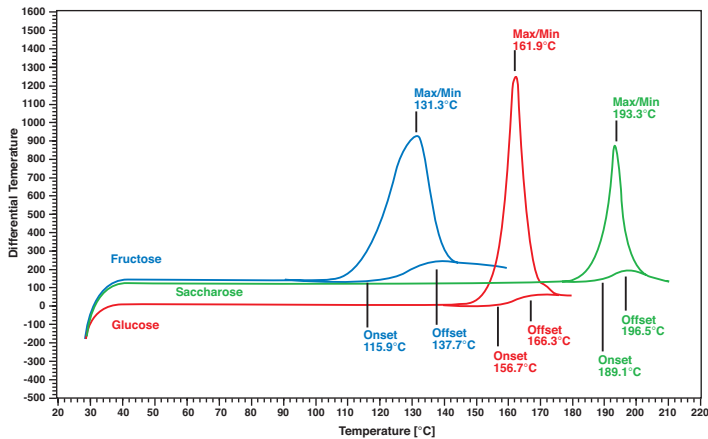
- Friedman analysis of dynamic and/or isothermal measurements
- Ozawa-Flynn-Wall analysis of dynamic measurements
- Analysis according ASTM E698
- Model-fit using Multivariate Analysis
- Nonlinear Regression
- and many more...

## LINSEIS Thermal Safety Software

LINSEIS-Thermal Safety Software enables the calculation of the Time to Maximum Rate under adiabatic conditions (TMRad). Finite Element Analysis (FEA) extends the application of calculating methods to analyze the thermal behavior under non-adiabatic conditions. FEA enables the determination of the impact that substance properties and container properties can have on the reaction progress. Key applications for this method are found in the chemical, pharmaceutical and food industries, for self-reactive chemicals, explosives and thermal hazards for dangerous goods.



# APPLICATIONS

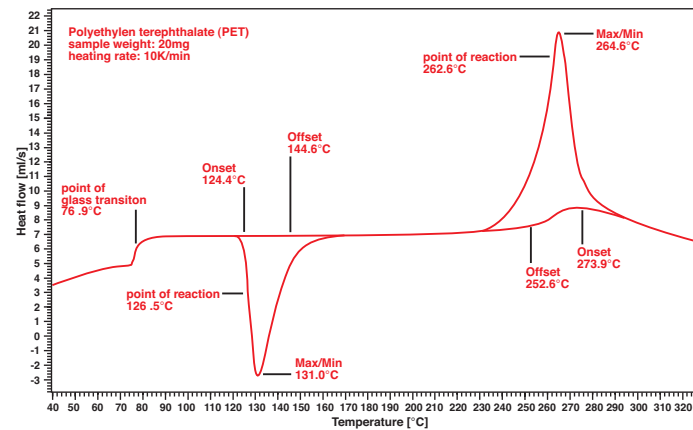


## 1. Food

The three evaluated substances (Fructose, Glucose and Saccharose) show distinctive melting points. These melting points can be precisely determined by means of Differential Scanning Calorimetry (DSC). For this the analytical method is frequently used for the determination of unknown substances. Even mixtures with identical molecular weight such as Fructose and Glucose can thus be recognized.

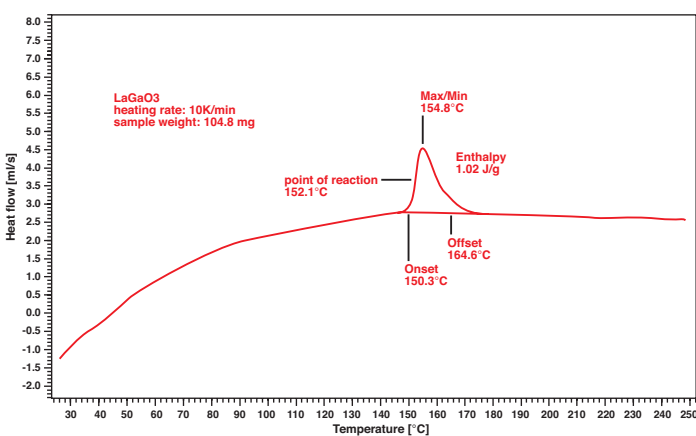
## 2. Thermoplasts

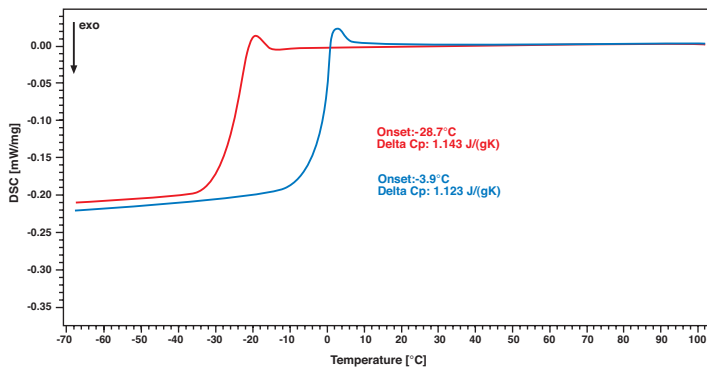
PolyEthylenTherephthalat (PET) shows a significant endothermic glass point at about 77°C, which is quite special for partly crystalline thermoplasts. The relation between the exothermal cold crystallization at 131°C and the endothermic melting peak is a measure for the degree of crystallization of the material. In the case of (PET) the crystalline part is very small which results in a good transparency of the material.



## 3. Metal Oxide

The used HiRes Sensor enables the determination of smallest caloric effects such as the crystalline structure change of Lanthanum - Galliumoxid (LaGaO<sub>3</sub>). The substance is very interesting when fast oxygen/ion conductors are required. A typical application is the use in lambda sensors for catalytic converters.



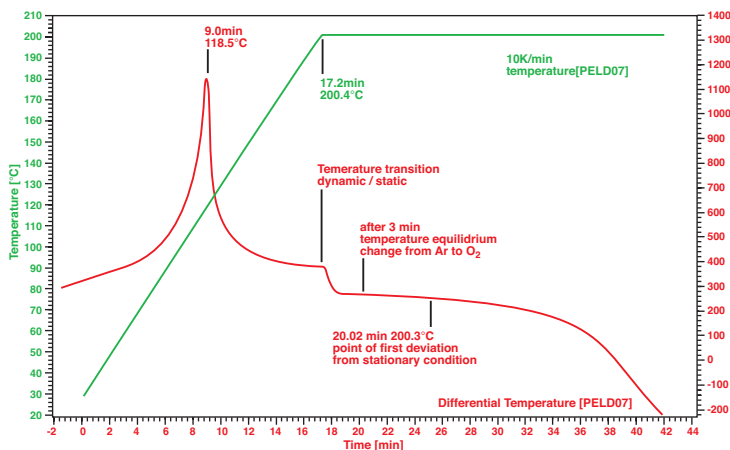


#### 4. Pharma

Sorbitol is frequently used as replacement for sugar in Sweets, Diet products and as carrier substance for pharmaceuticals. The glass point from water-free sorbitol at  $-1.6^{\circ}\text{C}$  is increased to  $-25.4^{\circ}\text{C}$  by adding 5.4% water. Both samples remain entirely amorphous after the smelting (took place before the heating up).

#### 5. Polymers (OIT) “Oxidative Induction Time”

Initially the polyethylene sample is heated up to  $200^{\circ}\text{C}$  under argon atmosphere with a heating rate of 10K/min. After 3 minutes at the equilibrium the environment is changed from argon to oxygen. After an additional 5 minutes the exothermal oxidation of the sample starts.



#### LINSEIS Application Handbook:

##### Thermal Analysis

- DTA
- DSC
- HDSC
- TG
- TMA
- DIL
- MS/FTIR Coupling

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**Services:** Service Lab, Calibration Service

[www.linseis.com](http://www.linseis.com)