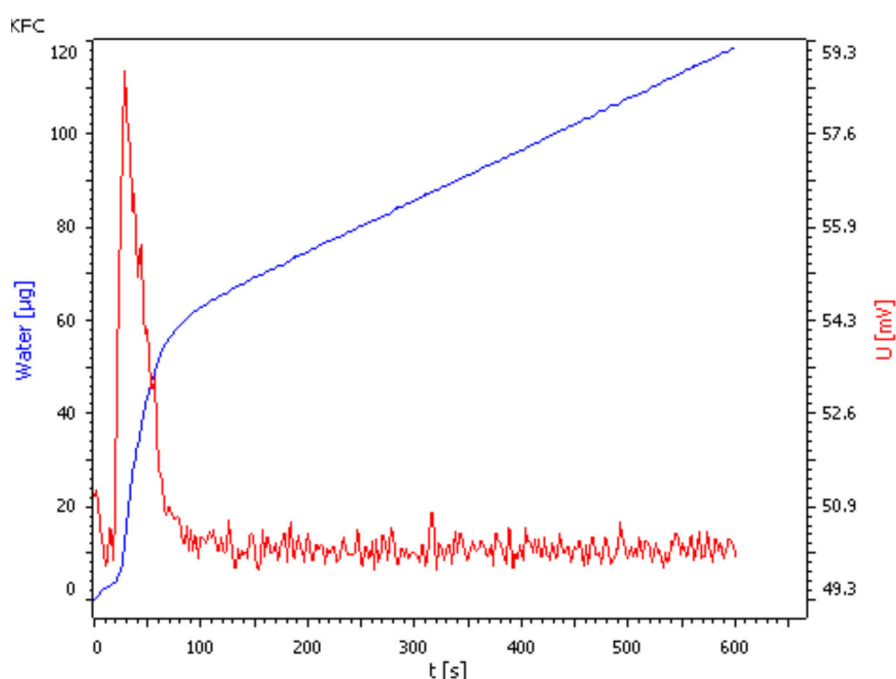


Water in expandable polystyrene

Oven system with closed sample vials simplifies analysis



The presence of water in expandable polystyrene (EPS) can have a negative impact on the thermal insulation properties, as it increases thermal conductivity. If EPS is exposed to a high moisture environment, additional water may be absorbed, which can further affect thermal insulation.

Direct analysis of the moisture content by Karl Fischer titration requires the water to be extracted from the EPS, which involves several time-consuming steps. Therefore, determination of the water content with an oven system is preferred. As EPS expands when heated, the use of sample boats, as required by ASTM D6869, is not possible, as the EPS will contaminate the oven system. This Application Note describes the determination of water content in EPS using an oven system with closed sample vials. A determination takes about 7 to 14 min depending on the water content of the sample and the sample size.

Method description

Sample

Expandable polystyrene

Sample preparation

0.5 – 1.5 g of sample is weighed into the sample vial, tightly closed with the cap and placed on the rack of the Oven Sample Processor.

Solutions

HYDRANAL[®]-Coulomat AG Oven

Configuration

874 Oven Sample Processor with <i>tiamo</i> [™] full	2.874.0010
851 Titrando with generator electrode without diaphragm	2.851.0110

Analysis

All measurements are carried out at the same temperature using the same parameters.

The sample size should be chosen in such a way that the sample will still fit into the vial after its expansion during the measurement.

After starting the sample series, the Sample Processor moves to the conditioning vial, the needle pierces the septum, the gas flow is started, and the titration vessel is conditioned. Then a determination with an empty sample vial is carried out to prepare the system and rinse all tubing. Following the system preparation, three blank values (empty sample vials) are determined and the mean value of the blank is saved as common variable. This value is subtracted from the EP of the sample determination. Subsequently, the water content of the samples is determined. Between two determinations, the titration vessel is conditioned again.

Parameters Coulometer

Conditioning	on
Start drift	10 µg/min
Drift correction	auto
Stabilizing time	60 s
Cond. stop time	off
Pause	0 s
Endpoint at	50 mV
Dynamics	70 mV
Min. rate	15 µg/min
Stop criterion	rel. drift
Relative stop drift	5 µg/min
Extraction time	120 s
Generator electrode	without diaphragm
Generator current	400 mA
Stirring rate	15
I(pol)	10 µA
Temperature	25 °C
Stop time	off

Parameters Oven Sample Processor

Temperature	150 °C
Flow rate	50 mL/min
Gas type	nitrogen
Inlet	Valve

Results

Mean (n = 6) [%]	RSD [%]
0.223	1.22