

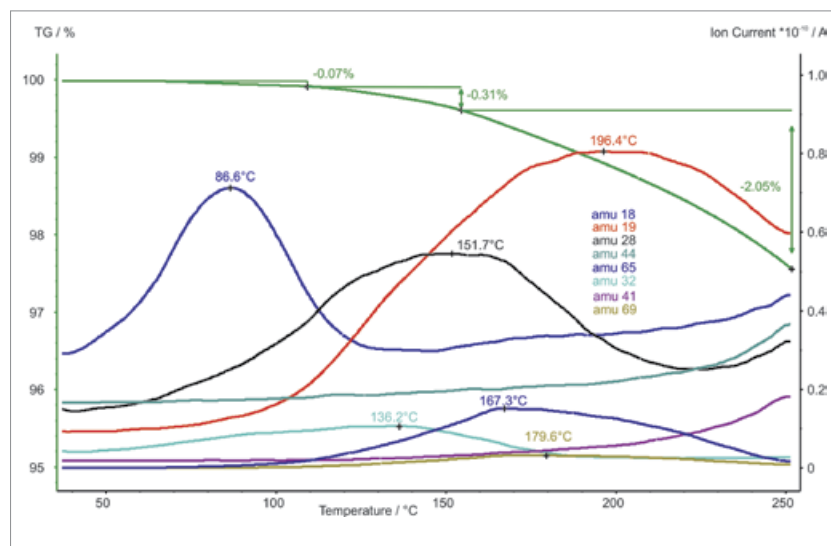
# APPLICATION SHEET

## BUILDING MATERIALS – CHEMISTRY

# BLOWING AGENTS IN INSULATION MATERIALS (FOAM)

Insulation materials like foams are found in many applications like the insulation of houses and roofs, refrigerators, freezers etc. Blowing agents which are often also called foaming agents play an important role for the main properties of the insulation material. These properties and requirements concern besides the ther-

mal conductivity a low flammability, low toxicity and a high load bearing capability. In addition the use of some chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFs) as blowing agent is prohibited or should be avoided because of ozone depleting potential and global warming.



### Instrument

STA 449 C Jupiter® – QMS 403 Aeolos®

### Test Conditions

Temperature range	RT ... 250°C
Heating/cooling rates	10 K/min
Atmosphere	Argon at 70 ml/min
Sample mass	180 mg
Crucible	Al <sub>2</sub> O <sub>3</sub> beaker
Sensor	TG type S

# APPLICATION SHEET



## Results

An insulation material (foam) was studied using simultaneous thermogravimetry (TG) and mass spectroscopy (MS). During the entire measurement, three mass-loss steps of 0.07%, 0.31% and 2.05% were observed. The last mass-loss step was not completed because of the beginning decomposition above ~230°C which was not the main issue of the test. Below ~100°C, the ion current for mass number 18 indicates the release of water (surface humidity). The broad peaks for mass

numbers 28 and 32 at 152°C and 136°C reflect the release of the blowing agents N<sub>2</sub> and O<sub>2</sub>. Mass numbers 19, 65 and 69 are due to the F containing blowing agent (HCFC) while the increase in mass numbers 41 and 44 at highest temperatures is due to the beginning decomposition of the foam sample. In general these results demonstrate the suitability of coupled TG-MS for the study of blowing agents in insulation materials and their thermal stability.

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