

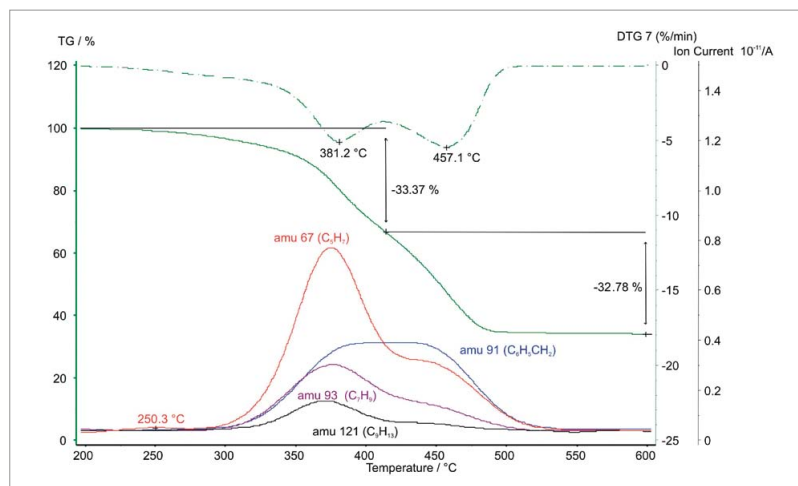
APPLICATION SHEET

POLYMERS – AUTOMOTIVE

RUBBER

Rubbers are used in a large amount of products and applications such as car tyres, sealings, O-rings gloves, boots, toys, cable insulation, etc. Synthetic rubbers consist of cross-linked polymers which are reinforced, for example, by silica, carbon and carbonates. Rubbers contain furthermore plasticizers which result in a better flexibility of the rubber. Thermal analysis is typically used for the study of the temperature stability and decomposition of rubber.

One important question for example is: At which temperature is the plasticizer released? In addition, coupling of thermal analysis instruments with gas analyzers like mass spectrometers allows for the chemical identification of the evolved gases: Does the rubber, for example, release polycyclic highly aromatic hydrocarbons (PAHs) which are potentially cancerous?



Instrument

STA 449 C Jupiter® – QMS 403 Aëolos®

Test Conditions

Temperature range	RT ... 600°C
Heating/cooling rates	10 K/min
Atmosphere	Argon at 70 ml/min
Sample mass	12.52 mg
Crucible	Pt with pierced lid
Sensor	TG type S

Results

By means of simultaneous thermogravimetry (TG) and mass spectrometry (MS), the pyrolytic decomposition of a rubber sample was investigated. Upon heating the sample to 600°C, two mass-loss steps of 33.4% and 32.8% were observed. Maxima in the rate of mass change occurred at 381°C and 457°C. From the mass spectrometer signals (only a few exemplary mass numbers are shown), it can be concluded which organic molecules were evolved at which temperature. For example at 250°C, mass number 67 (most probably due to C₅H₇) indicates the release of the plasticizer. PAHs could be no detected.