Analysis of Polyoxymethylene by TG-DSC + FTIR

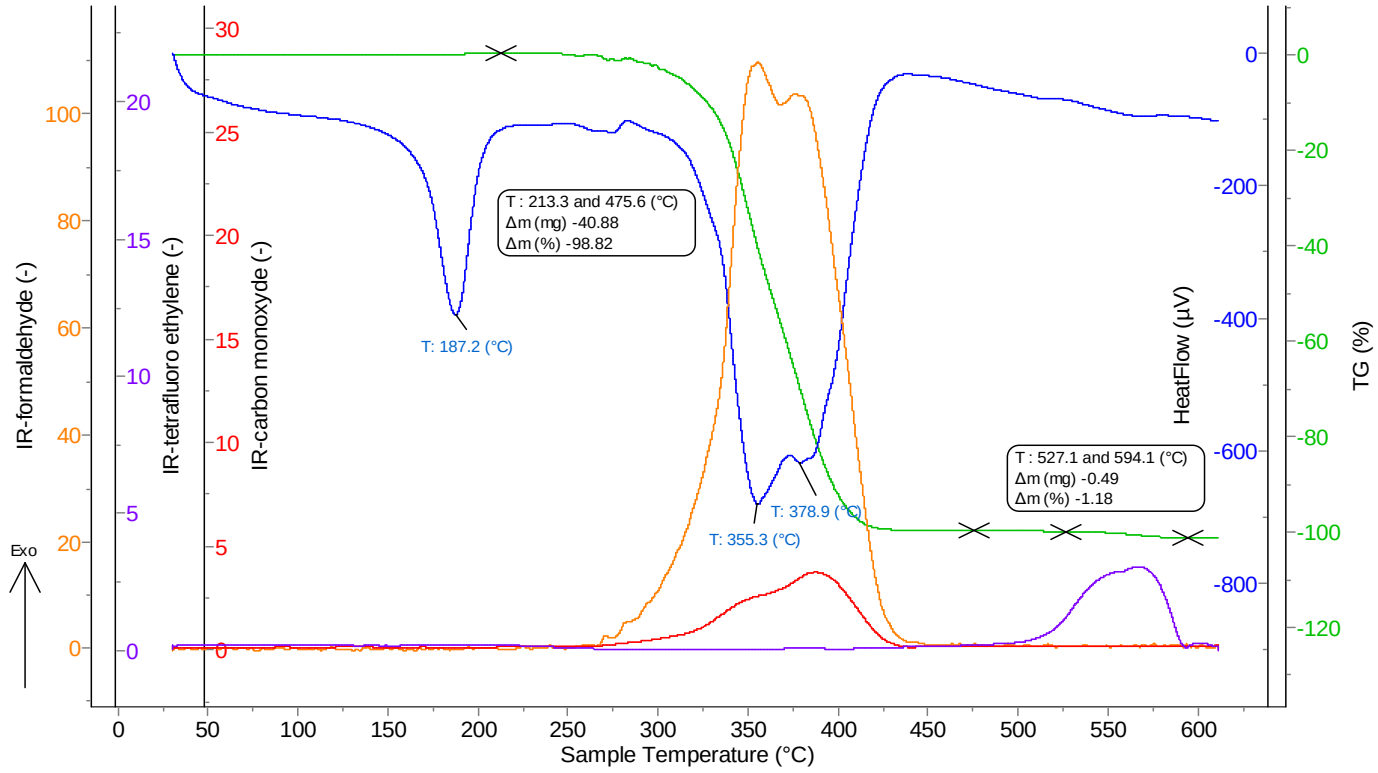
Introduction

One interesting feature of **LABSYS evo STA** is the possibility to connect its gas exhaust to a FTIR spectrometer in order to identify the vapours evolving from the sample and to monitor the level of each identified vapour.

Experimental method

The following experimental procedure has to be used:

Sample : Polyoxymethylene
Crucible : Platinum
Mass: 41.37mg
Atmosphere : Argon 60ml/min
Experimental procedure : The temperature is programmed from ambient up to 600°C at 10 °C/min.



Results and conclusions

The Heat Flow curve presents two endothermic effects. The low temperature peak (with a maximum at 187.2°C) may correspond to melting because it isn't related to any mass loss signal. While the higher temperature peak (with two maxima at 355.3°C and 378.9°C) corresponds to the decomposition of Polyoxymethylene and is related to the main mass loss of 98.82%. Finally, the last mass loss of 1.18% is due to a second decomposition.

From the FTIR spectra it is possible to draw the variation of intensity associated to the specific absorption band for carbon monoxide (2000-2200cm^{-1}), formaldehyde (2600-3100cm^{-1}) which are decomposition products of POM and tetrafluoroethylene (1100-1400cm^{-1}). The release of this last compound is probably not linked with the degradation of the macromolecular chain, but with the presence of an additive or a residue of the preparation of the polymer in the final material.