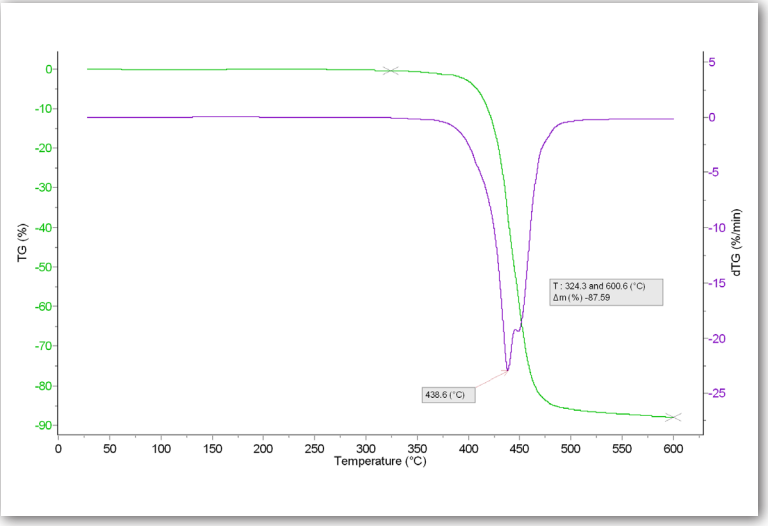
Thermal stability of Polyethylene by TGA

INTRODUCTION

Thermal stability is the ability of a polymeric material to resist the action of heat and to maintain its properties. For instance, the processing conditions of a polymer (e.g. injection molding temperature) need to be compared with its decomposition temperature in order to avoid changing the polymer characteristics during its processing.
Thermogravimetric analysis (TGA) is primarily used to determine polymers thermal stability as it measures the temperature at which a mass loss of the material is detected, that is to say at which the decomposition of the material starts.



EXPERIMENT

Setline STA was used for the experiment. A sample amount of 25 mg was weighed and inserted in an alumina crucible. The temperature and atmosphere conditions were then applied:
• Heating from 30°C to 600°C at 10°C/min
• Atmosphere: nitrogen flow at a rate of 30 ml/min
A blank experiment with an empty alumina crucible was run using the same experimental conditions. The obtained signals were used to subtract the contribution of buoyancy effects from the test with samples.

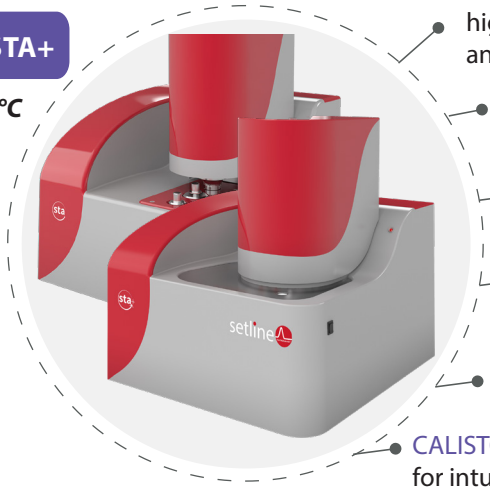
RESULTS AND CONCLUSION

Polyethylene begins to decompose at around 325°C with a maximum rate of decomposition at 438.6°C as observed thanks to the derivative of TG signal (dTG).
At 600°C, the total mass loss is 87.59%. Setline STA is very well adapted for the investigation of the thermal stability of polymeric materials through the study of their decompositions. For such a test, Setline STA benefits from its flexibility in terms of temperature and atmosphere program for the definition of the different heating and cooling sequences, together with a very efficient and automated gas control device.

INSTRUMENT

SETLINE STA / STA+

Ambient to 1100°C



HIGH QUALITY, CONSISTENT AND RELIABLE DATA
high sensitivity balance specifically designed for TGA analysis and true plate shaped DSC transducer

CONVENIENTLY DESIGNED
robust balance and DSC sensor technology with an easy DSC sensor access and replacement

REASONABLY PRICED INSTRUMENT & SENSOR
for easy, cost effective replacement

LOWER COST OF OWNERSHIP
through simplified maintenance and a Replacement Parts Guarantee

TECHNICAL & APPLICATION SUPPORT
for fast expert help with any questions

CALISTO 2.0 EXCLUSIVE SOFTWARE
for intuitive and easy data handling