

## Thermal stability of O-ring materials by TGA

### INTRODUCTION

Many polymers can be used as seals, adhesives, and flexible parts. Thermal stability is a key parameter for selecting the most suitable polymer among the potential candidates to manufacture gaskets and O-rings.

The resistance against temperature of four different O-ring materials were compared using SETLINE TGA: NBR (Nitrile Butadiene Rubber), EPDM (Ethylene Propylene diene Monomer), PTFE (Polytetrafluoroethylene) and FPM (Fluorinated rubber).

### EXPERIMENT

SETLINE TGA was used for the experiments. For each material, a sample amount of  $30 \text{ mg} \pm 2 \text{ mg}$  was weighed and inserted in an alumina crucible.

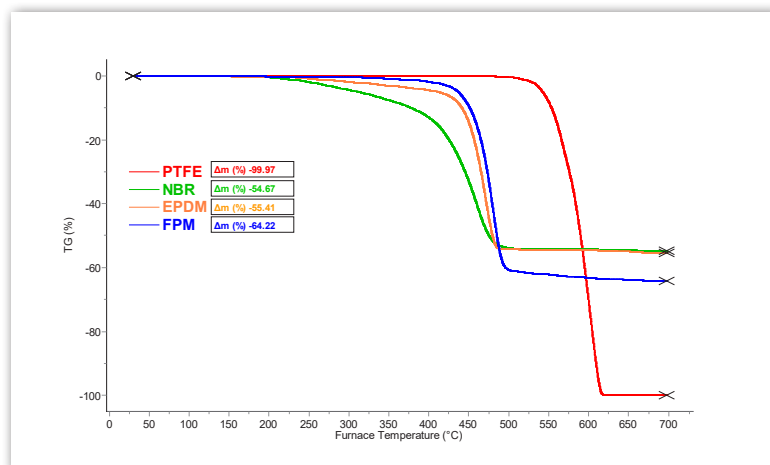
The following profile was then applied:

- Heating from  $30^\circ\text{C}$  to  $700^\circ\text{C}$  at  $10\text{K}/\text{minute}$
- Atmosphere: nitrogen flow at a rate of  $30 \text{ ml}/\text{min}$

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 tests with samples.

Note: although blank experiment subtraction is a common good practice in TGA, the contribution of this correction is below  $0.005\%$  on the final mass loss results of that series of experiments.



### RESULTS AND CONCLUSION

NBR and EPDM begin to decompose at around  $210^\circ\text{C}$ . At  $700^\circ\text{C}$ , their respective mass loss is  $54.67\%$  and  $55.41\%$ . Concerning FPM, its thermal stability is better than NBR and EPDM with a decomposition temperature observed at around  $270^\circ\text{C}$ .

PTFE is the most stable, with a decomposition starting at around  $480^\circ\text{C}$ . However, it has a higher decomposition rate than the three other elastomers and reaches a mass loss of  $99.97\%$  at the end of the heating.

### INSTRUMENT

#### SETLINE TGA

Ambient to  $1100^\circ\text{C}$



#### ACCURACY MADE ACCESSIBLE

with a simple and reliable hang-down balance, specially designed for TGA applications

#### 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