

Temperature correction of SETLINE TGA using magnetic transitions

INTRODUCTION

The calibration of the temperature scale of thermal analyzers is necessary to ensure reliable results. Why a specific method for TGA? The usual method is based on melting experiments of standard reference materials. But as melting does not lead to a mass variation this method applies to TGA instruments that are combined with simultaneous DTA or DSC measurements, known as STA. With TGA instruments, the method uses the magnetic transition temperatures, or Curie points of magnetic materials.

EXPERIMENT

Samples of Nickel, Alumel and of a high Curie point alloy were placed in the platinum crucible of a SETLINE TGA. SETLINE TGA is equipped with a built-in and software-controlled electromagnet used to apply a magnetic field on the samples during temperature calibration. So, the samples were heated up to 700°C at 10 °C/min under a nitrogen flow at 30ml/min and under a magnetic field.

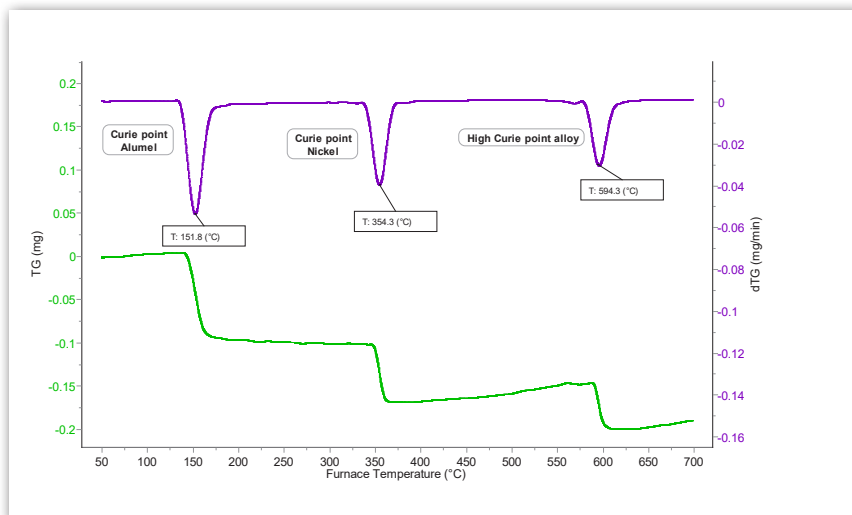


Figure 1: TG and dTG curves obtained with Nickel, Alumel and a high Curie point alloy

RESULTS AND CONCLUSION

When heated above its Curie temperature, a magnetic material suddenly loses its magnetization (it is a reversible process). It means that at its Curie temperature, the tested samples are suddenly not anymore attracted by the electromagnet. This change appears on the TGA signal as a slight perturbation.

Figure 1 shows the impact of this perturbation on the TG and DTG signals obtained with the three samples. The inflexion point of the mass variations can simply be determined by Calisto data processing software. The differences between these inflexion points – the experimental Curie temperatures - and the expected literature values is used for temperature correction. A simple module calculates temperature correction coefficients, that are then applied to any future experiment made with the SETLINE TGA.

INSTRUMENT

SETLINE TGA

Ambient to 1100°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