Thermal Analysis Option

Mathematics

Expand your Evaluation Possibilities

This software option offers a number of useful calculations that can be applied to curves for advanced evaluation possibilities, adding even more flexibility to the STAR^{e} Software.

Available functions

Reporting	• Cut to frame • Smooth • Take apart
Arithmetic	• Add/subtract curve • Divide/multiply • Add/subtract value • Average curves • Divide/multiply curve • Subtract line • Subtraction poly-line
Advanced functions	• Envelope curves • Compare curves
Calculus	• Derivative • Integral • Integration • Fast Fourier transform • Polynomial fit

Gain more information from your data with the pure mathematical functions such as integration, addition, subtraction, averaging, or derivatives. Besides these mathematical functions, there are many possibilities to present evaluations in your own desired format with the ability to smooth curves or cut to frame to show the area of interest.

Included functions help to provide more insight to the materials being measured with your Thermal Analysis System.

Features and benefits

- **Mathematical function** – users may design their own evaluations
- **Reporting function** – allows users to optimize curve display

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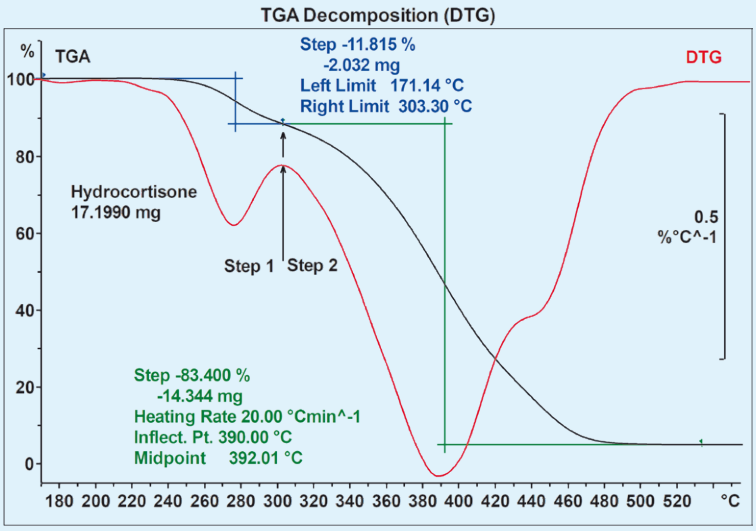
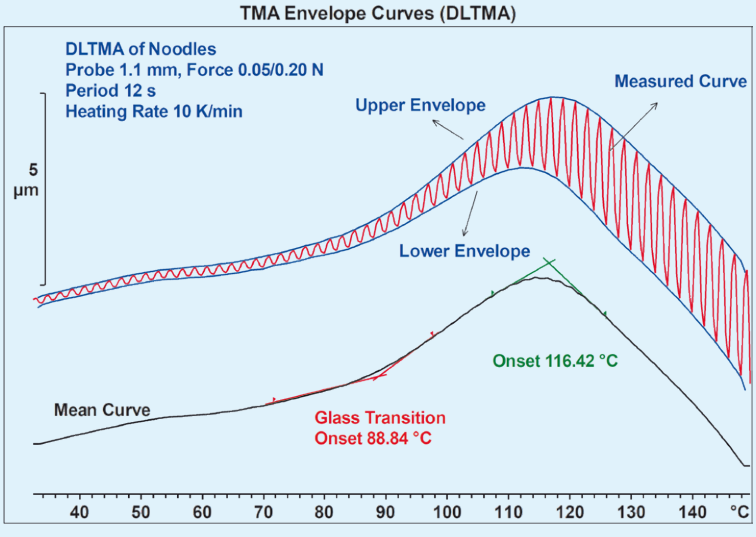
Application Examples



Derivative of TGA curve

The example shows the thermo gravimetric analysis (TGA) of hydrocortisone, an active pharmaceutical ingredient. The TGA curve shows the decomposition in several steps. Decomposition steps sometimes overlap, therefore the exact determination of the evaluation limits of each step is difficult to define using the original curve. In such a case the calculation of the 1st derivative (DTG curve) is very helpful. The peak of the DTG curve clearly shows the transition between the two steps. This allows an unambiguous evaluation of the convoluted TGA weight loss steps of decomposition.



Envelope curve of DLTMA curve

TMA is often used to determine low intensity glass transitions (T_g) due to its increased sensitivity regarding dimension changes. Dynamic load TMA (DLTMA) further increases the sensitivity. This example describes how the T_g of an edible noodle is determined with DLTMA. The upper part of the diagram shows the measured DLTMA curve with the addition of the upper and lower envelopes. The mean displacement curve is calculated by averaging the two curves. From the mean curve it is clear that the sample's T_g is 88.8 °C, due to the slight change of slope. The sample also continuously expands up to about 110 °C, then undergoes plastic deformation.

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