APPLICATION**SHEET**

Polymers – DSC 214 *Polyma*

High DSC Heating Rates for Fast Polymer Identification

Claire Strasser

Introduction

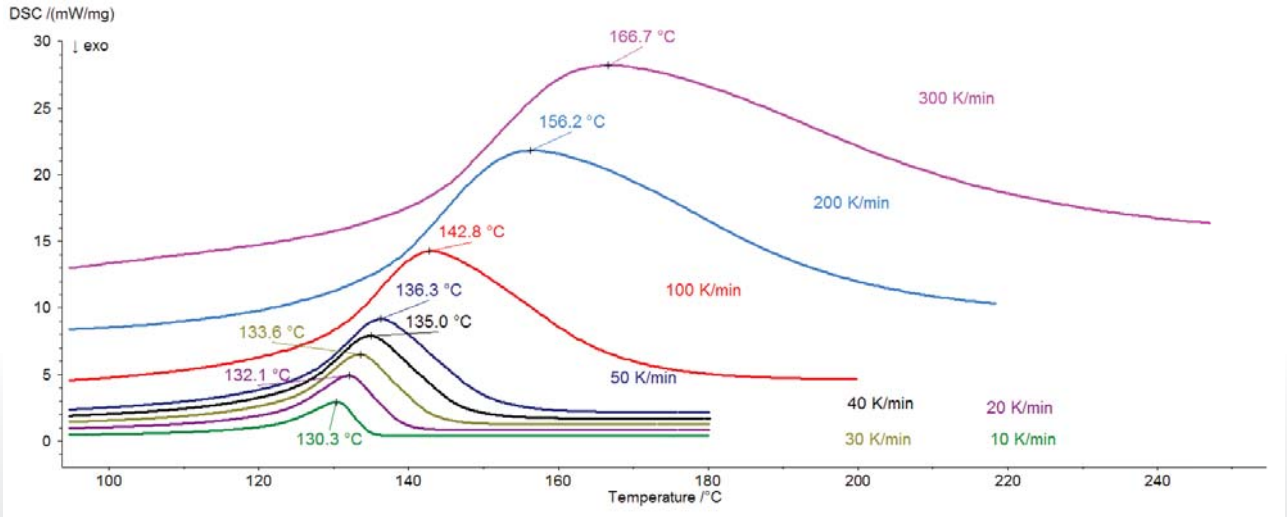
For effective incoming goods inspection at polymer processors' sites, it is often necessary to quickly obtain quality statements about the material delivered. Differential Scanning Calorimetry (DSC) is ideally suited for this task, as identical materials yield identical DSC curves. For quality control, DSC measurements should be carried out under the same conditions (heating rate and sample mass). In this example, the influence of the heating rate on the DSC curve of HDPE was investigated.

Test Results

The DSC 214 *Polyma* was used to measure the 5.21-mg HDPE sample under a variety of heating rates from 10 K/min to 300 K/min. The sample was cooled at 20 K/min between each of the heating segments, so that the same thermal history was achieved at the beginning of each heating step. The results are presented in figure 1.

Conclusion

With increasing heating rates, the melting peaks shift to higher values, i.e., from 130.3°C (10 K/min) to 166.7°C (300 K/min). In addition, the results reveal that higher heating rates can be used to magnify thermal effects: the melting peak is higher and wider if the sample is subjected to a faster heating rate. At 150°C, the measurement at 10 K/min (green curve) is already finished (sample completely molten), while for the measurement at 300 K/min (pink curve), melting has just begun at this temperature. When using high heating rate, the end temperature of the respective segment had to be increased to ensure complete melting of the sample during heating. Knowledge of the correlation between the peak temperature and heating rate allows for fast identification of a polymer by using high heating rates.



1 Influence of the heating rate on the melting peak of HDPE

NGB · Application Sheet 252 · E · 12/13 · Technical specifications are subject to change.

NETZSCH-Gerätebau GmbH
Wittelsbacherstraße 42 · 95100 Selb · Germany
Phone: +49 9287/881-0 · Fax: +49 9287/881505
at@netzsch.com · www.netzsch.com

NETZSCH