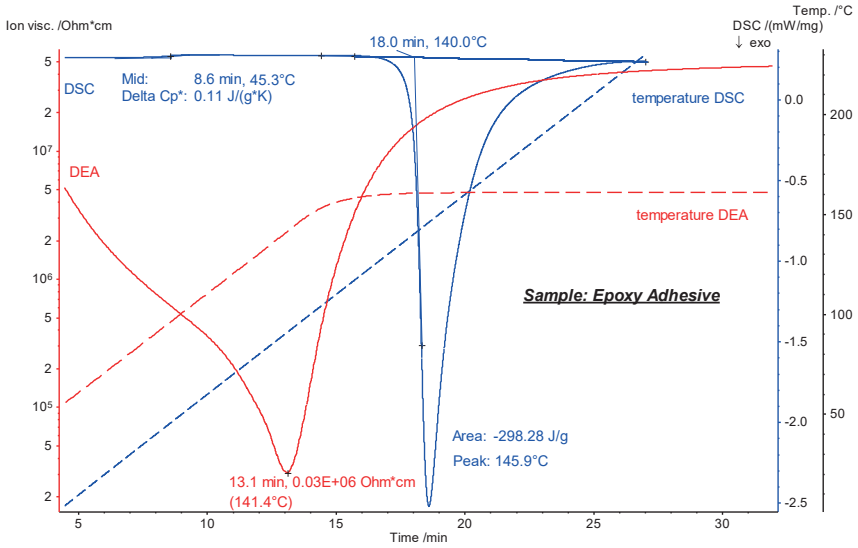
APPLICATION**SHEET**

Polymers · Adhesives
DSC 214 *Polyma* – DMA 242 E *Artemis*

Epoxy Resin

Introduction

Epoxy resins are used in the construction of airplanes, automobiles, bikes, golf clubs, skis, snowboards, and many other applications where high strength bonds are required. Epoxy adhesives are exceptional adhesives for wood, metal, glass, stone, and some plastics. They can be made flexible or rigid, transparent or opaque/colored, fast setting or extremely slow. Epoxy adhesives are almost unmatched in heat and chemical resistance among common adhesives. In general, epoxy resins cured with heat will be more heat- and chemical-resistant than the same formulation cured at room temperature.



Test Conditions	DSC	DEA
Temperature range:	-20 ... 230°C	25 ... 160°C and isothermal
Heating/cooling rates:	10 K/min	10 K/min
Atmosphere to 550°C:	Nitrogen at 20 ml/min	Static air
Sample mass:	14.27 mg	Sample spread on sensor
Crucible/sensor:	Al, pierced lid	IDEX sensor (comb structure and electrode distance of 115 µm)
Frequency	-	1 Hz

Test Results

DSC curve (blue curve): The endothermic step at 45°C (midpoint) is due to the glass transition of the uncured resin. The exothermic effect at 18 min (140°C, onset) corresponds to the beginning of the curing process and provides the curing peak at 146°C with an enthalpy of 299 J/g.

DEA curve (red curve): During heating, the ion viscosity of the sample decreases due to softening of the material. It increases after 13.1 minutes (141.4°C) indicating the beginning of the curing process.

Curing is not entirely finished at 170°C after 32 min since the ion viscosity still slightly increases. DSC and DEA are ideal tools to study the curing behavior of resins. The results show the excellent correlation of these complementary techniques. In contrast to DSC, the DEA technique can show the flow behavior (low ion viscosity level) before curing and can be used in-process (in the production line), not only in the laboratory.

NGB · Application Sheet 131 · E · 0821 · Technical specifications are subject to change.

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