

# APPLICATION SHEET

Polymers – Automotive

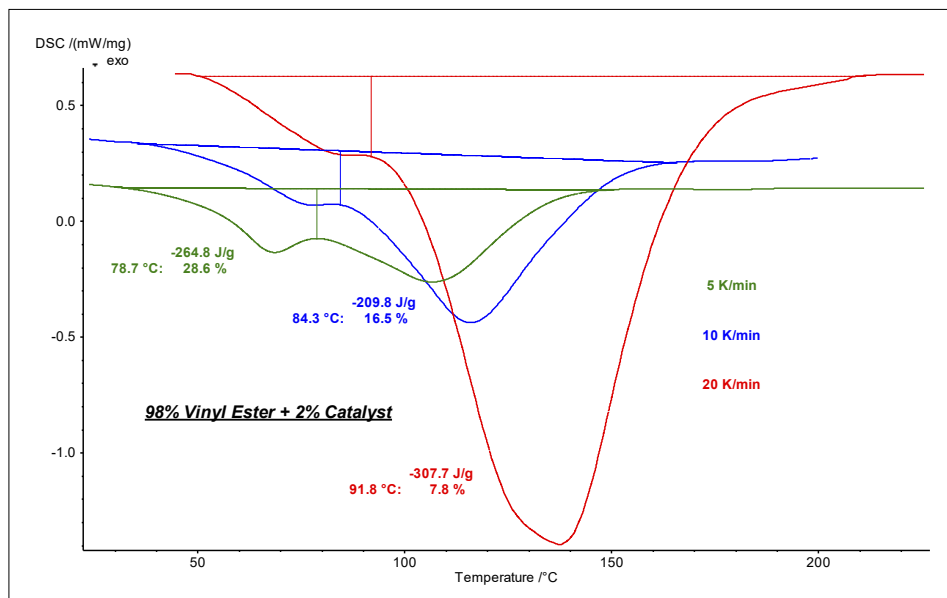
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## Vinyl Ester Resin

### Introduction

Vinyl ester resins have properties intermediate between those of epoxy resins and unsaturated polyester resins.

Like epoxy resins, they feature good thermal and mechanical properties; when cured and compared with unsaturated polyester resins, they have a very good chemical resistance. They are mainly used in transport products.



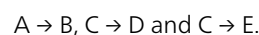
### Test Conditions

Temperature range: -20 ... 250°C  
Heating/cooling rates: 5, 10, 20 K/min  
Atmosphere: Nitrogen (20 ml/min)  
Sample mass: approx. 10 mg  
Crucible: Al, pierced lid  
Sample preparation: Mixing of resin and catalyst (98:2)

### Test Results

In the three measurements, an exothermic two-step peak was detected between room temperature and 200°C. It is due to curing of the sample. The temperatures of these peaks were shifted to higher temperatures with

increasing heating rates. The contribution of the first peak also depends on the heating rate. On the basis of these three measurements, a kinetic model was calculated with the Thermokinetics software. A model with two independent reactions was used with one of these reactions made up of two competitive reactions:

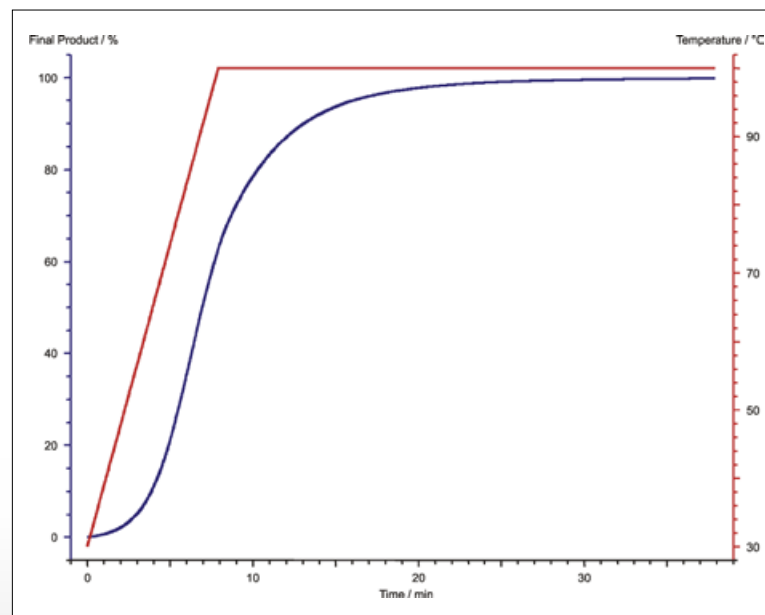
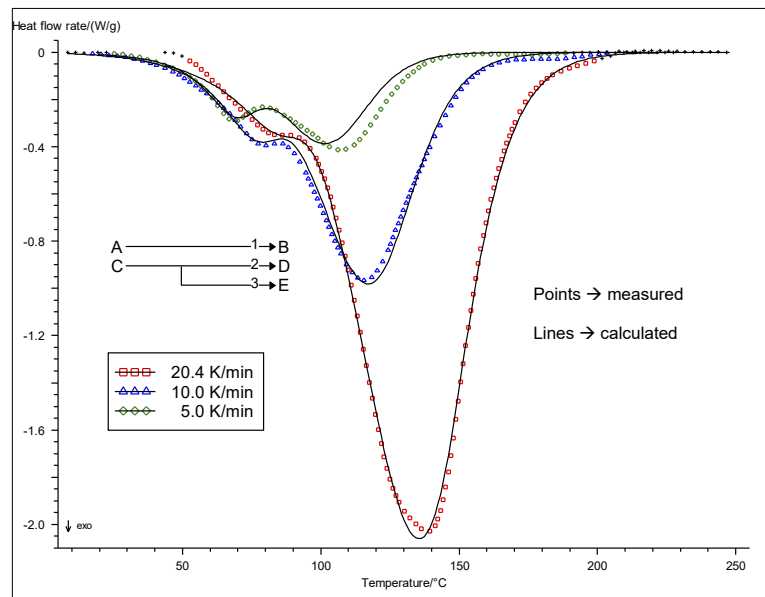


The model fits with the measurements with a correlation coefficient of 0.998 (figure 2). Figure 3 shows a simulation of the final product development on the basis of a kinetic model. It can be seen that curing can be achieved after complete heating to 100°C and keeping the temperature constant for approx. 20 minutes.

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NGB · Application Sheet 140 · E · 0720 · Technical specifications are subject to change.