

APPLICATION SHEET

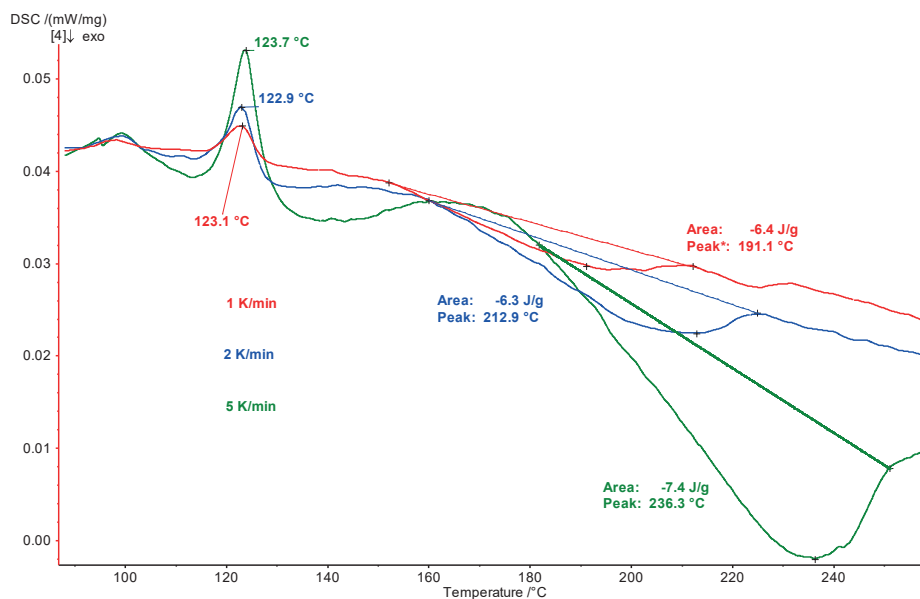
Polymers · Powder Coatings
214 Polyma

Powder Coating

Introduction

Powder coatings are dry types of coating which are applied as a free-flowing, dry powder. The main difference between a conventional liquid paint and a powder coating is that the powder coating does not require a solvent to keep the binder and filler parts in a liquid suspension form. The coating is typically applied electrostatically and is then cured under heat to allow it flow and form a "skin." The powder may be a thermoplastic or thermoset polymer.

It is usually used to create a hard finish that is tougher than conventional paint. Powder coatings are mainly used for coating of metals, such as "white goods", aluminum extrusions, and automotive and motorcycle parts. The most common polymers used are polyester, epoxy or acrylics. During production, the polymer granules are mixed with hardener, pigments and other powder ingredients. The mixture is heated in an extruder, rolled flat, broken into small chips and then milled to make a fine powder.

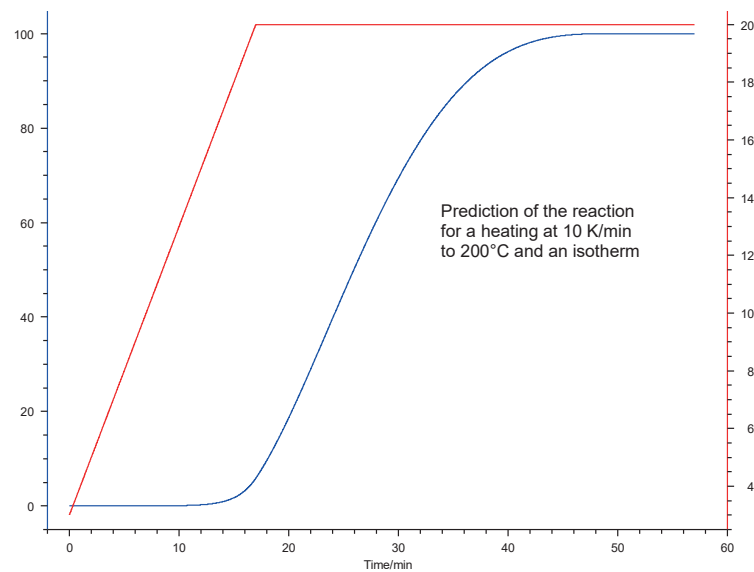
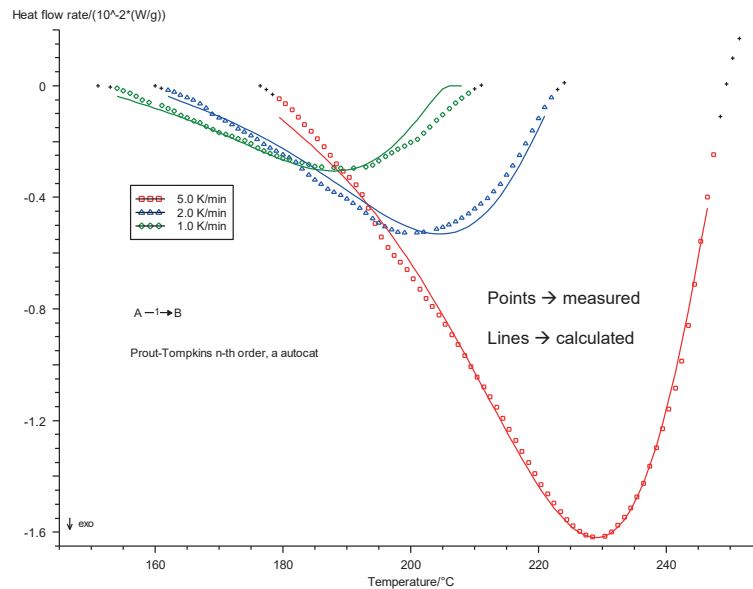


Test Conditions

Temperature range:	25 ... 300°C	Sample mass:	approx. 10 mg
Heating rate:	1, 2 and 5 K/min	Crucible:	High-pressure
Atmosphere:	Nitrogen at 20 ml/min		

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Test Results

In open crucibles, the exothermic peak of curing was overlapped with the endothermic peak due to the release of volatiles during the reaction. That's why the measurements had to be made in high-pressure crucibles. In the three measurements, the exothermic curing peak was detected between 160°C and 250°C. With increasing heating rates, the temperatures of the peak were shifted to higher temperatures. On the basis of these three measurements, a

kinetic model was calculated with the *Thermokinetics* software. A model with a one step-reaction $A \rightarrow B$ was used. The model fits with the measurements with a correlation coefficient of 0.998.

It is possible to predict the course of the reaction for a given temperature program. For example, for heating from room temperature to 200°C at 10 K/min, followed by an isothermal segment at 200°C, the powder coating is completely cured after 47 minutes.