

## THERMAL SOLUTIONS

### Long Term Stability Testing of Printing Inks by Differential Scanning Calorimetry

#### PROBLEM

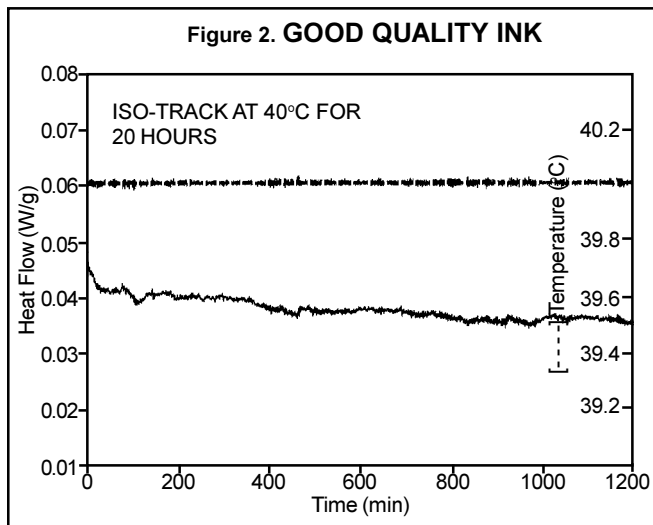
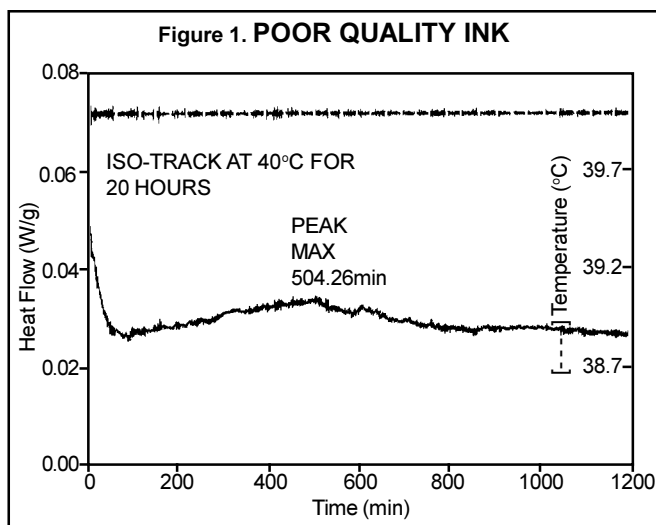
A printing ink used in point of sale applications (e.g. printing magazines) was providing a poor quality finish. The cause of this end-use performance deficiency was believed to be aging (degradation) occurring in the ink during storage. A similar ink did not show any loss in finish quality after an equivalent storage time. The manufacturer, therefore, was interested in a method for predicting the aging properties of different ink formations.

#### SOLUTION

Aging (degradation) is an exothermic (heat evolved) process normally detectable by differential scanning calorimetry (DSC), a thermal analysis technique which measures heat flow into and out of materials. However, the degradation for these inks is very gradual at typical storage temperatures.

Hence, only very weak, broad thermal events are produced. Detection by DSC, therefore, requires high temperature stability in the DSC so that any exothermic peaks observed are the result of degradation in the material and not the result of baseline drift.

Figure 1 shows the DSC results at 40°C for a poor performing ink. The solid curve represents the heat flow with time and indicates a very broad exotherm beginning at about 50 minutes. The broken curve represents the DSC temperature with time and indicates that the temperature in the TA Instruments DSC with ISO TRACK is constant ( $40^{\circ} \pm 0.05^{\circ}\text{C}$ ). Hence, the exothermic behavior observed is the result of degradation in the ink. This conclusion is supported by the DSC results (Figure 2) for the good performing ink. No exotherm is observed in this latter case even after 20 hours.



For more information or to place an order, contact:

TA Instruments, Inc., 109 Lukens Drive, New Castle, DE 19720, Telephone: (302) 427-4000, Fax: (302) 427-4001

TA Instruments S.A.R.L., Paris, France, Telephone: 33-01-30489460, Fax: 33-01-30489451

TA Instruments N.V./S.A., Gent, Belgium, Telephone: 32-9-220-79-89, Fax: 32-9-220-83-21

TA Instruments GmbH, Alzenau, Germany, Telephone: 49-6023-30044, Fax: 49-6023-30823

TA Instruments, Ltd., Leatherhead, England, Telephone: 44-1-372-360363, Fax: 44-1-372-360135

TA Instruments Japan K.K., Tokyo, Japan, Telephone: 813-5434-2771, Fax: 813-5434-2770

Internet: <http://www.tainst.com>