

APPLICATION NOTE

Online Monitoring of Epoxy Value Using a ClearView® db Photometer

Purpose

To measure epoxy value and starting liquid resin content with our two-channel GUIDED WAVE™ ClearView® db Photometer and fiber optic insertion probes with simple, easy-to-maintain, linear calibrations.

Experimental Approach

The NIR peak at 2208 nm is traditionally used to measure epoxy value. However, this intense peak requires a narrow optical path (2 mm). Also, the basic liquid resin starting material is a spectral interferent, requiring more sophisticated (multivariate) calibration methods.

A full spectrum NIR spectrometer was used to measure the NIR spectra of 13 samples in a 5 mm cuvette at 190 °C.

Results

The resulting spectra are shown in Figure 1 for samples ranging in epoxy value from 0.037 to 0.182. Epoxy value can easily be measured in the NIR range using a peak wavelength at 1694 nm and a reference wavelength at 1620 nm. The measurement of liquid resin content is readily measured at 2050 nm. The resulting calibration for epoxy value is linear, as shown Figure 2, with an average error of 0.004%. Linearity extends to epoxy values of 0.5 in a more recent study. The basic liquid resin content measured at 2050 nm is shown to linearly decrease with increasing epoxy value in Figure 3, as expected.

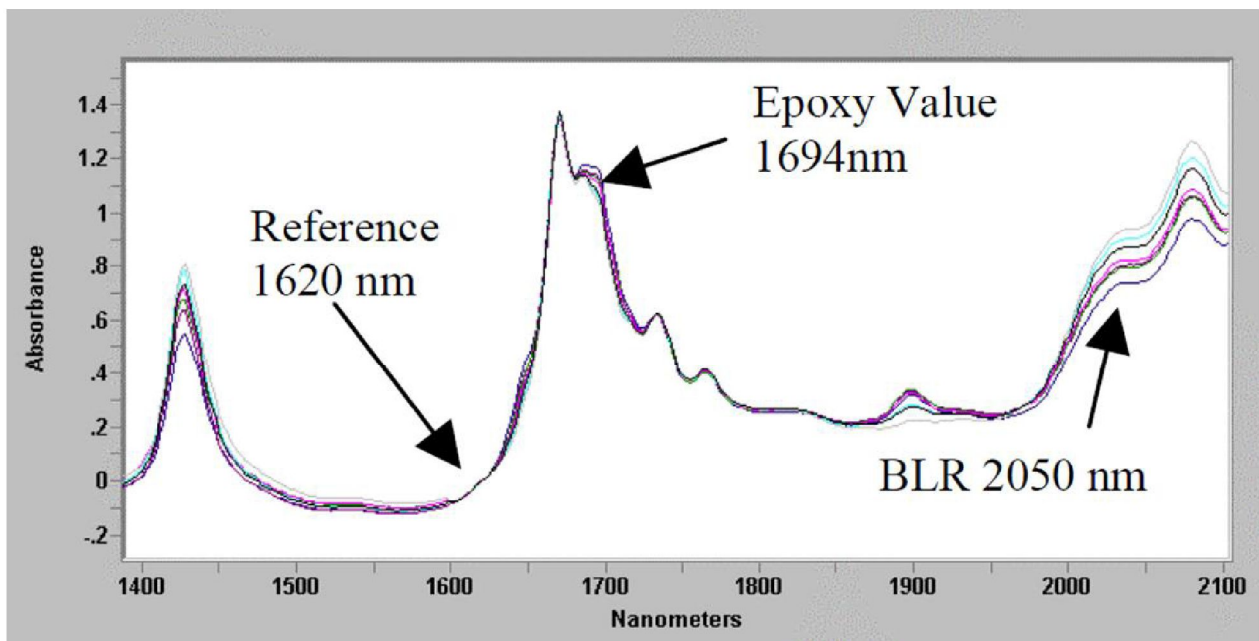


Figure 1

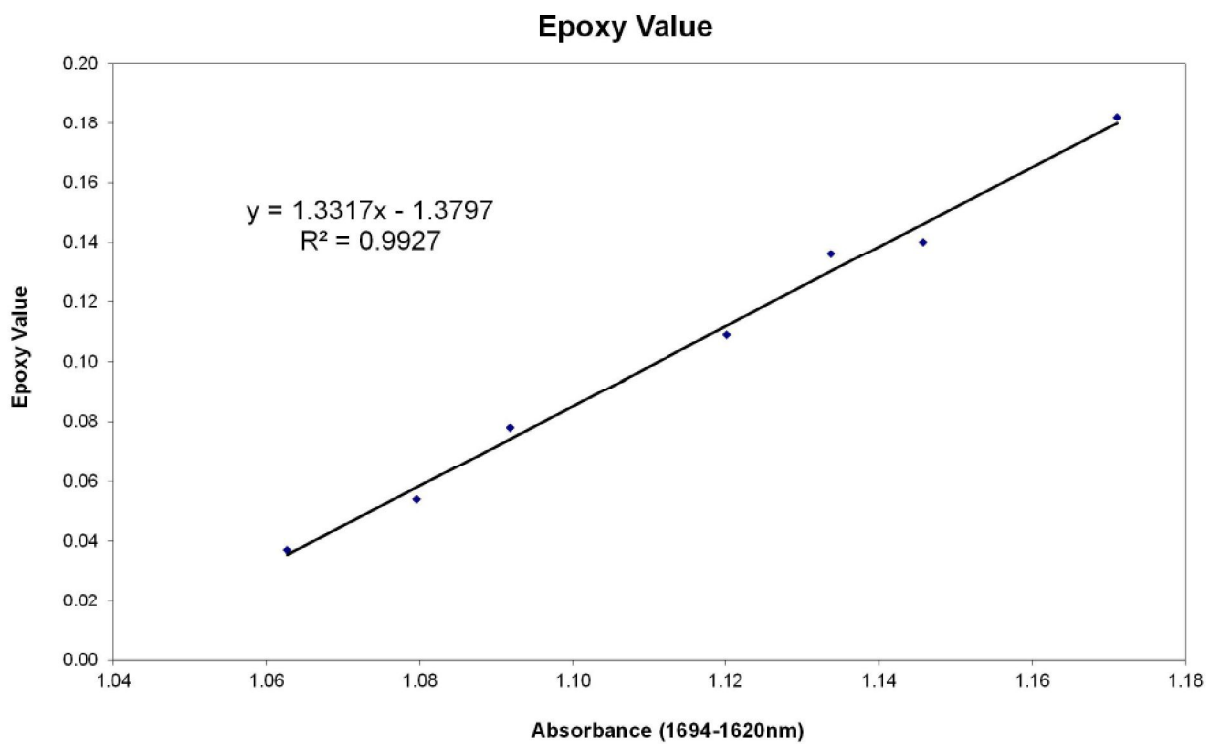


Figure 2

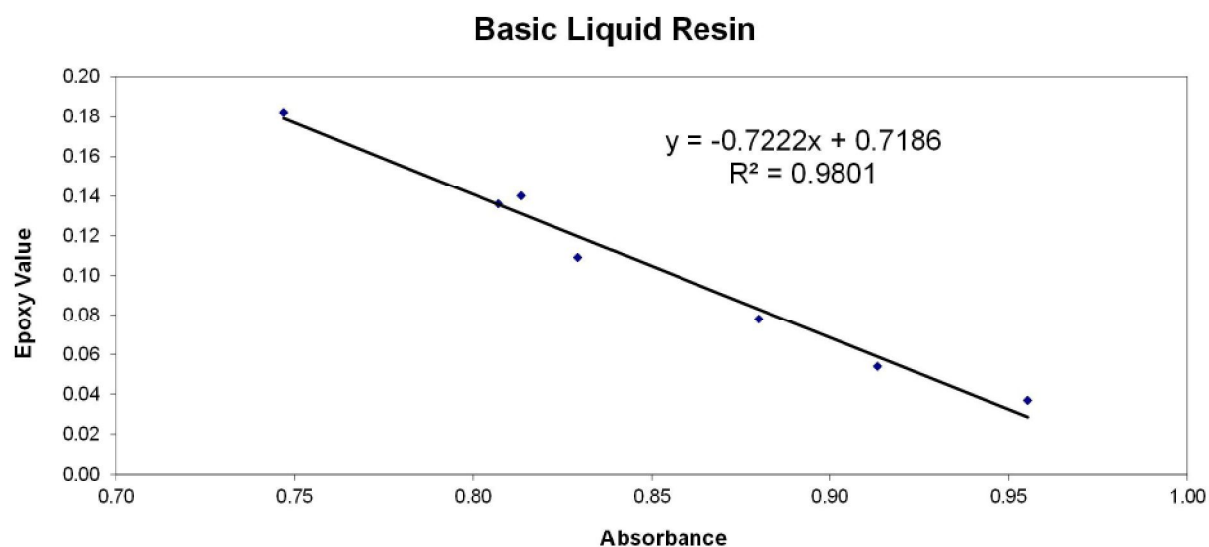


Figure 3

Conclusion

These results suggest that a ClearView db Photometer using three wavelengths and one probe can easily monitor the epoxy reaction.

The ClearView db supports up to two remote probes. This enables a single analyzer to measure two reactors or transfer lines for epoxy value. For more information on this application or the analyzer contact a Process Insights sales or technical representative.

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Process Insights – The Americas

4140 World Houston Parkway Suite 180, Houston, TX 77032, USA +1 713 947 9591

Process Insights – EMEA

ATRICOM, Lyoner Strasse 15, 60528 Frankfurt, Germany +49 69 20436910

Process Insights – APAC

Wujiang Economic and Technology, Development Zone, No. 258 Yi He Road, 215200 Suzhou, Jiangsu Province, China +86 400 086 0106

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