

Application Note — On-Line Monitoring of Epoxy value with a ChemView® Photometer

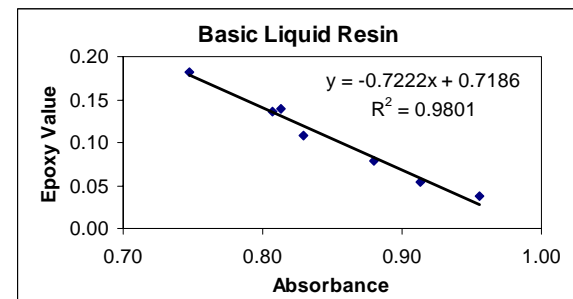
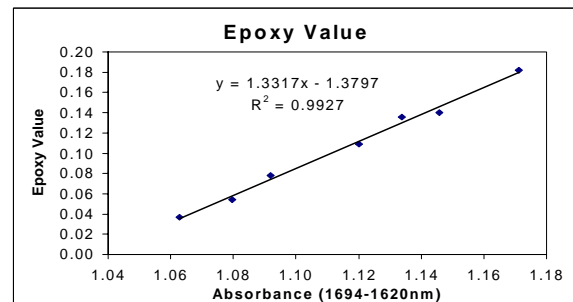
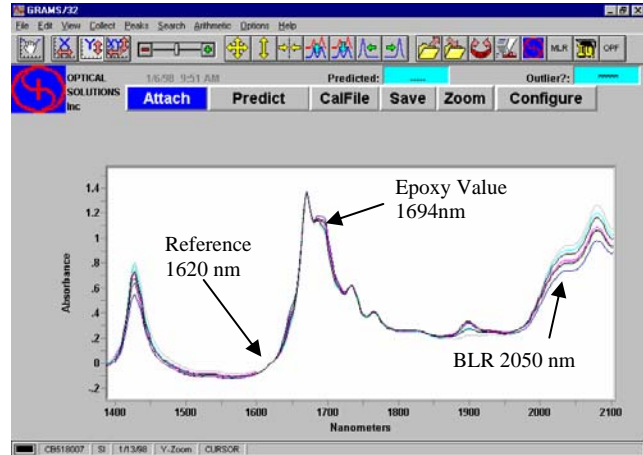
Purpose: To measure epoxy value and starting liquid resin content with the two-probe Simulplex™ ChemView® photometer and fiber optic insertion probes with simple, easy-to-maintain, linear calibrations.

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

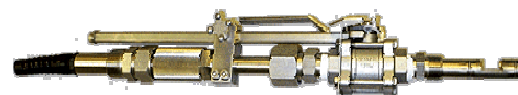
The Optical Solutions' PS-2 diode array spectrometer was used to measure the NIR spectra of 13 samples at 190°C in a 5 mm cuvette in the HeaterCell™ fiber optic accessory.

Results: The resulting spectra are shown top right for samples ranging in epoxy value to about 0.20. Epoxy value is best measured at 1694 nm using a reference at 1620 nm, and the basic liquid resin is readily measured at 2050 nm. The resulting calibration for epoxy value is linear, as shown at middle right, with an average error of 0.004%. Linearity extended to epoxy values of 0.5 in a more recent study. The basic liquid resin content at 2050 nm is shown to linearly decrease with increasing epoxy value, as expected.

Conclusion: These results suggest that a ChemView® photometer with three wavelengths can monitor the epoxy reaction. Since six wavelengths are possible, a Simulplex™ ChemView® can be used to measure two probes simultaneously, each having the above three wavelengths, for the lowest cost-per-point available.



Simulplex™ ChemView®
in Class 1, Div 2
Z-Purged Enclosure
for Two Probes



Fiber optic insertion probe in ball valve