

Application Note —

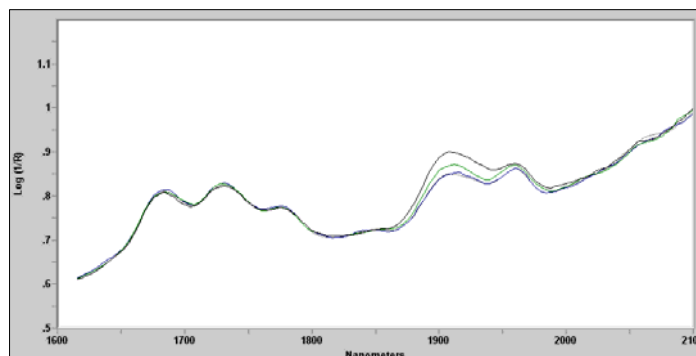
Water in TiO₂-Loaded Polymer with Reflectance NIR in a ChemView® Photometer

Purpose:

To determine water content in a white polymer liquid containing TiO₂ using a near-infrared (NIR) ChemView® photometer and fiber optic reflectance probe.

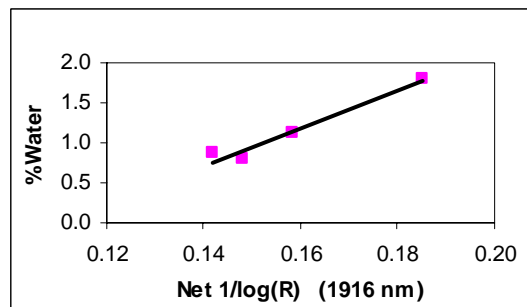
Approach:

Samples were mixed with TiO₂ and water was added by weight. In order to determine the best wavelengths for our ChemView® photometer, a fiber optic reflectance process probe (shown right in a ring stand with the white sample on the tip) was connected to our PS-2E portable diode array spectrophotometer using a 2 m bifurcated fiber bundle with SMA connectors.



Results:

The NIR spectra of several samples are shown top right. They have a baseline, typical of reflectance spectra, that increases at longer wavelengths. C-H activity occurs in the 1650 – 1750 nm region. Variations in water occur near 1900 nm. By taking a reference wavelength on the left and right sides of the water peak, the baseline underneath the water peak can be interpolated in the ChemView® software and the "net" absorbance due to water determined.



A calibration for water is shown middle right. The ChemView® and probe were installed on line. Water data were collected and compared to the laboratory reference method. The resulting comparison is shown at the bottom right over the first several months. The results consistently differ by <0.1% water. A constant offset adjustment was subsequently made to bring the on-line results into agreement with the lab values.

Conclusions:

It is a common belief that a FT-NIR spectrophotometer is required for reflectance measurements. These results demonstrate that ChemView® photometers can be used for stable, sensitive reflectance measurements of water in TiO₂ and other mixed phase systems (e.g. emulsions) with less cost and complexity.

