Guided Wave
INCORPORATED

*Process Analytical Systems*

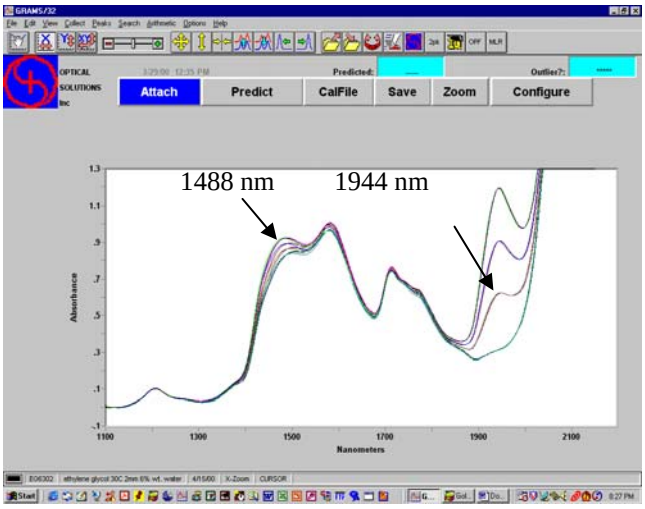
# Application Note —

## On-Line Monitoring of Water in Ethylene Glycol with a ClearView® Photometer

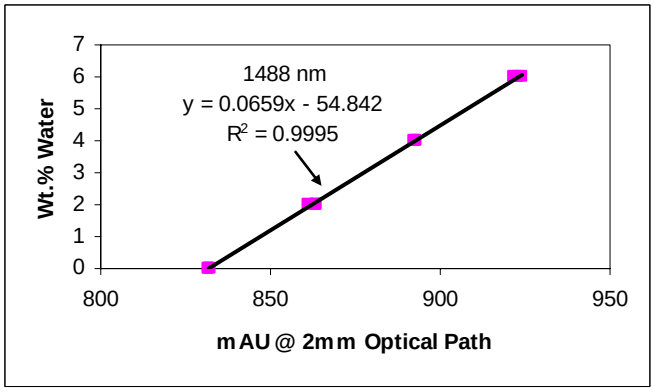
Purpose:
To determine water content in ethylene glycol (EG) without sample temperature control.

Experimental:
Our PS-2E NIR diode array spectrometer was used to measure the NIR spectra of 0 to 6% water in EG in the 25 to 35 °C temperature range using a 2 mm cuvette in our HeaterCell™ fiber optic accessory. The resulting data were then used to define the wavelengths for our on-line process photometers.

Results:
The resulting PS-2E spectra are shown below for 0, 2, 4 and 6% water in EG, each at 25, 30 and 35 °C.




ClearView®
in Class 1, Div 1
Enclosure




Excellent linearity is achieved (shown above for 1488 nm) in the range tested showing data at all temperatures. The long-term photometric drift of ClearView® is 2 mAU (0.002 Absorbance Units), which is equivalent to ±0.1 % water at 1488 nm. This wavelength was chosen because temperature in the range specified had a negligible effect upon the spectral absorbance at each water concentration.

It is good practice to maintain absorbances below about 1.2 AU. The high background absorbance from EG due to its OH content restricts the optical path length of the fiber optic probe to < 3mm. Practical experience warns against using narrow optical paths to avoid entraining particles, or especially bubbles, and for ease of cleaning. 2 mm is as small as we are comfortable recommending for process analysis. ClearView® was designed for the VIS-NIR range up to 1650 nm. Therefore, it is suitable for the 1488 nm measurement. If extra precision is required, our top-of-the-line ChemView® photometer is the proper choice for use at the more sensitive wavelength at 1944 nm (±0.01 %). Furthermore, if only the ppm range is of interest, we can provide a longer (e.g. 5 mm) probe at 1944 nm with our ChemView® having precision of about ±50 ppm in the 0 to 3000 ppm range.

Conclusions:
Our low cost ClearView® photometer can achieve ±0.1 water in the 0 to 5% range using a 2 mm optical path in an insertion probe or a flow probe (for a slip stream) on-line, providing two scalable 4-20 mA analog outputs and 2 configurable high/low switch closure alarms, along with our standard low light (fiber breakage, window fouling) and lamp replacement hardware alarms.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