

Application Note — On-Line Monitoring of Water in Acetic Acid with a ClearView™ Photometer

Purpose: To determine water content in acetic acid with sample temperature correction.

Approach: The PS -2 NIR diode array spectrometer was used to measure the near-infrared spectra of 0-15% water in acetic acid at various temperatures in a 5 mm cuvette in the HeaterCell™ fiber optic accessory.

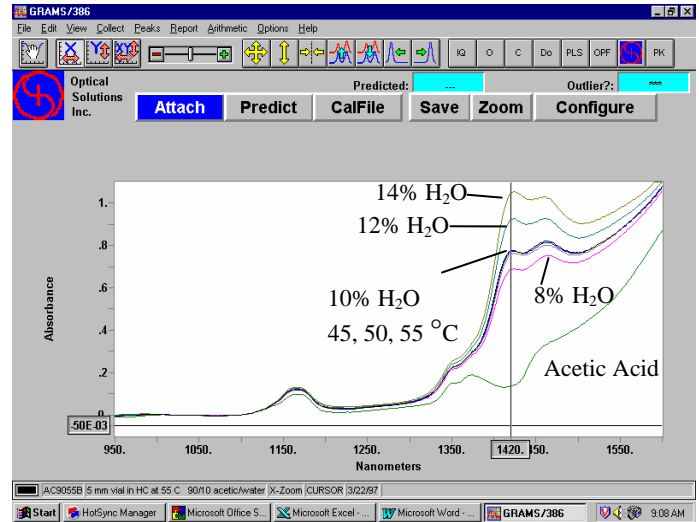
Results: The resulting spectra are shown at the top right. Minimum temperature sensitivity is found at 1420 nm. (vertical line).

Excellent linearity is achieved (shown middle right) in the range tested, up to 15% water. The photometric drift (~2-4 weeks) of ClearView™ is 1 mAU (0.001 Absorbance Units), which is equivalent to 0.015% water. Even at four times this value, ClearView™ should be able to measure water in acetic acid to better than 0.1% under isothermal conditions.

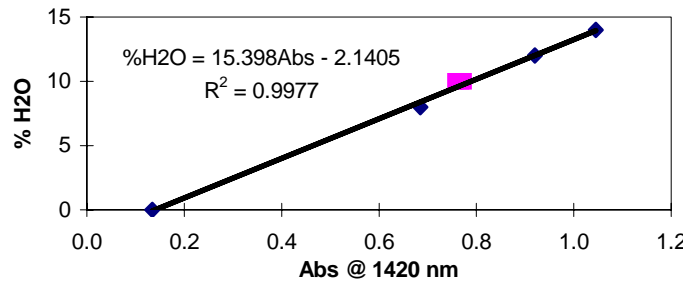
The absorbance of water is known to change as a function of temperature, and this will change the reported water content. This relationship is shown in the graph at bottom right. Changing the temperature by 5 °C from the target temperature of 50 °C changes the absorbance by about 0.010, or 10 mAU. From the above calibration, this means a change in the reported water value by 0.15%, or about 0.03%/°C.

By measuring the sample temperature with an RTD element, bringing the signal back into ClearView™ (through an intrinsic safety barrier for hazardous environments), and including a temperature coefficient in the EDIT COEFFICIENTS screen of the microprocessor-based ClearView™ a precision of 0.05-0.1% water in acetic acid can be achieved.

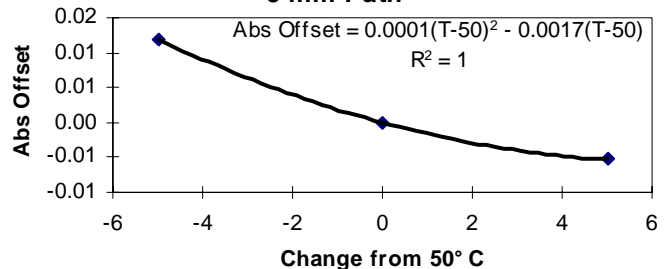
Conclusions: A microprocessor ClearView™ photometer with sample temperature correction can achieve < 0.1% precision for the measurement of water in acetic acid on-line and long-term.



**Water in Acetic Acid
5 mm Path; 50 °C**



**10% Water in Acetic Acid
5 mm Path**



**ClearView™
Class 1, Div 1**