Increasing sample throughput using the Cary 6000i

Data Sheet

Introduction

The Cary 6000i UV-Vis-NIR spectrophotometer offers the sensitivity of an InGaAs detector in the NIR range (800 nm–1800 nm) that is by far superior to any commercially available instrument measuring over a similar range.

The main features include:

- Larger photodynamic linear range (capable of measuring absorbances up to 8 in the NIR)
- Superior signal-to-noise (S/N) achieved with significantly less averaging, resulting in greater sample throughput
- Superior spectral resolution

Sample throughput can be increased significantly with the Cary 6000i

The InGaAs detector provides sensitivity of the order of 100 times better than that of commercially available PbS detector instruments. This means that spectra can be acquired in a fraction of the time due to the significantly less signal averaging required.

Agilent Technologies

Figure 1 below demonstrates this point by comparing the spectrum of water vapor collected on a Cary 5000 (a PbS detector in the NIR) and the Cary 6000i. It should be noted here that the Cary 5000 UV-Vis-NIR spectrophotometer is considered the "best-in-class" commercially available PbS NIR instrument available today.

Results/Data

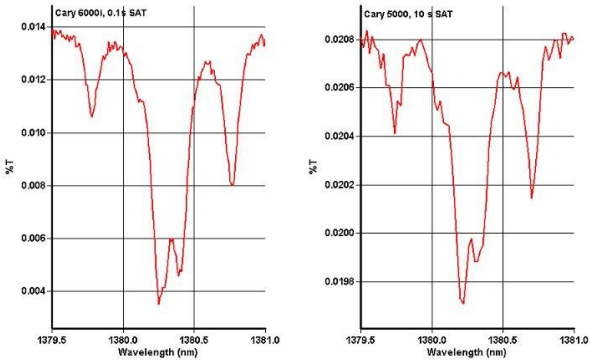

Figure 1. Water vapor spectrum collected on the Cary 6000i InGaAs and the Cary 5000 PbS spectrophotometers

A Signal Averaging Time (SAT) of 10 seconds was used on the Cary 5000 compared to 0.1 seconds on the Cary 6000i. Also, a SBW of 0.05 nm was used on the Cary 5000 compared to 0.02 nm on the Cary 6000i. The S/N achieved is significantly better on the 6000i, which uses 100 times less the averaging with 2.5 times reduced SBW. To put this in perspective, a typical spectrum requiring 5 seconds averaging/data point, collected every 1 nm over the range NIR of 800–1800 nm, i.e. 1000 data points, can take approximately 160 minutes to collect (includes a baseline collection) on the Cary 5000 instrument compared to taking 1.5 minutes on the Cary 6000i (based on a 0.05 s SAT). Furthermore, as the sensitivity of the Cary 5000 is better than that of other commercially available instruments, the time to collect data over this wavelength range on other spectrophotometers can be significantly greater.

Discussion

The Cary WinUV Scan Application also provides a unique feature to further decrease measurement time while maintaining the required Signal:Noise and Spectral Resolution. Known as "Signal to Noise Mode", it is best used for samples that vary dramatically in signal intensity across the wavelength range. Where other instruments require using the longest averaging time for the entire scan, the unique Signal to Noise feature in the Cary WinUV Scan software allows you to obtain a spectrum with the desired S/N across the wavelength range in much shorter time. This is because the instrument will only average for longer periods at the "high absorbing/low %R or %T" wavelengths and will use much less averaging at "lower absorbing/high %R or %T" wavelengths.

Figure 2 below shows the ease at which it is to set up such a collection. By entering the acceptable S/N and a timeout period, the instrument will average at each wavelength until the S/N is met OR the timeout period has lapsed, before moving onto the next wavelength. This can literally reduce the scan time by a further 50 %.

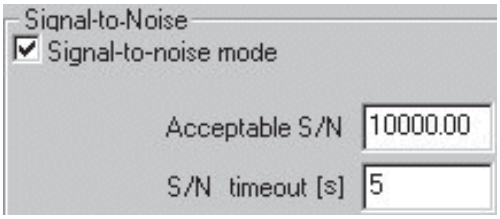

Figure 2. Signal to Noise mode on the Cary WinUV Scan application

Conclusion

The benefits of having (a) Increased Sensitivity and (b) Signal to Noise mode, can result in enormous savings in time, as well as measurement costs per sample, if multiple samples are to be run on a daily, or even weekly, basis.

This page is intentionally left blank.

www.agilent.com/chem

Published March, 2011
Publication Number 5990-7831EN

Agilent Technologies