Superior linear range (>3.5 Abs) of the Agilent Cary 60 UV-Vis

Technical Overview

Introduction

The photometric accuracy and linearity of a spectrophotometer defines its ability to measure an absorbance that can be directly related to a compound of known absorptivity or concentration. Of similar importance is the dynamic range over which the spectrophotometer remains linear. A wide linear dynamic range permits the analysis of highly turbid solutions and a wide range of sample concentrations (optical densities), as well as reducing sample preparation (dilution) requirements. This data sheet uses a Certified Neutral Density glass filter set to demonstrate the excellent linear range of the Agilent Cary 60 UV-Vis spectrophotometer.

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Materials

- Cary 60 UV-Vis spectrophotometer
- Certified Neutral Density filter set

Method

1. Set up the instrument as follows:
   - Wavelength range: 700–400 nm
   - Scan rate: 60 nm/min with a data interval of 1.0 nm, signal averaging time 1.0 s
   - Zero/Baseline correction: On
   - All other parameters: Default
2. Perform a Zero/Baseline correction on the blank Certified Neutral Density filter, and block the detector for the 0% measurement.
3. Scan each filter in the Certified Neutral Density filter set.
4. Construct a calibration curve by plotting the observed Absorbance against the expected Absorbance for each filter.

Results

The data collected on the Cary 60 are shown in Figures 1 and 2.

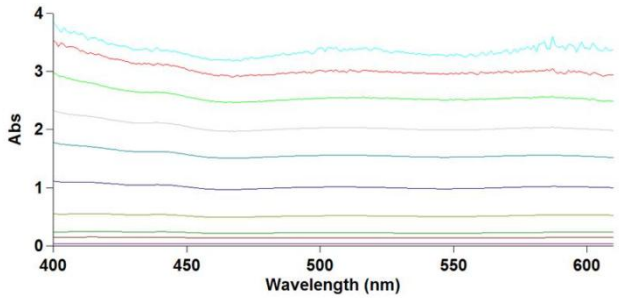

Figure 1. Wavelength scan of certified neutral density filters in the Cary 60 UV-Vis spectrophotometer, showing the excellent photometric linearity and range of the instrument

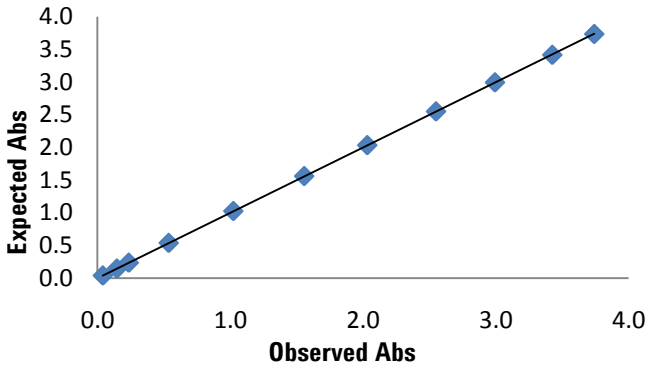

Figure 2. Calibration curve demonstrating the high level of accuracy and the photometric range of the Cary 60 UV-Vis spectrophotometer. Measuring the absorbance at 590 nm, using certified standards the data presented here show that the photometric range extends above 3.5 absorbance units, with a correlation co-efficient of 0.9996

Summary

The Cary 60 UV-Vis spectrophotometer demonstrates the highest level of accuracy and excellent photometric linearity extending above 3.5 absorbance units. This provides an enhanced ability to perform measurements with accessories, such as micro- volume cells and fiber optic probes, which traditionally reduce the optical throughput of the instrument. Also, given that optical performance like this is usually found in much higher priced research instruments, the Cary 60 is a cost effective the solution ideally suited for both routine analysis and research.

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Published May 1, 2011
Publication Number 5990-7948EN

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