TPS Temperature Profile Spectrophotometer

The novel temperature gradient optical cell creates a stable temperature gradient across the liquid sample. The sample's absorbance spectrum is interrogated as a function of position. Because the position is directly related to the temperature of the sample, temperature dependent spectra are obtained.

Rapid data collection

Temperature dependent spectra are obtained 25-100 times faster than with conventional instrumentation. The flow-through design of the cell further contributes to high throughput.

Wide-Ranging Applications

Spectral, thermal and thermodynamic properties of biomacromolecules and biomolecular interactions, including protein denaturation, nucleic acid strand separation, and biomolecule-drug interactions. Further applications in thermally induced small molecule ligand exchange and ionization reactions.

Unique Experiments

Control of the temperature gradient provides means for stepping, scanning, and zooming along the temperature axis.

Thermally Unstable Systems

Many molecules degrade or precipitate during the long exposures to high temperature characteristic of conventional "melting" experiments. The speed of TPS reduces the exposure time making previously impossible experiments a reality.

High Temperature Resolution Studies

Interrogation of the sample over a small temperature gradient provides means to obtain spectra at very high temperature resolution.

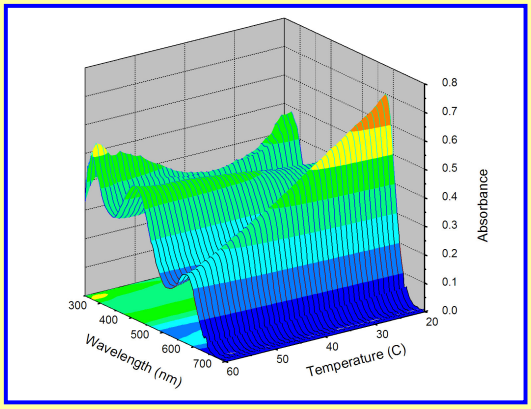
Self-Contained Instrument

The TPS instrument contains the temperature gradient cell, light source and spectrophotometer in a single enclosure. An external PC controls the instrument and provides a user interface.

Adds Versatility to Existing Instruments

The TPS can be configured for any light source and spectrophotometer to which fiber optic connections can be made. An external PC controls the TPS and provides a user interface. Alternatively, the TPS control and user interface can be implemented via the interfaced instrument's macro programming capabilities.

Collection of 3-D Absorbance Spectra using TPS



To demonstrate the primary function of the device, we use a simple pH indicator system (5.0×10^{-5}M Thymol Blue, in 50 mM Tris Acetate, pH 9.0 at 25 C) to visualize the temperature gradient. The UV/Vis spectrum of the solution changes with temperature due to the temperature dependence of the ionization constant of the tris buffer. As the temperature is increased, the pH of the solution is lowered and the distribution of ionization states of the thymol blue dye changes resulting in a spectral change as a function of temperature. A gradient between 20 C and 60 C was formed and equilibrated for 1 minute. Spectral data were collected simultaneously from 192 to 862 nm at 0.33 nm resolution with 1 sec averaging time. Spectra were collected at positions corresponding to 0.5 C temperature intervals. Thus, in less than 4 minutes, 81 complete spectra containing a total of (81 x 2048) =165888 data points were collected.

Specifications

Dimensions: 8.25” w x 20.5” h x 20.5” d
Temperature Range: -2 to 102 C
Temperature Gradient Range: 5C - 50C
Time for Temperature Gradient Formation: 95% in 30 s
Detector Range: 200 - 800 nm
Computer Interface: USB 2.0

IBET, Inc.
1507 Chambers Road
Suite 301
Columbus, OH 43212
614-487-1379