Biochemical Analysis
The Lambda Series

Bioreresearch laboratories routinely use UV/Visible spectroscopy for the analysis of proteins, enzymes, nucleic acids and oligonucleotides. Whether a quick check of optical density, DNA-purity, enzyme analysis, or a quantitative determination of a protein or DNA, the Lambda series of UV/Vis spectrometers can quickly and easily perform your analysis.

These reliable workhorse systems are controled by our powerful but easy-to-use UV WinLab™ Software. Proven in thousands of installations around the world, UV WinLab can scan a spectrum, collect wavelength programed data, work in concentration mode or collect time-drive data. It has a sophisticated report generator that takes advantage of stored report templates. The system can be operated from user created methods or from the bio specific methods supplied.

A large number of ready-to-run methods for routine biochemical analysis are included with our UV BioLab™ collection. With a single mouse-click the method is activated and the instrument is ready to measure your samples. Simply call-up the method and start it.

The UV BioLab collection of pre-programmed methods is available at no extra charge for all Lambda systems, and include five key method groups:
• Nucleic acid analysis
• Protein analysis
• Kinetic analysis
• General quantitative analysis
• General UV/Vis spectroscopic analysis

An applications manual describing background and chemistry, together with detailed sample preparation procedures, is available.

Key Features
- Quality systems for dependable results
- Software and accessories optimized for biochemical analysis
- Microcells for small volume samples
- Cell transports to meet your needs and your budget
- Bio-specific method collection
Faster DNA Quantitation with the Lambda series

Nucleic Acid methods include OD260 measurement, DNA purity (ratio A260/A280) determination (see Figure 1), and the concentration measurement of primers, probes, oligomers or RNA. In addition, our UV WinLab software includes a special oligocalculator routine. It allows precise measurements of the concentration of oligonucleotides based on the absorbance reading and base composition or sequence.

Figure 2 represents the oligocalculator results for concentration and Tm of the 25mer oligonucleotide (GATGAGTTGCTGGTACAACTGG) together with its molecular mass and molar extinction coefficient. Concentration and Tm are calculated using the base sequence. When the oligocalculator is connected to the spectrometer, oligo concentration is determined directly from the absorbance reading using the calculated molar extinction coefficient.

Maximum Performance for Micro-Volume Samples

Molecular Biologists performing spectrophotometric analysis of small sample volumes will appreciate the microcuvettes designed specifically for the Lambda Series (see Figure 3). Quartz microcuvettes are available to accommodate sample volumes of less than 2 µL. These cuvettes fit easily in the standard cuvette holder. No special cell holder is required.

Quick and Easy Protein Analysis

Protein analysis and most common colorimetric protein assays can be done quickly and easily with the pre-programmed methods included with our UV BioLab collection. Simply prepare the standard solutions and samples according to protocol, and activate the respective method. The measurements will automatically be taken with one simple click of the mouse.

Figure 2. Oligocalculator results for the concentration and Tm of a 25mer oligonucleotide together with its Molecular Mass and Molar Extinction Coefficient.
The following protein methods are included with the UV BioLab collection. If sample automation is desired, a sipper system may be added. In addition to the provided method, developers may choose to create their own methods with UV WinLab software.

- $\text{OD}_{280}$ for direct protein determination
- Lowry protein method for high and low concentration range
- Dye binding protein assay according to Bradford (see Figure 4, Coomassie blue)
- Biuret method for protein Quantification
- BCA assay

### Automated Kinetic Experiments

With UV WinLab’s integrated UV KinLab™ module and pre-programmed methods, it is easy to monitor enzyme reactions in order to determine enzyme activity.

Absorbance versus time is displayed on-line, and enzyme activity calculated from the resulting slope of the reaction curve. This can be done automatically with a defined time interval, or calculated post-run with experiment specific timing (see Figure 5).

Automation of kinetic measurements in UV/Vis spectrometry is usually achieved by use of manual or automated cell changers. Enzyme tests are often time-consuming with a typical test lasting between 3 and 15 minutes. Automated thermostatted Cell Changers can help reduce the measurement time for multiple samples.

### Cell Changer Systems for Any Application

Our 8+1 and 9+1 Cell Changer systems significantly increase sample throughput and are optimized for time-dependent UV/Vis spectroscopic measurements like enzyme kinetics, they may however be used for all basic methods:

- Timedrive and Kinetics for single wavelength measurement.
- Wavelength program for measurement at up to 8 different wavelengths including result calculation.

#### Figure 3.
Microcuvettes for the Lambda 25, 35 and 45.

#### Figure 4.
Quadratic calibration curve for Coomassie blue dye binding protein assays (Bradford).
- Scan for complete absorbance / wavelength spectra.
- Concentration measurement with multi-standard calibration and flexible calibration curve fit.

Obtaining kinetic results is an easy process with the Lambda systems. Pre-thermostatted buffer is pipetted into the cells. The cells are then inserted into the sample holders, and the reaction started by simply adding your sample to the buffer. UV WinLab’s special kinetics module, UV KinLab, controls the entire analysis. Once the mixing period is finished, UV KinLab will record the absorbance in all cells for the defined time interval along with the reaction curves. Upon termination of the run, the slope and enzyme activity is calculated.

**The 8+1 Cell Changer System**

This system includes a water thermostatted linear 8-cell holder that allows up to eight samples to be measured simultaneously thus increasing sample throughput. The Lambda series double beam optical system and the single-cell reference holder automatically compensates for sample background effects. Since enzyme reactions are temperature sensitive, temperature control is crucial. All cell holders are water thermostatable and require a water circulator. PerkinElmer offers a temperature-controlled water circulation bath (20°C to 65°C), or one can be provided by the user. Other cell configurations like 8+8 or long path-length cell holders are also available.

**The 9+1 Cell Changer System**

This fully automated system is ideal for routine analyses. Both the 9-cell holder and the single-cell holder use Peltier-controlled thermostating and no water circulator is required. Samples are rapidly measured in parallel, and the Lambda series double beam optical system along with the thermostatted reference cell compensate for any background effects. The peltier system is controlled from the software and operates at a fixed temperature in the range of 20°C to 45°C. An optional sample temperature probe is available.

Typically, 10 mm glass- or quartz cells are used although the system will also accept semi-micro and plastic cells. The 9+1 system design will also allow the use of micro-cells (black side walls, volume 700 µL).
**Recommended Systems**

All systems may be configured alternatively with Lambda 35 (P/N L600000C), featuring variable slits or Lambda 45 (P/N L600000D) featuring variable slits and pre-monomochromator. The Lambda Series of UV/Vis spectrometers are PC-controlled systems operating with UV WinLab software. Therefore, a PC and printer are required.

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**Table I.** Alternative cells for DNA analyses.

<table>
<thead>
<tr>
<th>Cell Type</th>
<th>Part Number</th>
<th>Pathlength</th>
<th>Minimum Volume</th>
<th>Nominal Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semi-micro</td>
<td>B0631064</td>
<td>10 mm</td>
<td>400 µL</td>
<td>1400 µL</td>
</tr>
<tr>
<td>Micro</td>
<td>B0631077</td>
<td>10 mm</td>
<td>200 µL</td>
<td>400 µL</td>
</tr>
<tr>
<td>Ultra-micro</td>
<td>B0631079</td>
<td>10 mm</td>
<td>50 µL</td>
<td>30 µL</td>
</tr>
<tr>
<td>Ultra-micro</td>
<td>B0631081</td>
<td>10 mm</td>
<td>10 µL</td>
<td>5 µL</td>
</tr>
<tr>
<td>Ultra-micro</td>
<td>B0631083</td>
<td>1 mm</td>
<td>10 µL</td>
<td>5 µL</td>
</tr>
<tr>
<td>Ultra-micro</td>
<td>B0631080</td>
<td>5 mm</td>
<td>5 µL</td>
<td>2.5 µL</td>
</tr>
<tr>
<td>Ultra-micro</td>
<td>B0631082</td>
<td>0.1 mm</td>
<td>2 µL</td>
<td>0.5 µL</td>
</tr>
</tbody>
</table>

1. The micro cells and ultra-micro cells must be “over-filled”, so that the meniscus of the liquid is not in the sample beam. Therefore the minimum volume is larger than the “nominal volume”. This problem does not apply to “normal” cells.
<table>
<thead>
<tr>
<th>Spectrometer</th>
<th>Routine Enzyme Activity Determination</th>
<th>Enzyme Activity Determination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lambda 25 UV/Vis spectrometer (P/N L600000B).</td>
<td>Lambda 25 UV/Vis spectrometer (P/N L600000B).</td>
<td></td>
</tr>
<tr>
<td>Fixed 1 nm bandwidth, wavelength range 190 nm - 1100 nm. (Includes software)</td>
<td>Fixed 1 nm bandwidth, wavelength range 190 nm - 1100 nm. (Includes software)</td>
<td></td>
</tr>
<tr>
<td>Cell Changer</td>
<td>Automatic Linear 8+1 Cell Changer (P/N N1010567).</td>
<td>Accessory PCB (P/N L6000500), for 9 position peltier system.</td>
</tr>
<tr>
<td>Water thermostatable automatic linear cell changer for measuring up to 8 sample positions with one reference position.</td>
<td>Routine peltier accessory (P/N N1010566), 20 – 45°C, 9+1 position.</td>
<td></td>
</tr>
<tr>
<td>Temperature Control*</td>
<td>Temperature Measurement Kit (P/N B0185227).</td>
<td>9-Cell holder* (P/N B0510366), additional sample carousel. This will allow preparation of a set of samples, while another carousel is being measured in the spectrometer.</td>
</tr>
<tr>
<td>Water Circulator 110V/60Hz (P/N N9302736).</td>
<td>For temperature monitoring in one cell. Glass cell included.</td>
<td></td>
</tr>
<tr>
<td>Electronic temperature control, continuously settable from 32° to 60°C, temperature stability ± 0.2°C.</td>
<td></td>
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<tr>
<td>or</td>
<td></td>
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<tr>
<td>Water Circulator 230V/50Hz (P/N B0080171).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electronic temperature control, continuously settable from 20° to 65°C, temperature stability ± 0.2°C.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Optional