

**CECIL**  
UV:SPECTROPHOTOMETERS

innovación  
tecnológica  
para  
laboratorio

**Rafer**



SUPER  
**Aquarius**  
DOUBLE BEAM



Super Aquarius in use in Cecil's applications laboratory

### **Total Capability**

The Super Aquarius instruments offer all the features of the Cecil Aquarius double beam instrument with additional optical sophistication, enhanced performance and added power.

Super Aquarius is the choice for versatility, ultimate performance and the measurement of diverse and difficult samples. Operation in six languages is provided.

### **Variable Optical Bandwidth**

The top of the range CE 9500, offers four optical resolutions, 0.5, 1, 2 and 4nm. For samples with narrow absorption bands such as vapours and gases, the narrow 0.5nm bandwidth is extremely valuable. When high energy is helpful, for instance in measuring difficult turbid samples or fluorescence measurements, the 4nm bandwidth provides increased sensitivity and accuracy.

### **Powerful Integral Control**

The rapid operating system of the Super Aquarius instruments includes a mass of powerful software including complete instrument programming, band area correction and computation, spectral differencing and stripping etc. The software may be expanded by E-SEF - Encoded Software Enhancement Facility. Codes are available by telephone, fax or E-mail with no delay. A large built in memory stores 100 scans, plots, curves and methods all password protected.

### **Top Performance Optical System**

A high performance end on photomultiplier is used in a fully symmetrical optical system to provide the best possible measuring accuracy, with low noise, even when making difficult low energy measurements. Baseline stability is at least 10 times better than for single beam instruments.

### **Turbid Sampling Optics**

Strongly scattering samples display very high absorbance when measured normally. These may be measured accurately with the turbid sample optical system in Super Aquarius instruments.

### **Display Scrolling for Wide View**

Long scans, time plots and data tables may all be viewed by scrolling the screen display. Almost six screen widths - 550mm - of display may be viewed, not just one screen of information as is normal with other instruments.

### **Integral Data Storage**

Up to 100 wavelength scans, also 100 methods and 100 calibration curves may be stored in memory, for future use, protected by the operators personal security codes.

# POWERFUL INTEGRAL CONTROL



## DataStream - Data to PC

Provides rapid transfer of data for instant display on a PC. May be used with Excel or any spread sheet or mathematical package familiar to the operator.

## Instrument Validation

Validation software is programmed into all Super Aquarius instruments covering a wide range of Pharmacopoeia (EP/BP/USP) tests as well as tests using filters traceable to national standards and certified by Cecil Instruments.

## Assay Program

New and very powerful on board software allows the mathematical formulae for any assay, involving many wavelengths, and consisting of up to 76 characters to be entered rapidly. A total of 20 such formulae may be linked for automatic computation of results. The calculations may be linked with cell programming and all procedures may be stored as methods - an immensely powerful tool.

## Dynamic Scan Recall

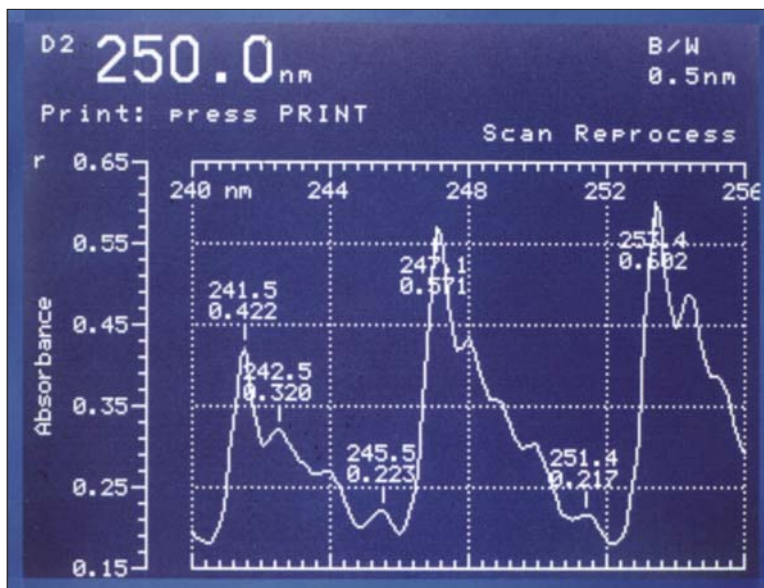
With this valuable time saving facility, all scans and plots are automatically stored as they are made. Up to 100 latest scans may be immediately recalled simply by selecting them from a list on the display. No scan storage procedure is involved, recalled plots may be reprocessed manipulated or overlaid with other live scans or scans recalled from memory.

## Methods Operation

Any analytical procedure may be stored as a code protected method. All instrument parameters are automatically set when a method is recalled ensuring that the original conditions are reproduced exactly, protected by the operators personal security codes.

## Unrestricted Reference Beam

A large sample compartment and symmetrical optical system provides a full sampling facility without restriction on the reference beam accommodation. Double six and four cell changers are available also an eight cell changer for tablet dissolution studies.



## System Excellence

Display Scrolling

Scrolled Width 430mm

DataStream - Data to PC

Spread Sheet - User Chosen

Assay Programming

Dynamic 8 Scan Recall

Method Storage - 100

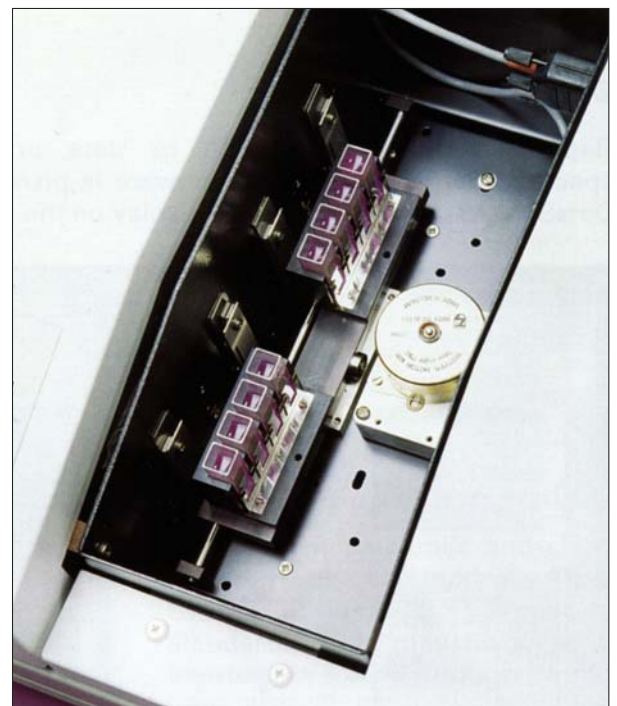
Spectral Storage - 100

Curve Storage - 100

Code Protected Storage

Validation Software

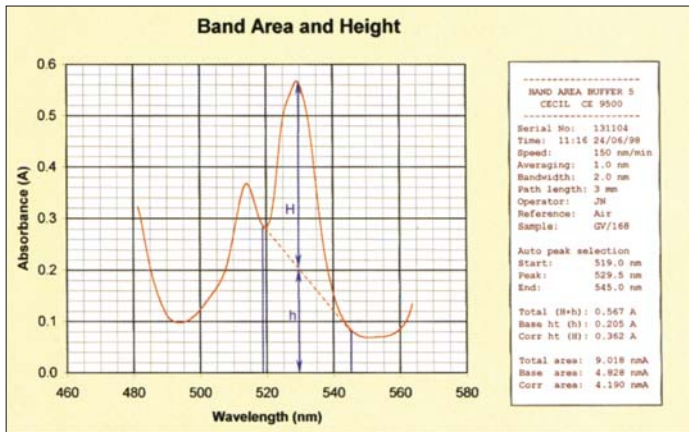
Software Expansion by E-SEF



## Scans Fully Documented

All scans including those recalled from memory or by dynamic scan recall are fully documented. Tables are produced of all peaks and valleys together with instrument, sample and operator details.

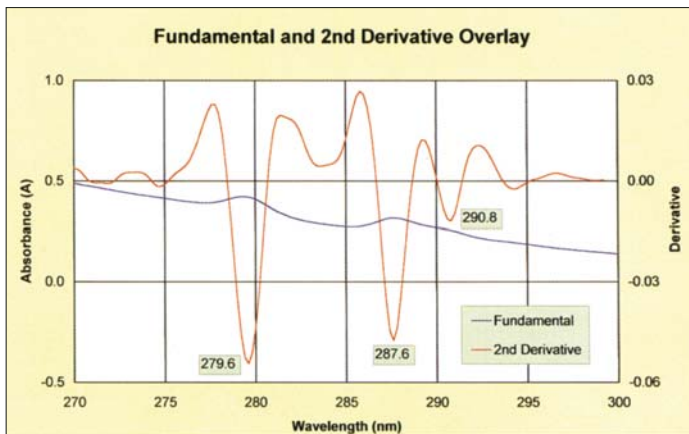
A high resolution scan of Benzene Vapour is shown on the left illustrating the available optical resolution.



**Band Quantification**

Quantitative assays using band area or height, corrected for background absorption are exceptionally easy to perform.

The procedure may be stored as a security protected method in the integral memory of the instrument.



**Derivative Spectra**

Derivatives up to the fourth are provided on the CE 9200 and up to the sixth on the CE 9500. Derivatives are a valuable technique for revealing hidden information or clarifying fine details in a spectrum. Bands masked by overlapping may be accurately located and quantified and distortion by a sloping background may be removed.

**DataStream**

Rapid transfer of raw data or data processed by the spectrophotometer's internal software is provided by the Cecil DataStream facility with instant display on the monitor of the PC.

Wavelength scans, single wavelength measurements, programmed measurements and sophisticated analytical procedures may all be transferred with great ease using DataStream.

**Microsoft Excel - 361peak.xls**

Wavelength (nm)	Absorbance
350.0	0.080
350.1	0.080
350.2	0.080
350.3	0.080
350.4	0.080
350.5	0.079
350.6	0.079
350.7	0.079
350.8	0.079
350.9	0.079
351.0	0.079
351.1	0.079
351.2	0.078
351.3	0.078
351.4	0.078
351.5	0.078

**DataStream - HyperTerminal**

```

SCAN BUFFER 7
CECIL CE 9500
-----
Serial No: 131104
Time: 14:50 17/06/98
Speed: 60 nm/min
Averaging: 1.0 nm
Bandwidth: 2.0 nm
Path length: 10 mm
Operator: JN
Reference: Air
Sample: GQ/581

Wavelength Absorbance
nm A
350.0 0.080
350.1 0.080
350.2 0.080
350.3 0.080
350.4 0.080
350.5 0.079
350.6 0.079
350.7 0.079
350.8 0.079
350.9 0.079
351.0 0.079
351.1 0.079
351.2 0.078
351.3 0.078
351.4 0.078
351.5 0.078
351.6 0.078
351.7 0.078
351.8 0.078
351.9 0.078
352.0 0.078
352.1 0.078
352.2 0.078
352.3 0.078
352.4 0.079
352.5 0.078
352.6 0.078
352.7 0.078
352.8 0.078
    
```

Transferred data may be saved on disk or immediately incorporated into a spreadsheet such as Microsoft Excel for display, manipulation, graphical presentation, archiving or report generation.

Reports may be produced using any of the wide range of printers supported by the Microsoft Windows environment.

Simplicity of operation is a key feature. Operators may use a familiar spreadsheet or maths package - Excel, Lotus 123, Grafit etc - thus avoiding a learning cycle and saving valuable time.

Shown here scan data has been transferred to the PC, incorporated into Excel and a graphical presentation produced which may be printed in exactly the format it appears on the screen.

```

-----
ANTIBIOTIC ASSAY
CECIL CE 9500
-----
Serial No: 131104
S/W version: R0040
Time: 13:01 25/06/98
Bandwidth: 2.0 nm
Operator: JN
Reference: Blank
Sample: Culture broth
Wavelength formula:
A1 = reading at 310.0 nm
A2 = reading at 330.0 nm
A3 = reading at 350.0 nm
A4 = reading at 370.0 nm
A5 = reading at 390.0 nm
TC = 0.185*A3-0.101*A2-0.0673*A1-0.0168*A5 mg/mL
CTC = 0.1485*A2-0.295*A4-0.0370*A3-0.0733*A5 mg/mL
    
```

	Cell Number					
	1	2	3	4	5	
Sample 1						
310.0 nm	0.259	0.259	0.261	0.260	0.260	A
330.0 nm	2.075	1.760	1.774	1.752	2.095	A
350.0 nm	1.272	1.268	1.272	1.262	1.276	A
370.0 nm	0.135	0.135	0.136	0.136	0.136	A
390.0 nm	0.123	0.123	0.122	0.123	0.122	A
TC	0.006	0.037	0.037	0.037	0.005	mg/mL
CTC	0.212	0.166	0.167	0.164	0.215	mg/mL

## Fast Program Any Assay

The Super Aquarius range is capable of very rapid computation of any required quantitative procedure using the Cecil 'Assay Program' provided as a new integral software module.

## Assay Program

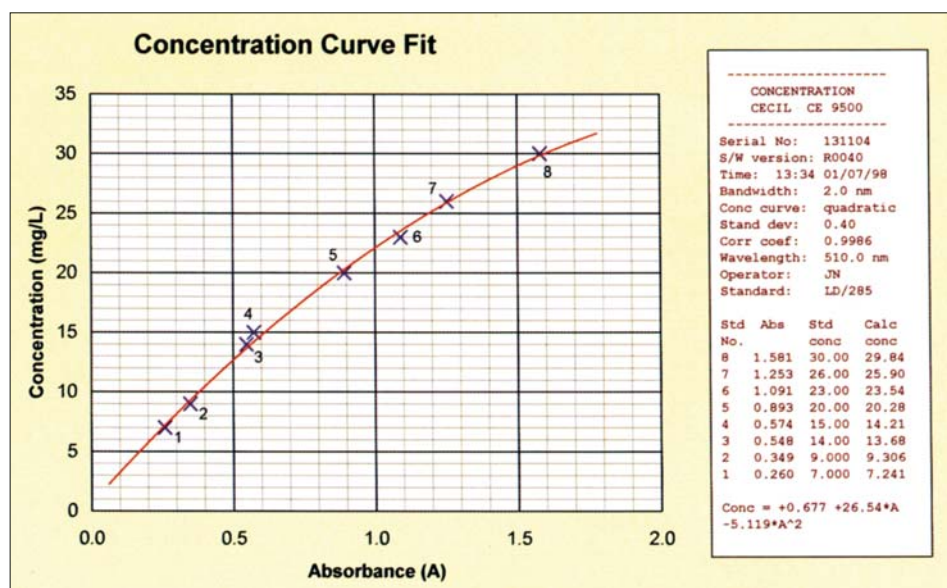
Assays may be quantified by simple operator text entry of any formula with up to 76 characters. For more complex calculations up to 20 formulae, each of 76 characters, may be linked for formidable computing power without a PC.

Assays may use up to 10 different wavelengths and 8 different cells in any automatic programmed method. Formulae may be stored, alpha numerically identified and security code protected.

The ease of entry and extraordinary speed of computation and tabulation of results and the absence of any operator programming, makes Assay Program a truly powerful tool, avoiding transcription and calculation errors. Validation is simple as no PC is used.

## Typical Assay

The assay of a mixture of two antibiotics, tetracycline (TC) and chlorotetracycline (CTC), is shown here. The formula was entered from the published literature, the cell and wavelength program set and 5 sets of results measured and tabulated. The total time, including formulae entry and set-up, for the complete procedure was incredibly short - less than 10 minutes.



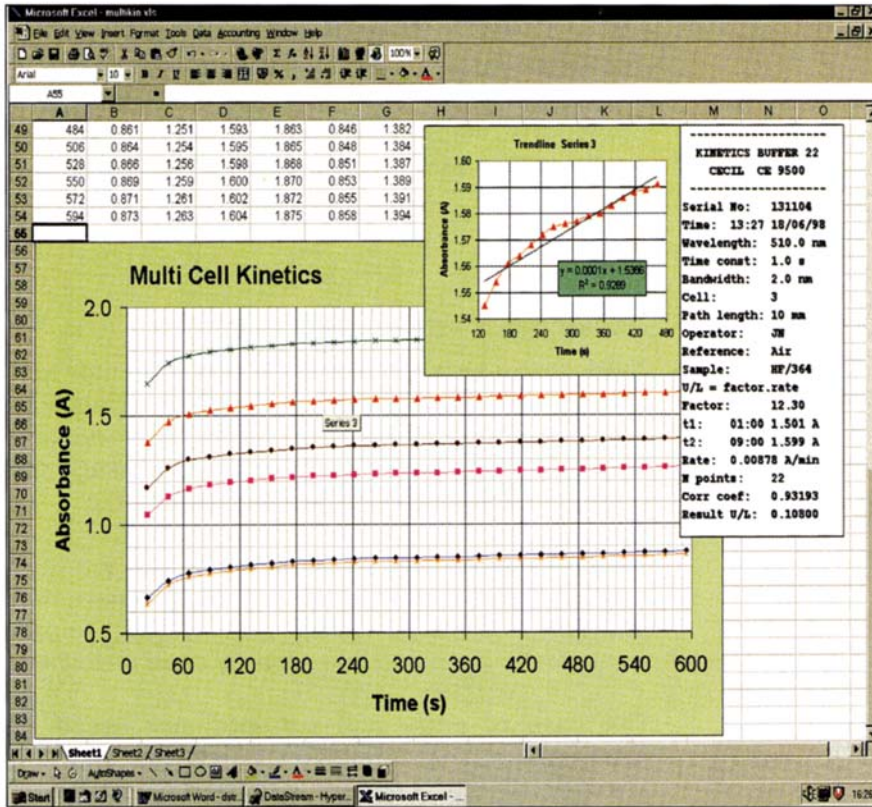
## Concentration Curve Fitting

Straight line, quadratic and cubic curves may be automatically fitted to up to 30 standards and replicate standards. Fits may be with an intercept or forced through zero.

## Editing and Storing Curves

Suspect standards may be observed on the screen display and deleted or replaced by a replicate.

Up to 100 curves may be stored in integral memory security code protected for future use.



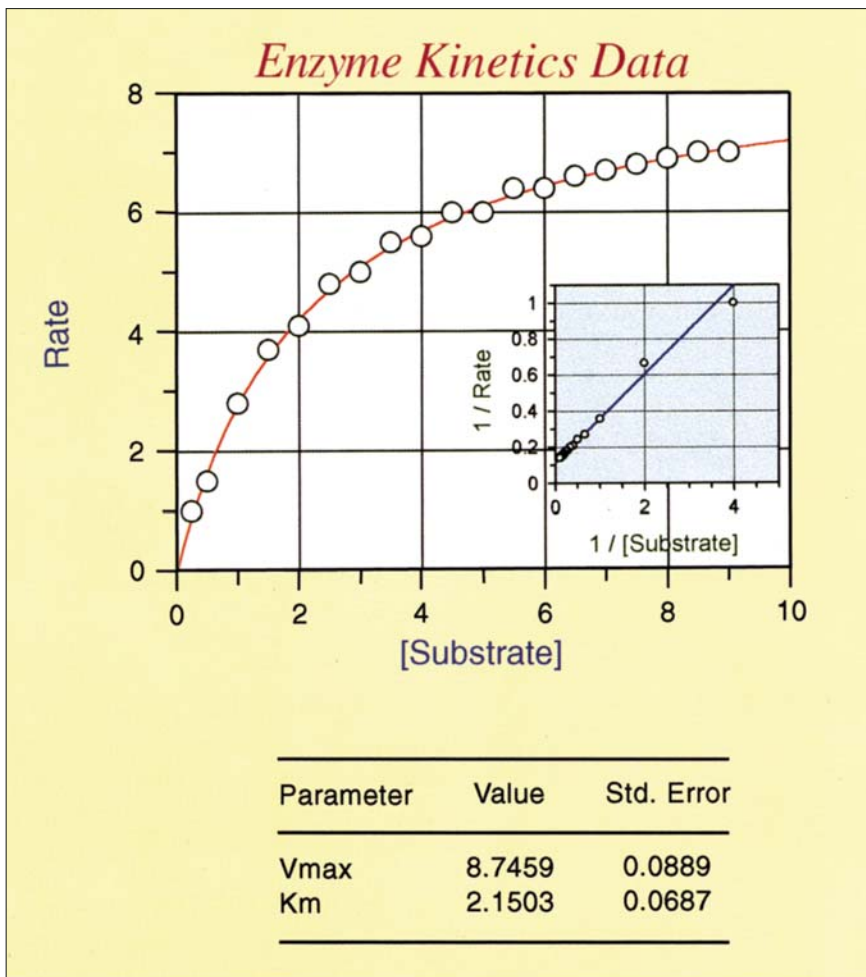
**Reaction Kinetics**

Single and multi-cell Kinetics are both available with reaction plots displayed on screen and printed. Regression analysis is applied to the user selected portion of the reaction curves ( $t_1 - t_2$ ) and results are reported in Units/Litre.

Data may be reprocessed as required and curves may be stored security code protected.

Sample temperature control is available for single cells and four and six cell changers, using either water circulation or thermoelectric temperature control.

An example of multi-cell Kinetics is shown on the left.



**Advanced Kinetics**

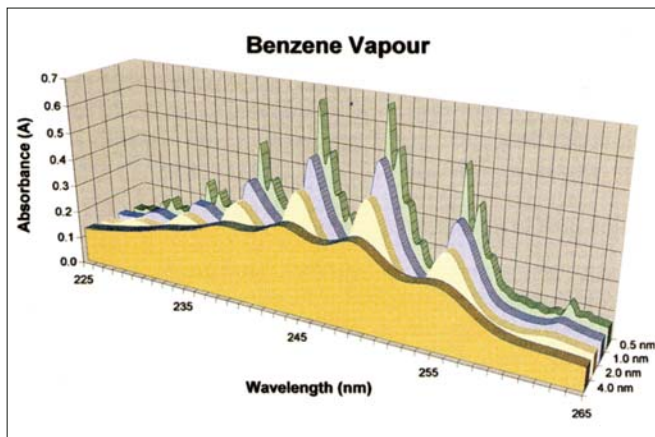
An example of advanced Kinetics is shown. Raw Kinetics data generated by the Super Aquarius with known substrate concentrations was captured by DataStream and transferred into Grafit.

Using a suitable graphical template the Michaelis-Menton curve was automatically plotted together with the chosen transformation, Lineweaver Burk, from which the values of Km and Vmax were automatically extracted.

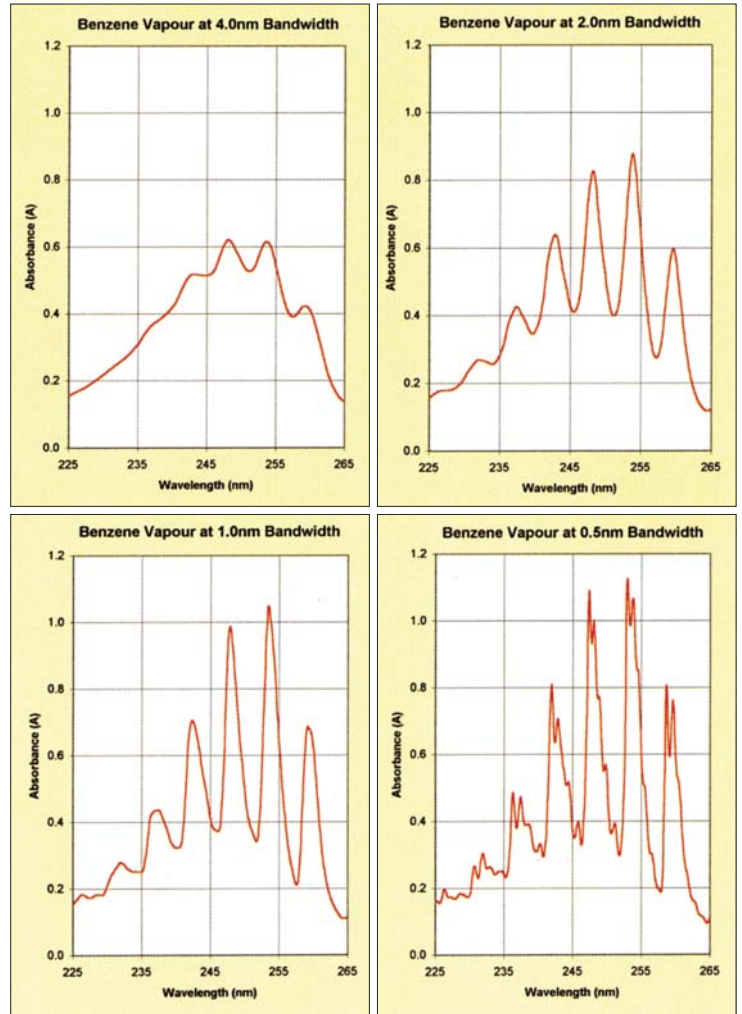
## Variable Resolution

Designed for the most demanding applications the CE 9500 with selectable optical resolution of 0.5, 1, 2 and 4nm and high performance photomultiplier ensures that all experimental requirements can be met.

The spectrum of Benzene vapour shows important spectral detail developed as resolution is progressively increased from 4nm to 0.5nm.



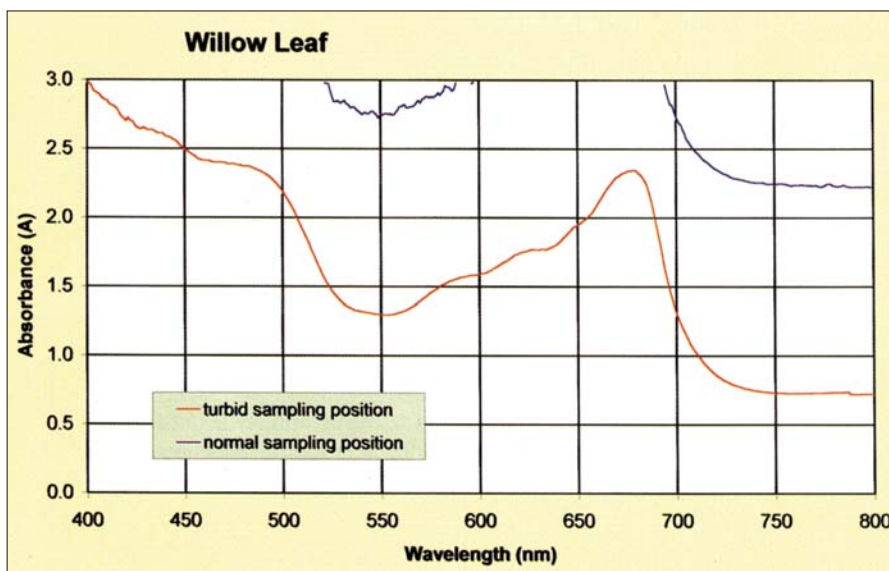
Overlaying of the Spectra at the four different optical resolutions shown above in 3D graphic format.



## Scattering Samples

Strongly scattering or turbid samples may be difficult to measure normally. With the special optical system of the Super Aquarius such samples may be measured successfully.

A willow leaf gives a noisy off scale trace of chlorophyll with peak absorbance of 3.7A. At the turbid sample position a low noise perfect on scale trace results from 25 times more energy reaching the detector.



## Optical Excellence

- Symmetrical Double Beam**
- Czerny-Turner Monochromator**
- Turbid Sampling Optics**
- Variable Optical Resolution**
- End Window Photomultiplier**
- Long Life Coated Optics**
- Full Reference Sample Space**
- Straylight 0.01%**
- Measurement to 0.0001A**
- Noise <0.00003A**
- Photo Reproducibility ±0.0001A**
- Spectrofluorescence**
- Gel and Film Scanning**

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## SCANNING

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### Double Beam Wavelength Scans

Scans at up to 4000nm/min are presented on screen or printed with all peaks annotated with wavelength and absorbance. Tables are also presented listing all peaks and valleys with values.

### Display Scrolling

Use of the display scrolling facility enhances the effective screen size and enables spectra and data up to 430mm wide, 6 screen widths, to be viewed.

### Dynamic Scan Recall

Up to 100 latest scans are automatically retained for recall by selection from a list and may be reprocessed, overlaid or transferred to protected memory for future recall.

### Overlaid Spectral Scans

Up to six scans; live scans, stored scans and scans from dynamic scan recall may be overlaid for convenient comparisons or further manipulation.

### Difference Spectra

New wavelength scans or scans from store may be presented on screen and the difference spectra produced. The scans may be normalised enabling spectral stripping to reveal impurities or additives.

### Derivative Spectra

Derivative spectra, up to sixth are readily produced, with selectable smoothing, either alone or superimposed on the fundamental, with or without an offset. Scaling is automatic with all peaks and valleys quantified.

### Scan Storage

Up to 100 spectra may be stored in safe memory for future recall. Each spectrum is automatically allocated a recall number, when stored, and may be security code protected against tamper or deletion.

### Programmed Scans

Automatic scans, single or repeat may be made of a cell program of up to 4, 6 or 8 cells. A programmed sequence of scans may also be made of a single sample.

### Time Course Plots

Changing samples or flows may be examined and displayed by making a time course plot. Data may be reprocessed and stored, security code protected, with an automatically assigned recall number.

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## QUANTITATION

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### Powerful Quantification

Many quantitative methods are available including band area computation with background correction, differencing and stripping of spectra, wine and colour assays, mathematical calculations between wavelengths, protein and DNA assays.

### Assay Program

User assay formulae using up to 10 wavelengths may be entered rapidly. Programming is automatic at entry without user intervention. Automatic sequenced multi-sample assays may be stored as methods.

### Curve and Line Fitting

A straight line, quadratic or cubic concentration curve may be fitted to up to 30 standards or replicates with an intercept or forced through the origin. Standards may be deleted and replaced and a new curve fitted.

### Reaction Kinetics

Single cell kinetic measurements are possible with plots and data displayed on screen. Data may be reprocessed, regression analysis applied and curves stored, security code protected against tamper or deletion.

### Multi-Cell Reaction Kinetics

Up to four or six cells are automatically measured with all reaction curves displayed on screen. Each curve may be selected for processing with the results of regression analysis printed.

### Multi Wavelength and Bio Assays

Assays are provided using either two or three wavelengths. A wine colour assay is provided. Assays for Warburg and Christian, Lowry, Bradford, Biuret and BCA methods are also available.

### Band Area and Height Computation

Band areas with correction for sloping background absorption are readily quantified, with all details and construction displayed. Band areas may also be computed for derivative spectra to facilitate difficult quantification.

### Cell Program

Using the various cell changers, measurements may be made on up to 4, 6 or 8 cells at a single wavelength with cycle time and number of cycles entered by the operator. A cell and wavelength program may be combined.

### Wavelength Program

Measurements may be programmed for 10 different operator selected wavelengths with the cycle time and number of cycles selected by the operator. A wavelength and cell program may be combined.

## SYSTEM FUNCTIONS

### Double Beam Optical System

The fully symmetrical optical system measures sample and reference simultaneously for ultimate accuracy, precision and baseline flatness. Long term stability is at least ten times better than single beam systems. Coated optics for long life.

### Variable Optical Bandwidth

The CE 9500 offers variable optical bandwidth from 0.5mm to 4mm. This range covers all the more exacting applications where either high optical resolution or maximum energy throughput is required.

### Method Operation and Storage

Up to 100 sets of instrument parameters, including concentration curves may be stored, security code protected. When recalled, instrument parameters are automatically set, avoiding errors.

### Alpha Numeric Entry and Assay Program

A full Alpha Numeric facility is provided for formula entry and documentation for GLP. Assay formula entry with Assay Program is rapid and calculations using many wavelengths may be made at high speed with fully documented results.

### Software Enhancement By E-SEF

E-SEF - Encoded Software Enhancement Facility - allows software modules to be enabled using encoded numbers provided by telephone, fax or E-mail. Software requirements may be tailored, at any time, as required.

### Data Storage and Protection

Data, including 100 spectra, concentration curves, kinetics and time course plots may be stored in safe memory, security code protected against tamper or deletion using a four digit password.

### Reprocessing

Scans, time course plots, and reaction curves may all be reprocessed to any required format on the display screen and then plotted on the integral or an external printer.

### Photomultiplier Detector

A high performance end window photomultiplier is used in all instruments for best possible accuracy and optimum performance in narrow bandwidth, or energy limited applications, eg turbid sample measurement.

### Performance Validation

Software and certified standards enable wavelength accuracy, absorbance accuracy, bandwidth etc. to be validated. A timed and dated report includes the serial number of the instrument.

## SAMPLING

### Cells and Flowcells

As well as 10mm cells and flowcells, holders are available for rectangular and cylindrical cells up to 100mm pathlength. A microsampling system measures to 50µl or below.

### Turbid Sample Measurements

A turbid sample optical system enables the measurement of highly scattering samples, which would otherwise be difficult or impossible to measure. 10mm cells, films or solid samples may be measured.

### Automatic Cell Changers

Automatic changers are available for 4, 6 or 8 cells, providing rapid sample changing or the facility for full programming.

### Sipette Sampling

Samples down to 300 microlitres may be measured in a 10mm cell. Sampling is under control of the instrument's microprocessor system. Samples may be saved or pumped to waste.

### Sample Temperature Control

Water and thermoelectric temperature control are available for single cells and automatic cell changers. Temperature is set from the control panel and displayed on screen. Programming is provided for thermal melt determinations.

### Batch Sampling

Automatic batch sampling for up to 100 samples is available. The pump fits within the sample compartment and volume etc is set from the control panel and displayed on screen. Batch number entry is provided.

### Dissolution Testing

Versions of the instruments fitted with a special cell compartment with piping port, are available for dissolution testing using Cecil TD software and a PC. Six and eight cell changers are available.

### Specular Reflectance

Special accessories enable specular reflectance measurements to be made. Both fixed angle and variable angle reflectance accessories are available. The latter is particularly useful for film thickness measurements.

### Fluorescence and Gel Scanning

Using the fluorescence accessory quantitative assays are possible. When required the excitation wavelength may be scanned. A gel scanner enables 100mm gels and films to be measured.

**Performance Validation**

A full validation software module is available on all instruments and may be released by E-SEF.

A range of Pharmacopoeia (EP/BP/USP) tests are provided for laboratories subject to regulatory control or following G.L.P. A selection of these tests is shown here.

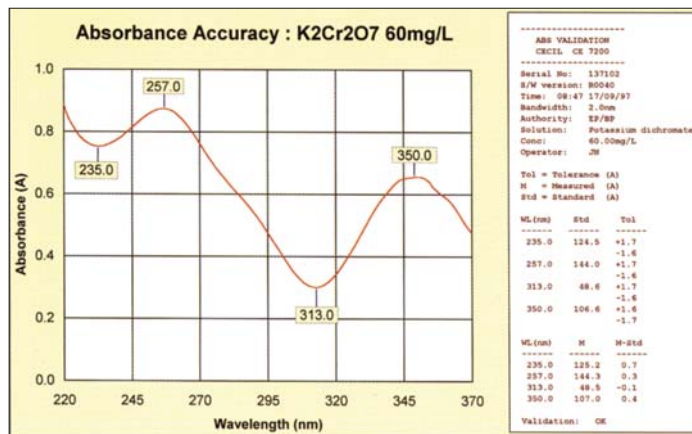
Test procedures are also provided using filters traceable to national standards with certificates issued by Cecil Instruments.

**Validation Using Filters**

Both absorbance and wavelength calibration checks are most conveniently carried out using certified filter sets calibrated by Cecil Instruments against NPL certified standards. Full validation programmes are provided.

**Absorbance Accuracy**

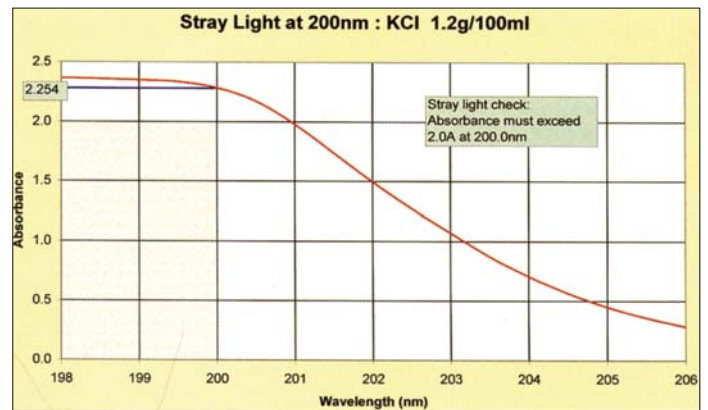
The Pharmacopoeia (EP/BP) test for absorbance accuracy uses a 60mg/L solution of Potassium Dichromate in a 10mm pathlength cuvette. The results of a test are shown here.



**Straylight**

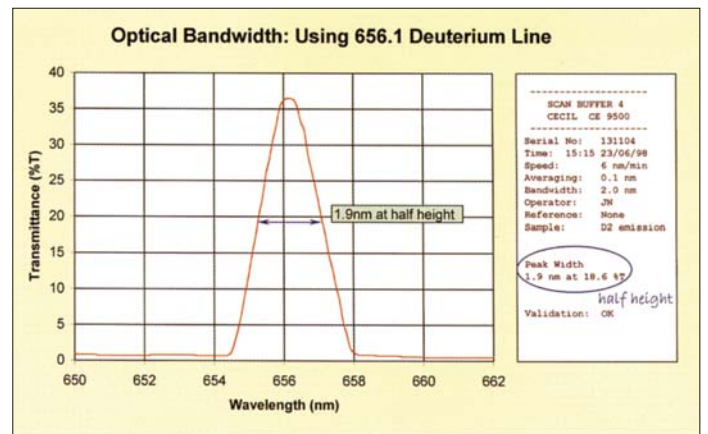
The Pharmacopoeia (EP/BP) test for straylight is shown. This uses a 1.2% w/v solution of Potassium Chloride in water measured against water in the reference beam.

The more widely accepted ASTM tests at 220nm and 340nm are also available.



**Optical Bandwidth**

An automatic procedure is provided which measures the half height width of the narrow deuterium emission line at 656.1nm.



**Micro-Sipette Sampling**

Samples of 300µl or less may be measured with very low cross contamination using the Micro-Sipette system. All measurements are made in the same cell enhancing accuracy.

The pump operates under the control of the instruments microprocessor system and is mounted within the sample compartment.

**Ultra-Micro Sampling**

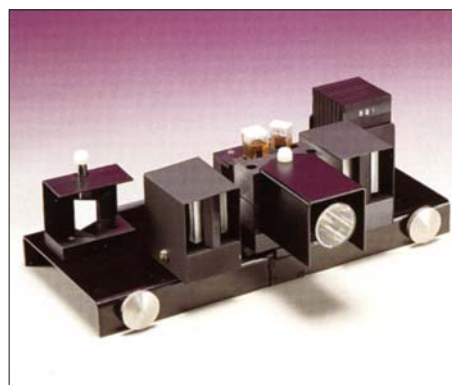
Valuable biological samples prepared with costly reagents may be measured using a special ultra-microcell and holder. Samples of 50µl or less may be accurately measured.

# COMPLETE ACCESSORY RANGE



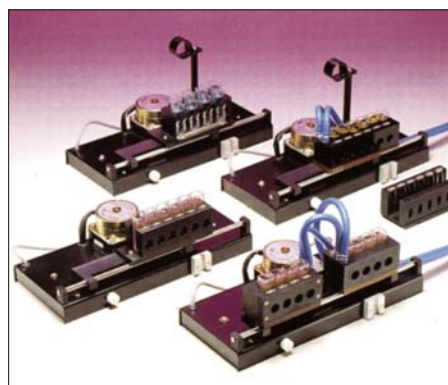
## Spectrofluorescence

Fluorescence measurements are made using the CE 572 accessory. Excitation radiation may be scanned and sensitivity maximised using the 4nm bandwidth of the CE 9500.



## Automatic Sample Changers

A full range of auto sample changers is available for sample and reference cells with the option of water or thermoelectric temperature control.



## Sample Temperature Control

Thermoelectric control is available for single holders and multi cell holders and includes temperature programming. Operation is via the spectrophotometer's control panel.



## ORDERING ACCESSORIES

### Cell Holders

Single cell 5-50mm pl - sample or reference	505 26 00
Micro sipette 10mm cell holder	503 26 00
Adjustable holder for micro cell	6600 57 00
50µl ultra microcell holder	8020 39 00
Holder for rectangular cells up to 100mm	595 27 00
Holder for cylindrical cells up to 100mm	595 26 00

### Cell Changers

Auto changer for 4 or 4 + 4 cells, requires holder	9070 31 00
Holder for 4 x 10mm cells sample or reference	594 54 00
Auto changer for 6 cells, requires holder	9070 34 00
Holder for 6 x 10mm cells	5500 33 00
Holder for 6 x 20mm cells	5500 34 00
Automatic 8 cell changer with holder	9070 32 00
4 position microcell changer	505 38 00

### Sipette and Batch Sampling

Return sipette system, requires holder and cell	9070 21 00
10mm sipette cell	202 07 02
20mm sipette cell	202 07 86
40mm sipette cell	202 07 87
Sipette 10mm cell holder	503 26 00
Batch sampler for 40 samples with pump	2021 82 00
Batch sampler for 100 samples with pump	2021 82 02

### Sample Stirring

Electronic stirrer and sample cell holder	7200 31 00
Electronic stirrer and sample and reference cell holder	7200 32 00
Electronic stirrer and 4 sample holder	7200 33 00

### Temperature Control - Water Circulation

Single or micro sipette cell holder	503 36 00
4 cell holder	20 236 16
2 x 4 cell holder, sample and reference	202 36 15
6 cell holder	5500 36 15

### Temperature Control - Thermoelectric

Thermoelectric Controller	CE2024
Holder for single or sipette cell	8020 56 00
4 cell holder	9070 57 00
2 x 4 cell holder	9070 58 00
6 cell holder	9070 59 00

### Lamps

Deuterium lamp with hours indicator	2202 01 42
Tungsten halide lamp - in pairs	2303 01 40

### Calibration Filters in Holders

Holmium filter	202 01 44
Didymium filter	303 01 30
Set of 2 certified Wavelength filters	303 40 00
Set of 4 certified Absorbance filters	594 44 00
Set of 6 certified Absorbance filters	594 66 00
Set of certified filters, 2 Wavelength, 6 Absorbance	594 77 00

### Reflectance

Fixed angle reflectance accessory - pair	CE 575
Variable angle reflectance accessory	CE 574

### Gel Scanning

Gel scanner - requires trough or film holder	9070 39 00
Gel trough - 5mm x 100mm silica	570 07 02

### Fluorescence

Fluorescence accessory	CE 572
10mm fluorescence sample cell	202 07 72
5mm fluorescence reference cell	202 07 73

### Printers and Cables

RS232c cable for 25 pin PC with protocol manual	2021 26 00
RS232c cable for 9 pin PC with protocol manual	2021 83 00
Printer connection cable	8000 71 00
Dot matrix printer	8000 70 01
Colour ink jet printer	8000 72 01

## SPECIFICATION

Detector	End window high performance photomultiplier
Optical System	Symmetrical full double beam; coated optics
Monochromator	Modified Czerny-Turner, 1200 L/mm holographic grating
Wavelength Range and Accuracy	190-800nm; 900nm R option and CE 9500 : ±0.5nm
Wavelength Accuracy	±0.1 nm at deuterium 656.1nm peak
Wavelength Reproducibility	±0.1nm
Resolution	1.8nm; - CE 9500 selectable
Straylight	Less than 0.01% at 220nm and 340nm
Straylight - as Pharmacopoeia KCl	Absorbance greater than 2A at 200nm
Photometric Noise	0.00003A (500nm, 2s response, 0A) RMS
Photometric Reproducibility	Better than ±0.0001A, 500nm
Baseline Flatness	±0.001A
Stability	Better than ±0.0001A/hour, 500nm
Display Screen LCD	Displays menus, spectra, curves, data etc.
Screen Display Scrolling	430mm viewing width for spectra, plots etc.
Scan Speeds	1-4000nm/minute
Overlaid Spectra	Up to 6 spectra with or without offsets
Dynamic Scan Recall	Up to 100 latest scans are held for recall
Photometric Readout	-0.3-3A; 0-200%T; 0-9999C
Photometric Accuracy	0.004A at 1A
Derivative Spectra	1st - 4th derivatives (1st - 6th CE 9500)
Kinetics, Single and Multi-Cell	Calculation of rate, with plot for up to 6 cells
Method and Data Storage	For 100 methods with data
Spectral Reprocessing	Spectral scans may be expanded, transformed or derivatised and replotted over any wavelength range
Quantitative Curve Fitting	Linear, quadratic or cubic to 30 standards
Cell and Wavelength programming	8 cells and 10 wavelengths in any combination
Assay Program	Program computation of user entered formulae
Storage With Password Security	100 spectra, time plots and reaction curves
Alpha Numeric Text Entry	For annotation and formula entry
Sample Temperature Control	Single or multi-cell, water or thermoelectric
Micro Sipette Sampling	Under MPU control, with or without sample return
Real Time Clock	Timed and dated reports for GLP
Computer and Printer Interfaces	Bi-directional serial RS232c and parallel ports

### Additional Specification : CE9500

Variable Resolution	0.5, 1, 2 and 4nm, variable optical bandwidth
Wavelength Range	190-900nm standard
Baseline	Full baseline for each bandwidth in safe memory
Derivative Spectra	1st to 6th derivatives
Turbid Sampling Optical System	Fitted standard, turbid sample holder provided
Precision Low Noise Measurement	Absorbance measurements with 0.0001A precision
Spectrofluorescence Measurements	Fluorescence accessory; Excitation wavelength scanning
Gel Scanning	Accessory available for 100mm gels
Size and Weight	805 x 410 x 210; 37Kg, 37.5Kg CE9500
Power Requirements	110-250V, 50/60Hz, 170W

## ORDERING

Spectrophotometers are supplied with power cable, instruction manual and sample and reference cell holders.

**CE 9200 Spectrophotometer**  
1.8nm Optical bandpass. Wavelength range 190-800nm.

**CE 9500 Spectrophotometer**  
Variable optical bandpass 0.5, 1, 2 and 4nm. Wavelength range 190-900nm.

**CE 9260 and CE 9560 Dissolution Spectrophotometer**  
Special version of each of the instruments suitable for tablet dissolution applications using Cecil TD software and a six or eight cell changer.

**8000 70 01 Dot Matrix Printer**  
Includes cable

**8000 72 01 Colour Ink Jet Printer**  
Includes cable

**8000 71 00 Connection Cable for Printers**

**OPTION R Wavelength Extension**  
Extends the working range to be 190-900nm (standard on CE 9500).

**OPTION T Turbid Sampling Optics**  
Available for the CE 9200 (standard on the CE 9500). For measurement of poorly transmitting or turbid samples.

## SOFTWARE MODULES

**Program C**  
Cell program for up to 4, 6 or 8 cells

**Program W**  
Automatic measurements at up to 10 different wavelengths

**Quant M**  
Multi-wavelength assays at 2 or 3 wavelengths, Warburg and Christian assays at 2 or 3 wavelengths, wine/colour assay at up to 10 wavelengths

**Quant P**  
Protein assays using the methods of Lowry, Bradford, Biuret and BCA

**Kinetics**  
Kinetic measurements with plots and reprocessing of data

**Kinetics M**  
Multi-cell Kinetics linked with autochanging of cells and plotting of reaction curves

**Assay Program**  
Construction and entry of mathematical formulae involving measurements at multiple wavelengths with automatic computation of assay results

**DataStream**  
Fast data transfer to PC for use with Excel or other spread sheets

**Validation**  
Validation of absorbance, wavelength, bandwidth, straylight etc. using liquid samples or certified standards

**Tablet Dissolution**  
Software for use with PC control of CE9260 and CE9560 for tablet dissolution monitoring