J-815

Circular Dichroism Spectrometer

Leading the development of chiroptical instrumentation

Superior Performance
Superior Innovation
Superior Reliability

JASCO

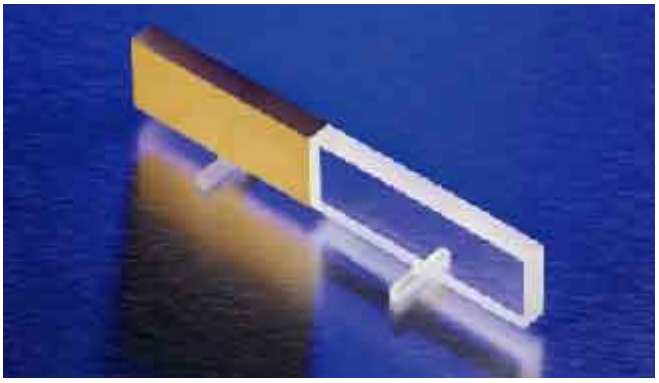
J-815 Circular Dichroism Spectrometer

The latest effort in the JASCO commitment to lead the field of Circular Dichroism

JASCO proudly announces the new model J-815 Spectropolarimeter, our latest Circular Dichroism spectrometer. Unparalleled optical performance and optionally available measurement modes are combined in a manner to make the J-815 a true "chiro-optical spectroscopy workbench". Instrument control and data processing are handled effortlessly by our JASCO's user friendly and innovative cross-platform software, Spectra Manager™ II. As an option, Spectra Manager™ CFR provides secure access and compliance features for 21 CFR Part 11.

- ***Compact benchtop design***
- ***Air cooled 150W Xenon lamp***
- ***Highest Signal-to-Noise ratio***
- ***Range of precise temperature control accessories***
- ***Automated titration and stopped-flow accessories***
- ***Spectra Manager™ II software for control and data analysis***
- ***Spectra Manager™ CFR option for 21 CFR 11 compliance***
- ***Flexible design allows field upgrades for different measurement modes and accessories as applications evolve.***

Innovative optical and mechanical design



Since 1961, JASCO has designed and built the finest in chiro-optical instrumentation. With 45 years of experience, the result is the best performance and reliability in the industry. Instead of using instrument components from other manufacturers, the entire instrument is designed and manufactured by JASCO. The mirrors in the J-815 are produced by a proprietary surfacing/plating/coating technique resulting in the highest reflectivity and optical throughput. The PEM is considered the heart of the CD instrument and the temperature-stabilized natural crystalline quartz prism eliminates instrumental drift. Finally, all electronic systems for instrument control are optimized for maximum performance and reliability.

Four Channel Simultaneous Data Acquisition

The 18 bit A/D conversion allows the system to simultaneously acquire up to four signals including CD, UV/Vis Absorbance, Fluorescence, Linear Dichroism, ORD, Fluorescence Detected CD, pH etc.. External signals such as those from a pH meter can be connected to instrument inputs for display within the software.

Multiple Acquisition Modes to Meet any Demand

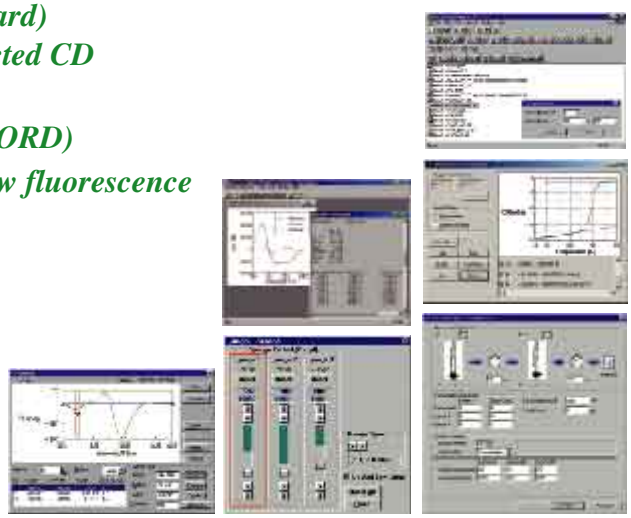
Wavelength scanning	*Continuous scan: running average method offering high speed measurements* *Step Scan: discrete wavelengths and response time to optimize signals* *Auto-scan: Based on step scan but offering a range of response times to speed data acquisition*
Time scan	*Fixed wavelength time scan for chemical denaturation and stopped-flow experiments*
Temperature scan	*Fixed wavelength for CD vs. Temperature thermal ramping* *Pre-set temperatures with equilibration times for spectral scanning* *3 Dimensional display of CD vs. Wavelength vs. Temperature or Time*

Versatility for a wide range of application requirements

Protein folding studies
Protein conformational studies
DNA/RNA interactions
Enzyme kinetics
Purity testing of optically active substances
Quantitative analysis of pharmaceuticals
Natural organic chemistry
Biochemistry and macromolecules
Rapid scanning (time resolved) experiments

JASCO offers a range of measurement modes and hyphenated techniques

- Circular dichroism (CD) and UV-Vis absorbance (standard)
- Scanning emission fluorescence and Fluorescence detected CD
- Automated titration and thermal ramping
- Linear dichroism (LD) and Optical rotatory dispersion (ORD)
- Stopped-flow CD, Stopped-flow absorbance, Stopped-flow fluorescence
- High throughput CD (HTCD)
- Magnetic CD (MCD)
- Chiral HPLC detection (LCCD)
- Near infrared CD (NIRCD)



Spectra Manager™ II features

- Full control from Windows® XP Pro with 21 CFR Part 11 compliance (optional)
- Secondary structure analysis
- Denatured protein analysis
- Multi-wavelength variable temperature programming
- Curve-fitting analysis
- Macro command programming
- Publication quality printing with customizable templates
- System validation program

Optional accessories

- Peltier cell holders, single and six position
- Scanning emission monochromator
- Automatic titration system
- 2, 3, and 4 syringe stopped-flow systems
- LD, ORD, OCD attachments
- Permanent, electro and super-conducting magnets
- Near IR extended detection

Thermal Denaturation of Lysozyme with CD and Fluorescence Detection

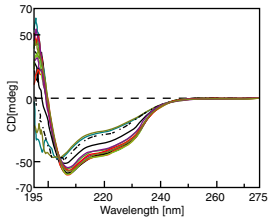


Figure 1. CD spectra demonstrating the thermal denaturation of lysozyme from 20 to 95°C.

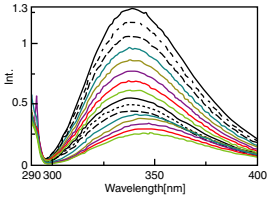
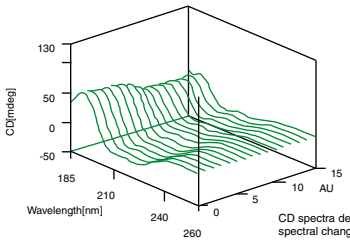


Figure 3. The fluorescence spectral change as lysozyme thermally denatures.

Hen egg-white lysozyme (1mg) was dissolved in 15 mL of deionized water. The thermal denaturation of the protein was evaluated using the JASCO J-815 CD spectropolarimeter equipped with the PFD-425 Peltier temperature controller and the FMO-427 emission monochromator for detection of fluorescence. The sample was contained in a 1cm quartz cuvette. Lysozyme CD and fluorescence spectra were simultaneously measured at 5° intervals from 20-95°C with the protein denaturation package. After the final measurement at 95°, the sample was cooled back to 20°C and a final set of spectra collected.

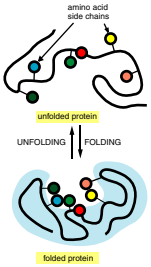
CD detection of Myoglobin Structure During an Automated pH Titration



CD spectra demonstrating the spectral changes that occur with pH titration.

An 18µg/mL solution of myoglobin was prepared by dissolving horse skeletal muscle myoglobin in deionized water. Chemical denaturation of the protein was initiated by the addition of 0.1M Sulfuric Acid using the automated titrator (ATS-429). The protein unfolding was followed using the JASCO J-815 CD spectropolarimeter. The sample was contained in a 1cm quartz cuvette using a magnetic stirrer. Myoglobin CD spectra were automatically measured at 0.05 mL intervals. The totally automated study was completed in just under an hour. CD spectra were collected from 260/180 nm with a data pitch of 0.1 nm. A band width of 1 nm was used with a detector response time of 4 sec. and scanning speed of 50 nm/min.

Rapid kinetics (protein refolding) monitored by using stopped-flow/CD/Fluorescence



The JASCO Model J-815 CD spectrometer can be coupled with the Bio-Logic stopped-flow modules to provide high speed mixing for the study of kinetics and protein folding in both absorbance and fluorescence modes. The Bio-Logic stopped-flow modules can be equipped with either 2, 3 or 4 syringes each individually controlled by a stepping-motor enabling extremely precise delivery and millisecond dead times.

The measurement of the refolding of Cytochrome C

Cytochrome C is denatured (unfolded) using guanidine hydrochloride. It can be refolded by dilution of the guanidine hydrochloride with sodium phosphate buffer. This refolding process, (complete in approximately 300 msec) is monitored by simultaneous CD and fluorescence.

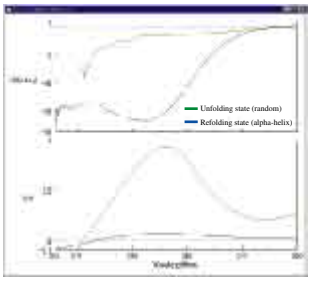


Figure 1

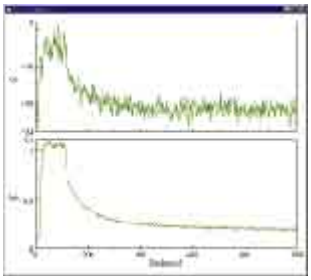


Figure 2

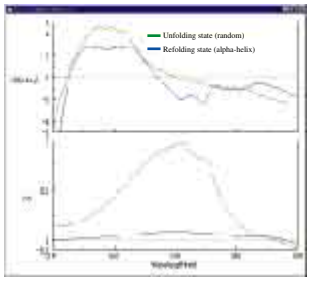


Figure 3

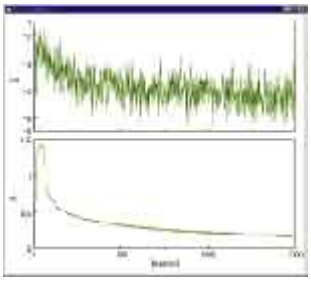


Figure 4

The kinetic trace at 222 nm (secondary structure region)

Figure 1 demonstrates the CD and fluorescence spectra of Cytochrome c, showing the unfolded and refolded states, in the secondary structure wavelength region. A change in this region (225 nm) is largely due to the alpha-helical content. Figure 2 shows CD and fluorescence kinetic traces at 220 nm when the Cytochrome C in guanidine hydrochloride (unfolded state) was mixed with the sodium phosphate buffer using the Biologic SFM-20 two syringe micro-volume stopped-flow accessory.

The kinetic trace at 289 nm (aromatic side chain region)

Figure 3 illustrates the CD and fluorescence spectra of Cytochrome C, showing the unfolded and refolded states, in the near UV (aromatic side chain) region. Changes in this region reflect changes in the local environment of the aromatic side chains and tryptophan residues. Figure 4 shows the CD and fluorescence kinetic traces at 289 nm. Cytochrome C is refolded in a mixture of guanidine hydrochloride and sodium phosphate buffer.

SPECIFICATIONS

Light source:	*150W air-cooled Xe lamp or 450W water-cooled Xe lamp (factory option)*
Measurement wavelength range:	*163 to 900 nm (standard detector)* *163 to 1100 nm (optional detector)*
Wavelength accuracy:	*±0.2 nm (at 163 to 180 nm)* *±0.1 nm (at 180 to 250 nm)* *±0.3 nm (at 250 to 500 nm)* *±0.8 nm (at 500 to 800 nm)* *±2.0 nm (at 800 to 1100 nm)*
Wavelength repeatability:	*±0.05 nm (at 163 to 250 nm)* *±0.1 nm (at 250 to 500 nm)* *±0.2 nm (at 500 to 1100 nm)*
Spectral bandwidth:	*0.01 to 15 nm*
Slit width:	*1 to 3000 μm*
Digital Integration Time (D.I.T.):	*0.5 msec to 32 sec*
Acquisition modes:	*Wavelength scan (3 modes), Time scan (slow and fast kinetics), Temperature scan*
Scanning speeds:	*1 to 10000 nm/min (continuous scan)*
Data interval:	*0.025 to 10 nm (continuous scan)* *0.1 to 100 nm (step scan)* *0.5 msec to 60 min (time course)*
CD full scale:	*±10, 200, 2000 mdeg*
CD resolution:	*0.0005 mdeg (at ±10 mdeg full scale)* *0.01 mdeg (at ±200 mdeg full scale)* *0.1 mdeg (at ±2000 mdeg full scale)*
Stray light:	*Less than 0.0003% (200 nm)*
RMS noise:	*185 nm: 0.030 mdeg* *200 nm: 0.020 mdeg* *500 nm: 0.020 mdeg* *(Spectral bandwidth 1 nm, D.I.T. 16 sec)*
Baseline stability:	*±0.03 mdeg/hr* *(Spectral bandwidth 1 nm, response 32 sec, wavelength 290 nm)*
UV measurement:	*Photometric range: 0 to 5 Abs* *Photometric accuracy: ±0.01 Abs*
External input terminal:	*Two channels (input range: -1 to 1 V)*
Shutter:	*Manual and PC control to prevent photobleaching*
Sample compartment:	*140 (W) × 300 (D) × 130 (H) mm* *Large size compartment (factory option): 305 (W) × 420 (D) × 270 (H) mm*
Nitrogen gas purge:	*High efficiency N_2 purge with internal optimization* *for lamp housing, optical system and sample compartment*
Dimensions:	*1115 (W) × 576 (D) × 410 (H) mm*
Weight:	*87 kg*
Power input voltage:	*100, 115, 220, 230, 240 V, 50/60 Hz*
Power consumption:	*320 VA*
PC interface:	*Windows® 2000 or XP Professional OS, Standard RS-232C (serial) communications/control interface*

● Specifications are subject to change without notice.

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ISO 9001 Certified
Products described herein are designed and manufactured by ISO-9001-certified JASCO Corporation.

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