

- $M_w$  of polymers
- Natural & synthetic
- Proteins
- Study aggregation

### A New Beginning

Characterizing dilute polymer solutions using static light scattering (SLS) has never been easier, more accurate, or a better value.

The **BI-MwA** uses a 30 mW, 660 nm diode laser and 7 angles to determine the intensity of scattered light as a function of angle and polymer concentration. From this information one of three plots is constructed with the standard **BI-MwAZP** software: Zimm, Berry, or Debye.

From such plots the weight-average molecular weight,  $M_w$ , the root-mean-square radius (radius of gyration),  $R_g$ , and the second virial coefficient,  $A_2$ , are calculated.

The **BI-MwA** can be used in batch or flow mode, as a chromatography detector, or for following the kinetics of polymerization using **TDSLS**, time-dependent static light scattering.

Best of all, the **BI-MwA** has the highest performance/price ratio of any light scattering detector used for  $M_w$  determination.

### Why Seven Angles?

A single, low angle is sufficient, theoretically, to determine  $M_w$ . However, calibration is still necessary without dust or flare light interfering. This requires an additional  $90^\circ$  measurement. At

least two angles are required to determine  $R_g$  from a straight line fit. However, two points always determine a straight line, with no room for error. Therefore, three angles are the absolute minimum for a least squares fit.

What if dust distorts one of the angular intensity values? What if more accuracy is required? For these reasons the standard

**BI-MwA** optical configuration has seven angles. Other configurations are available on request.

### Rugged Design, Small Footprint

About the size of a polymer handbook, the **BI-MwA** design avoids the pitfalls of similar machines. The flow path is vertical, not horizontal, avoiding trapped bubbles. There are no sharp corners inside the cell, only conical shapes. Previous solutions are more easily flushed.

The cell can withstand much higher pressures than earlier instruments of this type, up to 3.5 MPa, minimizing the chance of an expensive repair.

### Unique Microcontroller and Detector Design

The unique microcontroller used in the **BI-MwA** supports four analog inputs as standard, 16 optional, all with 24 bit resolution. Two-way communication is possible

using a USB port. The **BI-MwA** is completely re-programmable via flash memory. In this way, as requirements change, so does the instrument with a minimum of effort.

The ultra-sensitive CCD detector is uniform in its response, and, coupled with the microcontroller, allows for automatic gain adjustment over many decades of scattered intensity.

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### Applications

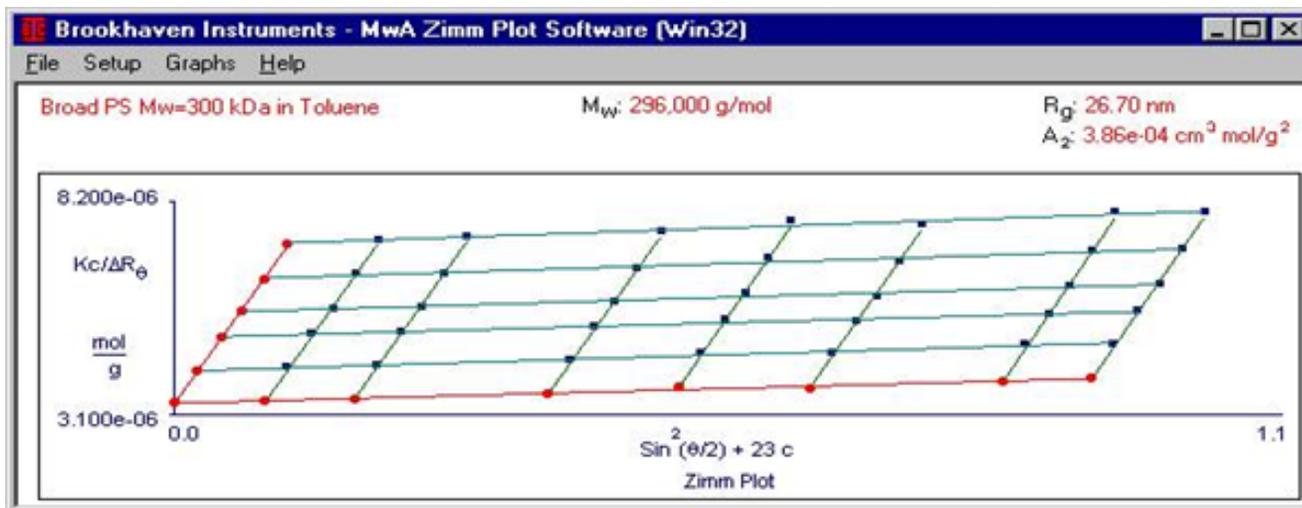
The **BI-MwA** is ideal for studying synthetic and natural polymers in solution, including proteins and polysaccharides. Investigate oligomerization, complex formation, aggregation, stability, and conformation.

SLS is an absolute technique for  $M_w$  determination; whereas, viscosity measurements require calibration and too many assumptions about the polymer/solvent system that may not be true in a particular case.

Even shape may be determined in some cases by plotting  $\log M_w$  vs  $\log R_g$ . The slope of the line can indicate whether the molecule is coiled, rod-like, or spherical.



# BI-MwA Molecular Weight Analyzer



## Specifications

Cell & Optics	Angles	7, nominally 35, 50, 75, 90, 105, 130, and 145, plus a reference angle
	Fiber	Low numerical aperture, integral to cell
	Back Pressure	3.5 MPa (500 psi) maximum
	Fittings	Standard HPLC inlet/outlet panel
	Volume	Cell, 100 $\mu$ L nominal; scattering, 20 nL nominal
	Laser	Nominal 30 mW, 637 nm, vertically polarized
	Cell	PET standard, options by request
Electronics & Detector	Control	Integrated, dedicated, powerful microcontroller
	Detector	CCD, ultra-high sensitivity and spatial uniformity
	Inputs	4 standard with 16 to 24 bit resolution, 15 optional with 24 bit resolution; computer selectable gain; suitable for use with most common RI, UV, and viscometer, thermocouple, thermistor, injector, pressure gauge, and pump outputs
	Power Requirements	100/115/220/240 VAC, 50/60 Hz 25 watts
	Dimensions	195 x 210 x 380 HWD in mm
	Weight	5.5 kg
	Options	BI-DNDC Differential Refractometer (RI detector) BI-TDLS Software for monitoring polymerization kinetics BI-VISC Viscometer for monitoring polymer solutions in TDLS

*A policy of continual improvement may lead to specification changes*

With distributors around the world, contact us for details about the office nearest you.



info@brookhaveninstruments.com  
www.BrookhavenInstruments.com  
Telephone: +1 (631) 758-3200  
Fax: +1 (631) 758-3225

