DynaPro Plate Reader III

Automated characterization of size, stability and molecular weight in industry-standard microwell plates

WYATT TECHNOLOGY

DynaPro Plate Reader III

Dynamic and Static Light Scattering in Microwell Plates

Analyze Size, Screen Stability

Dynamic Light Scattering (DLS) is a core technology for any lab engaged in nanoparticle sizing or biotherapeutic stability studies.

Most DLS instruments require tedious, one-at-a-time sample analyses by manually inserting and replacing cuvettes. The DynaPro Plate Reader III eliminates virtually all of the manual labor involved in measuring many different samples; it even enables fully-automated screening of processing or formulation conditions by making measurements in standard well plates.

Applications

- Develop stable biopharmaceuticals
- Optimize protein buffers for crystallization, SAXS or chromatography
- Formulate theranostic nanoparticles
- Discover small-molecule and peptide inhibitors of protein-protein interactions

Easy, automated all-in-one

With automated, in-plate capabilities you can perform experiments and carry out novel studies you wouldn't have imagined before.

- Acquire in one day the data that would otherwise take weeks
- Screen dozens of samples with thousands of formulation and temperature combinations
- Analyze and visualize an entire dataset at once, then zoom in for a detailed study of the most promising conditions
- Export your results with a single click
- Measure non-destructively and transfer plates to other analytical instruments

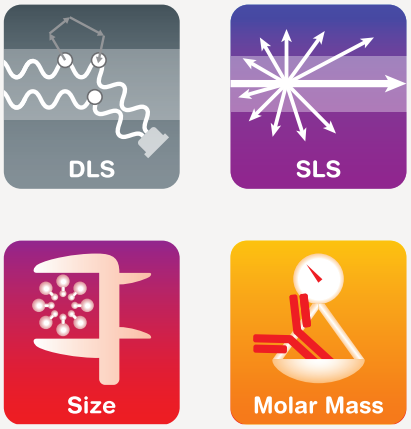
In-plate analysis saves you time and money!

- Measure directly in 96, 384 or 1536 well plates, simply load and walk away
- Microwell plates are disposable and less expensive per sample than disposable cuvettes
- Integrate with plate and liquid-handling robots for even more time savings

Maximize Characterization with DLS and SLS

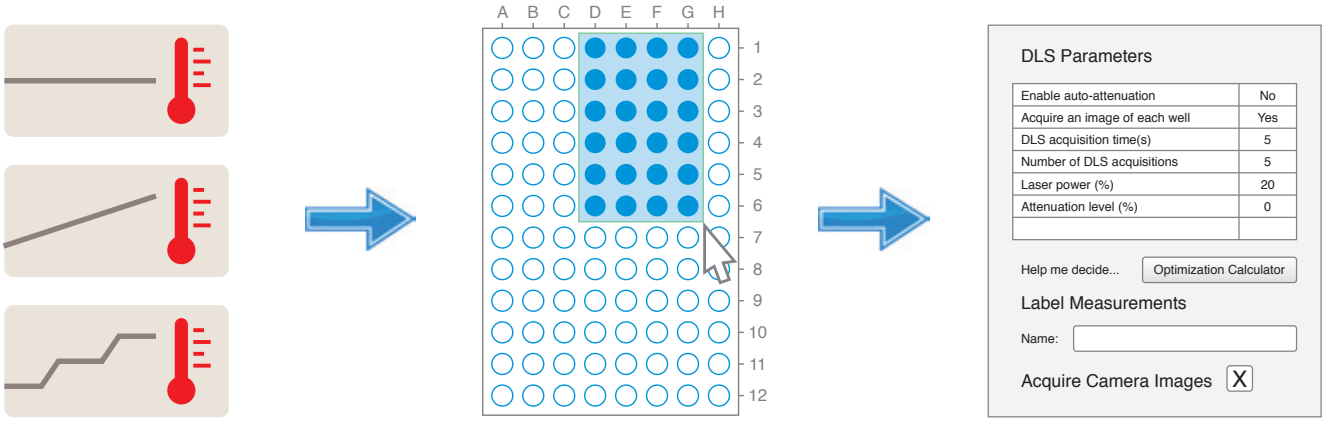
DLS is widely used to characterize proteins, nanoparticles, colloids and macromolecules from subnanometers to several micrometers. Requiring relatively small amounts of material, DLS—along with the new static light scattering (SLS) capabilities—helps assess key factors:

- Size (r_h) and size distributions
- Molar mass (M_w)
- Aggregation and stability indicators (T_m, T_{agg}, k_D, A_2)
- Purity or contamination, turbidity



Automated All-in-One

Design High-throughput Experiments



1. Select temperature profiles

Combine multiple profiles for complex protocols.

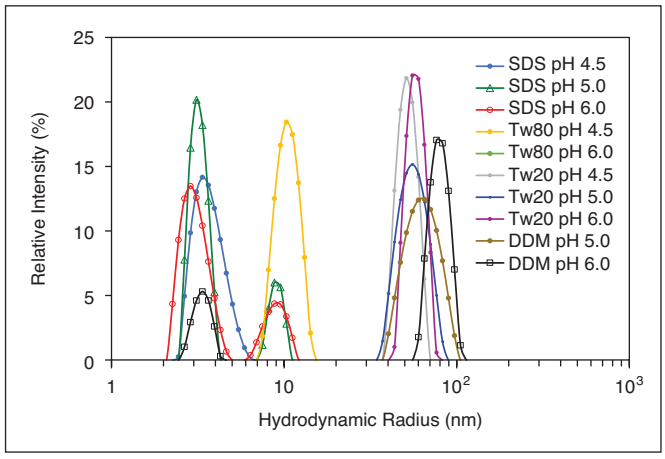
2. Select wells

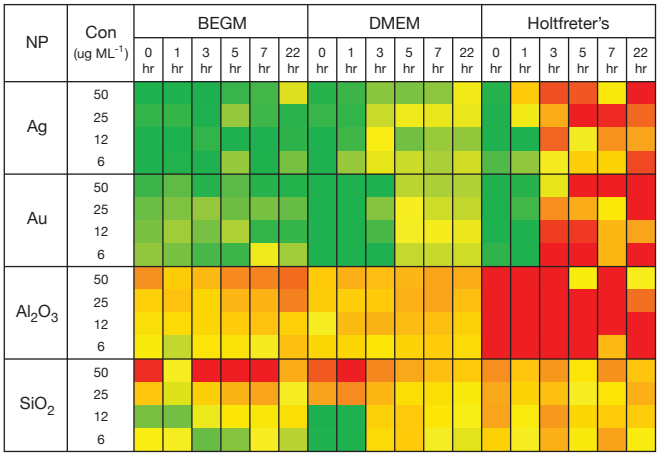
Include replicates and control samples.

3. Finalize design

Fine-tune parameters, add camera images.

Identify Optimal Samples





Which process creates the ideal nanoparticle size range?

Overlay size distributions from multiple wells.

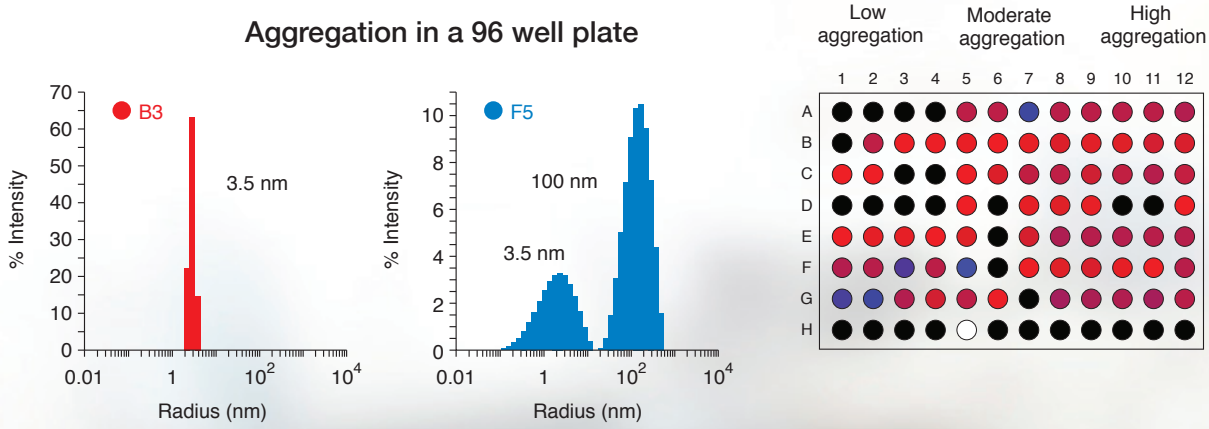
In which media are the particles most stable?

Immediately visualize an aggregation time course.

Advantages

- Compatible with industry-standard 96, 384 or 1536 microwell plates
- Enhanced thermal isolation prevents condensation
- First and only plate reader to provide molar mass
- Sample volumes as low as 4 µL
- Measure from 4 °C to 85 °C
- Infrared wavelength not susceptible to fluorescence
- 21 CFR Part 11 compliant software

Explore content-rich screening data and tackle comprehensive DLS experiments you never thought possible



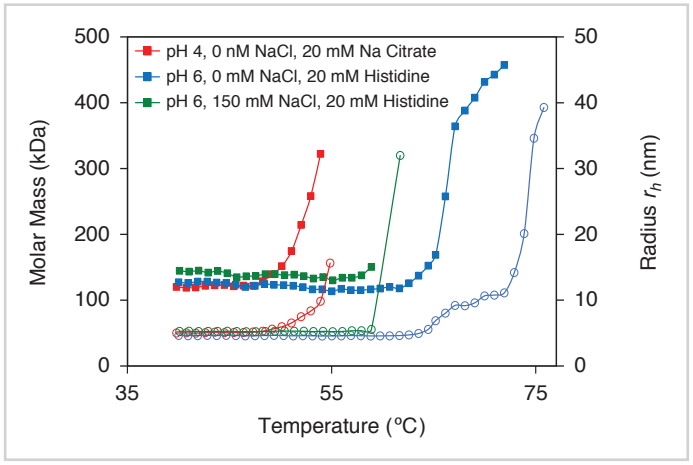
Weeks of Experiments in Just Hours

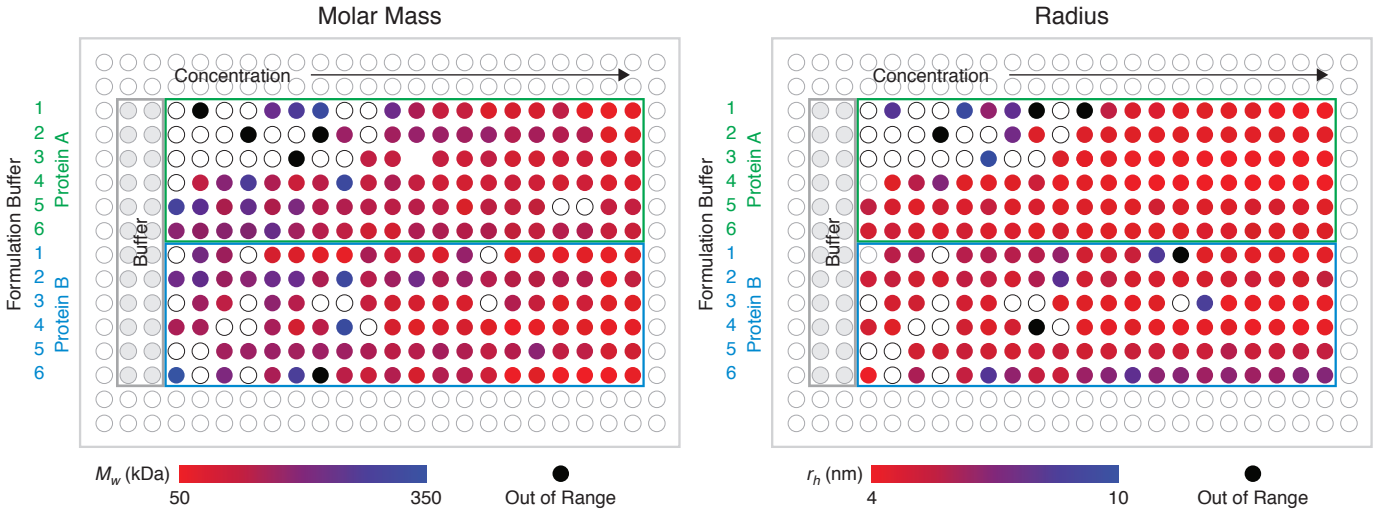
Biologics: Thermal and Colloidal Stability

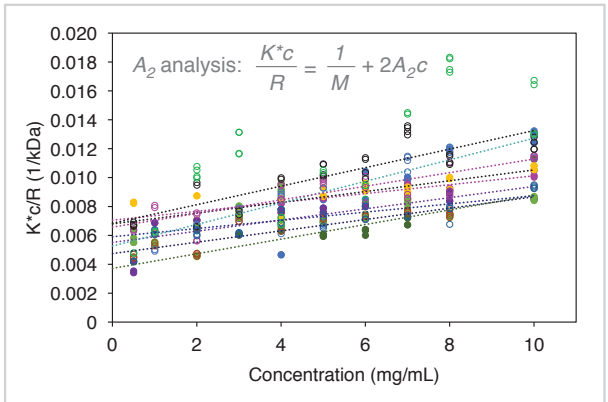
The DynaPro Plate Reader III performs high-throughput screening of biotherapeutic candidates to determine multiple properties of a plateful of candidates and formulations. Shown to the right and below is an analysis of proteins for thermal and colloidal stability.

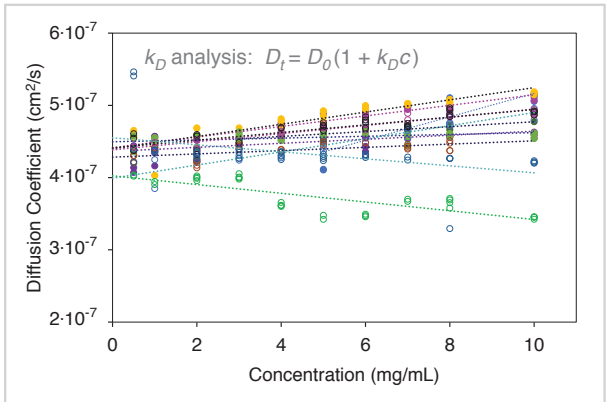
Right: The thermal stability of three formulations of an IgG is determined, in parallel, through changes in size (T_{onset} by DLS) and molar mass (T_{agg} by SLS) across a temperature ramp. Filled squares – molar mass; empty circles – hydrodynamic radii. One formulation exhibits multiple transitions.

Bottom: Analysis of aggregation and colloidal stability for two proteins via 10-point concentration series with two replicates at each concentration and condition. Size and molar mass are indicated in the SpectralView™ heat maps, while plots of second virial coefficient A_2 and diffusion interaction parameter k_D, two measures of colloidal stability, are shown below.





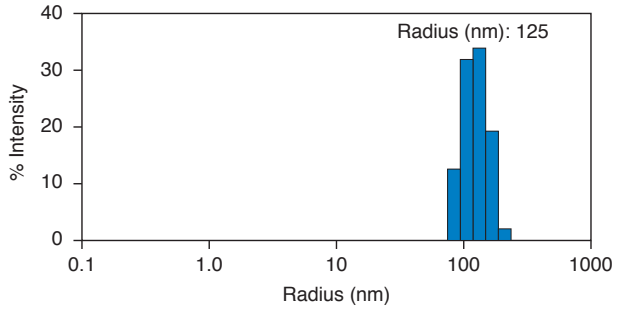


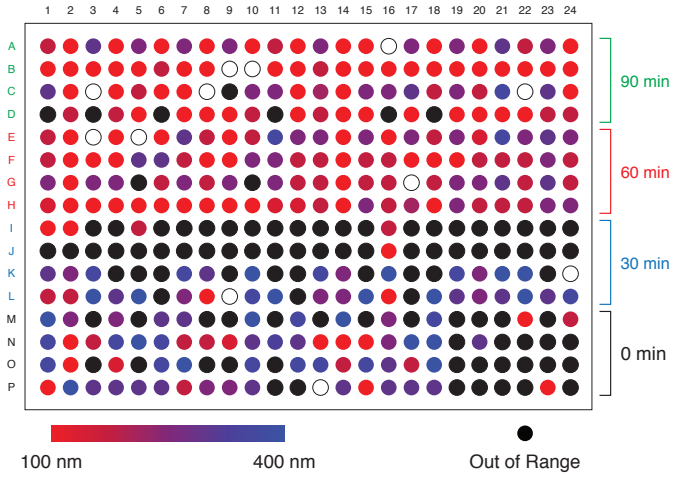


Nanoparticles: Process Optimization

Development of nanoparticle manufacturing processes is greatly accelerated when a matrix of processing conditions is combined with high-throughput particle sizing in the DynaPro Plate Reader III.

In this example, acoustic resonance milling of drug solids to nanoparticle size was performed in 96 well plates and samples aliquoted periodically to a 384 well plate for analysis. Conditions tested included surfactant type, ratio of surfactant to drug solids and length of milling time. Analysis parameters were median size D50 and degree of polydispersity. The SpectralView heat map indicates D50 size with different sections representing four processing times.



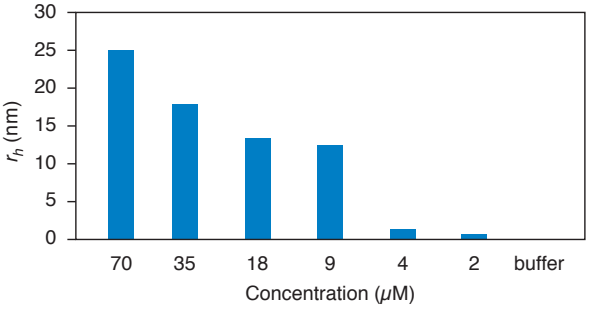


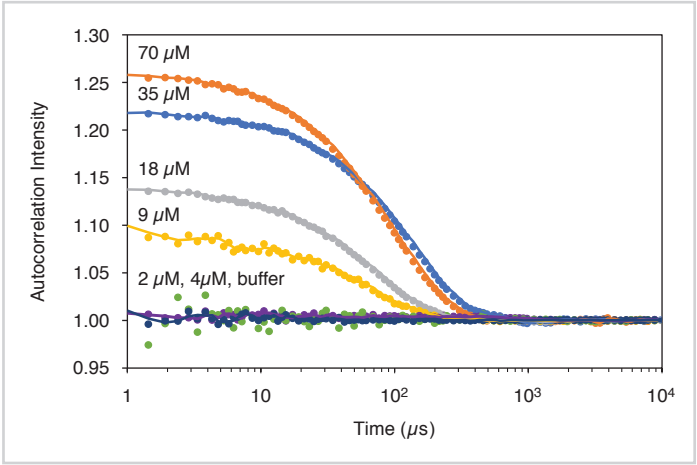
Polymer / surfactant additives	Drug compound nanoparticle measurements	
	D50 (nm)	%Pd
HPMC / SDS	144	23.2
HPC-SL / SDS	127	22.7
PVP K29-32 / SDS	127	22.9
Poloxamer 407	228	23.1
Polysorbate 80	129	23.7

Small Molecules: Compound Library Screening for Drug Discovery

Large aggregates of small-molecule drugs are known to produce false positives through non-specific binding and inhibition of protein targets. Compounds may be screened in different buffers to identify aggregation conditions and optimal, non-aggregating buffers.

These DLS data show autocorrelation and size results for a common small-molecule drug compound. The critical aggregation concentration (CAC) is identified at approximately 4 µM.





Specifications

Dynamic Light Scattering	
Size Range	0.5 to 1000 nm (hydrodynamic radius, r_h)
Minimum Concentration at 14 kDa	0.125 mg/mL (50 µL lysozyme in Greiner 384 well plates)
Static Light Scattering	
Molar Mass Range	1000 to 1,000,000 Da
Minimum Concentration at 67 kDa	1 mg/mL (50 µL BSA in Greiner 384 well plate)
Well Plates	
Supported Formats	96, 384, or 1536 Many industry-standard well plates are supported
Minimum Sample Volume	4 µL (2 mg/mL lysozyme in 1536 well plate)
Optics	
Laser Wavelength	830 nm
Laser Power	Programmable 10% to 100%
Attenuation Range	1 to 10^5
Temperature Control	4 °C to 85 °C*
Read Time per Well	5 to 20 seconds (~1.5 hours for a 384 well plate)
Electronics	
Correlator	512 channels, 100 ns sampling time in a multi-tau layout
Onboard Camera	3 megapixels, operates up to 50 °C
Digital Communication	Ethernet (TCP/IP)
Dimensions	60 cm (l) x 36 cm (w) x 25 cm (h)

Warranty: All Wyatt instruments are guaranteed against manufacturing defects for 1 year.

* Absolute accuracy of ± 0.5 °C from 4 °C to 50 °C, and ± 1 °C from 50 °C to 85 °C. Minimum temperature of 4 °C requires a laboratory ambient temperature of 24 °C or below.

Wyatt Technology is committed to continual improvement. Specifications are subject to change without notice.

Left to right:
Geofrey K. Wyatt, President
Dr. Philip J. Wyatt, Chief Executive Officer
Clifford D. Wyatt, Executive Vice President

For more than 35 years, we've operated as one of the very few remaining family-owned businesses in the analytical instrument industry. With installations in more than 65 countries, over 13,000 refereed journal publications citing our instruments and more than 25 PhD scientists on staff, we take great pride in the worldwide recognition that Wyatt Technology has received as a leading manufacturer of instruments and software for absolute macromolecular and nanoparticle characterization. Our dedication to providing customers with comprehensive training and personal support has made us the gold standard in this field.

The DynaPro Plate Reader III is just one of the many tools in the Light Scattering Toolkit for Essential Biophysical and Nanoparticle Characterization.

Learn more at www.wyatt.com

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