DynaPro Plate Reader III

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

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.
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
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.

<table>
<thead>
<tr>
<th>Polymer/surfactant additives</th>
<th>Drug compound nanoparticle measurements</th>
</tr>
</thead>
<tbody>
<tr>
<td>D50 (nm)</td>
<td>%Pd</td>
</tr>
<tr>
<td>HPMC/SDS</td>
<td>144</td>
</tr>
<tr>
<td>HPC-SL/SDS</td>
<td>127</td>
</tr>
<tr>
<td>PVP K29-32/SDS</td>
<td>127</td>
</tr>
<tr>
<td>Poloxamer 407</td>
<td>228</td>
</tr>
<tr>
<td>Polysorbate 80</td>
<td>129</td>
</tr>
</tbody>
</table>

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
- **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 ºC to 85 ºC**

### 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 ºC
- **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 ºC from 4 ºC to 50 ºC, and ± 1 ºC from 50 ºC to 85 ºC. Minimum temperature of 4 ºC requires a laboratory ambient temperature of 24 ºC or below.

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

---

Learn more at [www.wyatt.com](http://www.wyatt.com)