Protein size

Molecular weight

Zetasizer
μV

Zetasizer Micro V

Determine size and stability of proteins
with as little as 2μL of sample

Malvern

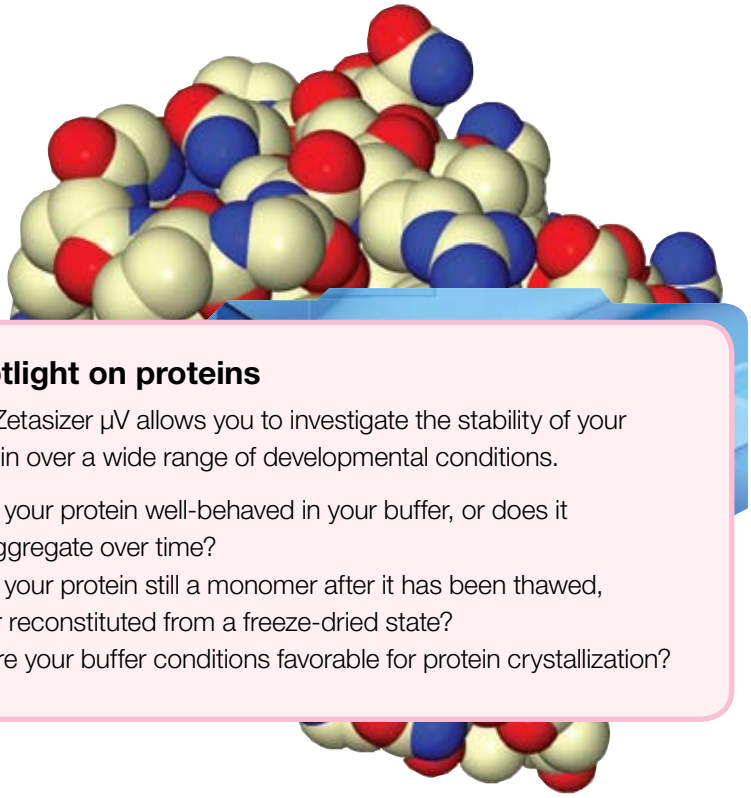
Detailed specification sheets from www.malvern.com/zetasizeruv

Designed with Protein Specialists in mind

The Zetasizer μV

Designed primarily for protein specialists, the new Zetasizer μV combines the industry's smallest sample volume and highest sensitivity along with rapid, high-precision temperature control to make this the leading protein-dedicated batch DLS instrument.

- Dynamic light scattering enables the accurate determination of protein size, the derived molecular weight and the proportion of any aggregates
- Static light scattering (also known as classical light scattering) enables you to determine the absolute molecular weight of a protein and its 2nd virial coefficient in a given sample buffer – a value indicating how well your protein is likely to stay in solution



Spotlight on proteins

The Zetasizer μV allows you to investigate the stability of your protein over a wide range of developmental conditions.

- Is your protein well-behaved in your buffer, or does it aggregate over time?
- Is your protein still a monomer after it has been thawed, or reconstituted from a freeze-dried state?
- Are your buffer conditions favorable for protein crystallization?

Rapidly and repeatably achieve the highest sensitivity in the smallest volume

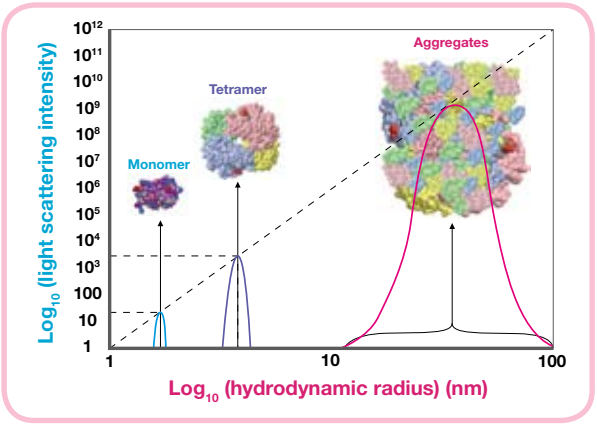
- Characterize very low concentrations of small proteins
- Use a fully recoverable sample volume of only 2μL, requiring only 40ng of a 65kDa protein
- Automatic power attenuation ensures that the signal reaching the detector is always fully optimized
- Fast, wide-range temperature control enables automated temperature trend measurements; ideal for melting point determination
- Uses the world's favorite, user-friendly, dedicated DLS software to set up standard operating procedures (SOPs) to maintain consistency between measurement procedures and export your data in multiple formats
- Connect to a size-exclusion chromatography system to determine the hydrodynamic size of the eluting peaks without calibration

Light Scattering - more than size measurement

The sensitivity, simplicity and non-invasive nature of dynamic light scattering makes the technique ideally suited for detecting aggregates and monitoring protein stability

Dynamic Light Scattering (DLS)

Single Mode Fiber (SMF) technology takes protein measurements by the Zetasizer μV to new levels of sensitivity enabling the measurement of samples with a hydrodynamic radius as small as 0.3nm. An important benefit of DLS is that samples can be measured in their original buffers. This means that the original solvation and oligomerization states are preserved.



DLS as a Size Exclusion Chromatography (SEC) detector

Dynamic light scattering is an absolute size measurement technique, as calibration is not required. Using DLS as an SEC detector can therefore be called Absolute SEC or ASEC. This technique can be used to identify the peaks in an SEC output without requiring calibration.

Static (classical) Light Scattering (SLS)

The classical Debye plot is used to determine the molecular weight of isotropically scattering globular proteins up to $2x10^7$Da and random coiled polymers up to $5x10^5$Da without the necessity for multi-angle measurements. The software can combine the SLS and DLS data to give an estimation of protein shape.

Parameters measured include:

- Mean hydrodynamic radius
- Polydispersity Index indicating the presence of a mixture of oligomers or aggregates
- Molecular size distribution
- 2nd virial coefficient
- Molecular weight estimated from size using established models
- Absolute molecular weight
- Size of proteins as they elute from an SEC column
- Melting points
- Molecular shape

Insight into your proteins

Why size and molecular weight characterization is important in protein research

The Zetasizer μV can be used during bioprocessing to screen for the effects of environmental factors, such as temperature, ionic strength, protein concentration, the presence of certain ligands or ions, or pH on a protein's monomeric or oligomeric state. The measurements can be made in any buffer, without sample modification.

Typical applications

Aggregate detection

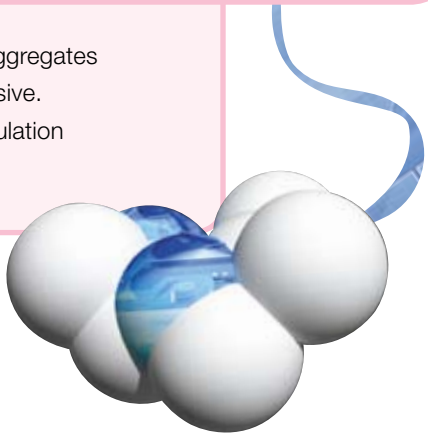
Light scattering can be used to detect aggregates in protein solutions, optimize storage conditions to avoid aggregation, and screen small molecule libraries for aggregated compounds that could act as non-specific inhibitors.

Drug development

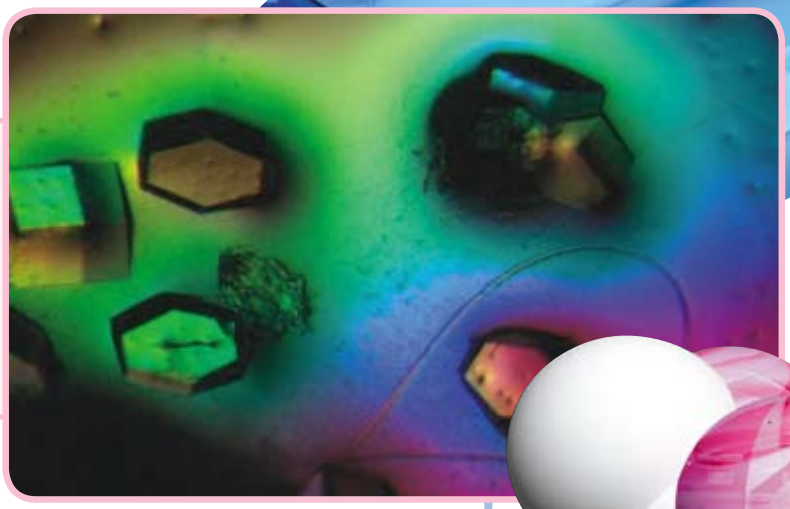
The Zetasizer μV can help screen buffers, to find optimal crystallization conditions to speed up the structure determination process.

Protein therapeutics

The presence of aggregates can cause adverse effects in several ways. Large aggregates are easily removed by filtration whereas smaller soluble aggregates are more elusive. The sensitivity of the technique means that DLS is ideal for purification and formulation development.



Typical applications



Crystal screening

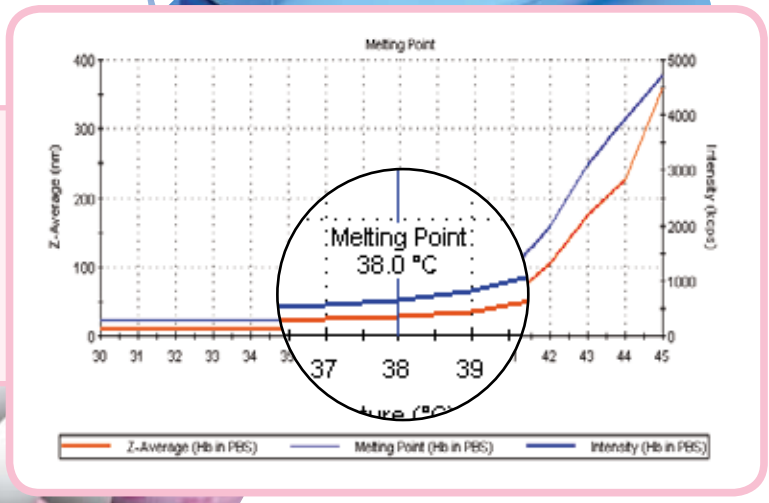
Protein purity is important in the production of crystals for determining the molecular structure by X-ray diffraction. The Zetasizer μV requires minimal amounts of sample and enables you to determine the ideal conditions for your protein stock solution prior to setting up crystallization screens.

Protein solubility screening

The Zetasizer μV can monitor changes in size, scattering, intensity and polydispersity over time to optimize conditions for long-term stability and shelf-life.

Identify thermal characteristics

Stable, accurate and rapid temperature control is part of the fundamental design of the Zetasizer μV, reducing the time it takes to run temperature trend measurements. Predefined temperature trend methods enable the automated determination of thermal denaturation points.



Software designed for protein specialists

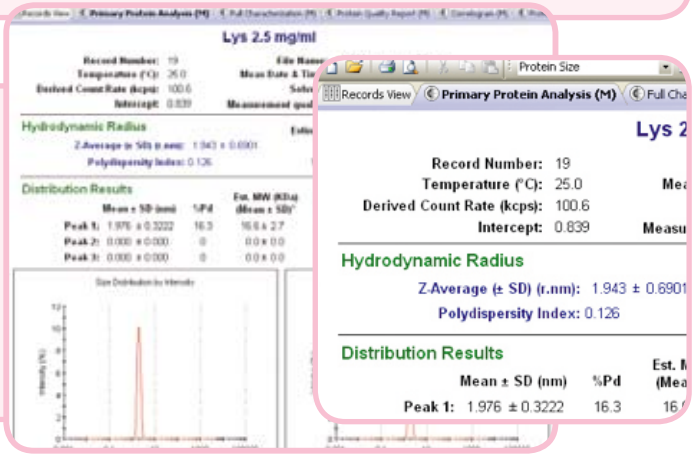
It's no coincidence that our user-friendly, flexible and intuitive software is also the world's most popular.

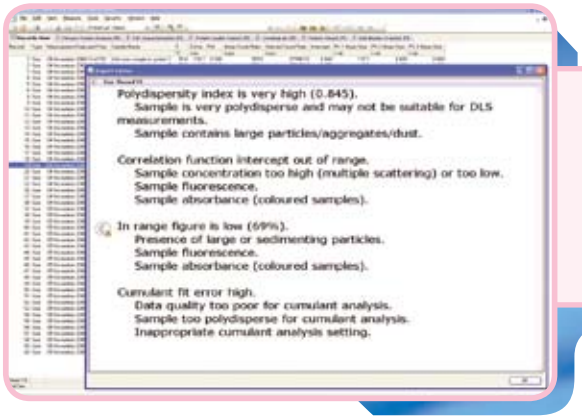
SOPs

Standard operating procedures (SOPs) simplify the way measurements are performed. Any measurement procedure can be customized to the specific needs of a test or sample. Each SOP can be saved so that experiments can be repeated with identical protocols.

Protein Workspace

The default setup of the software is customized for the analysis of proteins and biomolecules. Everything about this interface, from the parameters reported, the views of the results, the units used and the measurement procedures are geared to support the requirements of the protein specialist





Expert Advice System

Producing the data is now easy, but how good is it? The Zetasizer μV incorporates an expert advice system that utilises the expertise of Malvern scientists to examine data quality and assist with method improvement.

Protein utilities

This set of tools is designed to help the user with experimental design and interpretation of the data. Assistance is available for recommended sample concentrations and 'what if' scenarios are available to provide shape estimates such as the Perrin factor, prolate and oblate axial ratios, as well as an estimate of molecular weight from the size measured.

Protein wizard

This wizard is an expert report in the software that can assess your sample from a number of points of view. It can give an idea of the total proportion of aggregates in a sample, the ratios of possible oligomeric structures, and can also suggest whether a sample might be suitable for crystallization trials.

Now you can...

Add the power of advanced light scattering techniques to your laboratory to add insight into the structure and stability of your proteins.

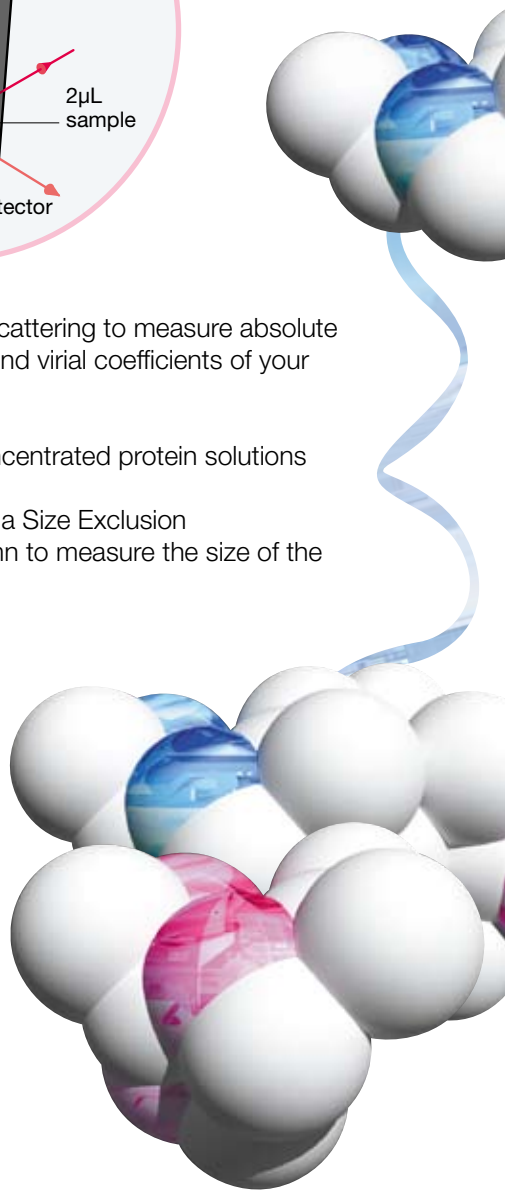
- Use nanogram amounts of sample to accurately and reproducibly measure the size of your protein
- Easily retrieve your data, and export to your chosen program, or directly cut and past the graphs into your reports
- Optimize the stability of your protein samples
- Employ classical light scattering to measure absolute molecular weight and 2nd virial coefficients of your protein
- Measure dilute and concentrated protein solutions
- Connect the system to a Size Exclusion Chromatography column to measure the size of the proteins eluted

...with ease

Worldwide local support

Support for applications and technical help – Malvern has the most scientists and technical specialists in light scattering systems and applications of any company.

Achieve the best accuracy, reproducibility and ease of use with the most sensitive system available – The Zetasizer μV



Specifications

The Zetasizer μV is dedicated to the measurement of the size and molecular weight of proteins, requiring only nanograms of a typical 65kDa molecule.

Parameter	Zetasizer μV
Size range (radius)	0.3nm to 0.5 microns
Molecular weight range	380Da to >20MDa
Minimum sample volume	2μL
Sensitivity at minimum volume	0.1mg/mL lysozyme
High concentration	Yes - Optically clear samples
SEC detector mode	8μL flow cell (option), external start trigger from SEC system
Laser	60mW, 830nm
Temperature range	2°C to 90°C ±0.1°C
Weight	14kg
Dimensions	W:D:H, 350mm x 410mm x 170mm
Power	90V-260V AC, 50/60Hz, 100W
Dry air	100kPa (1bar), 4mm o.d. tubing
Computer interface	USB

Main features

- Only 2μL sample required (fully recoverable)
- Simple to operate using graphical user interface
- Fast, wide range temperature control enables automatic temperature trend measurements
- Standard operating procedures for repeatability
- Uses world favorite DLS software
- Global after sales support network for training and service

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Zetasizer μV

detailed specifications at www.malvern.com

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