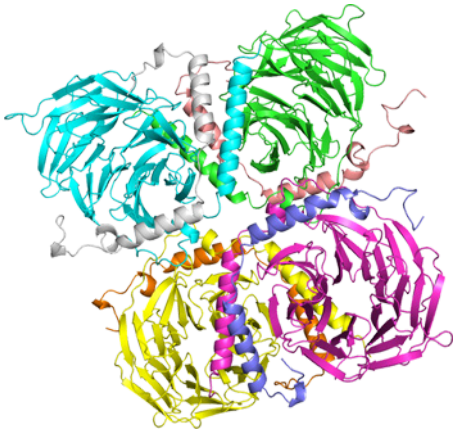
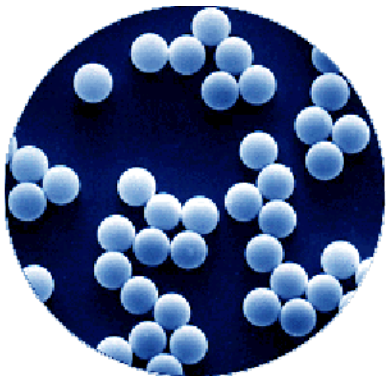
Brookhaven Instruments Corporation

NanoBrook Omni

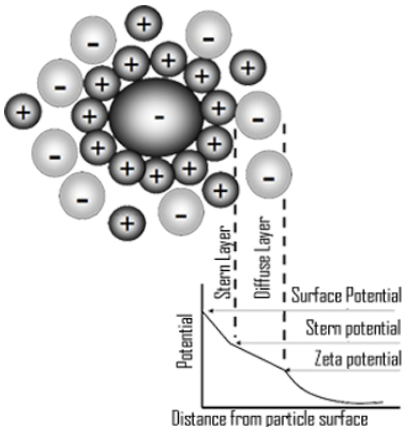
Particle Sizer and Zeta Potential Analyzer



Proteins: Size, Zeta Potential, Molecular Weight



Nanoparticle Sizing



Zeta Potential of Nanoparticles

Protein Sizer | Nanoparticle Sizing | Zeta Potential | Molecular Weight

NOVA INSTRUMENTS

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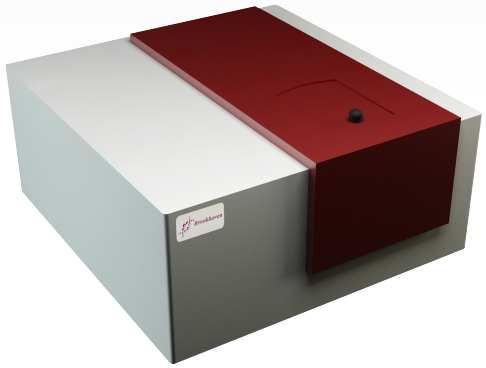


SIZING

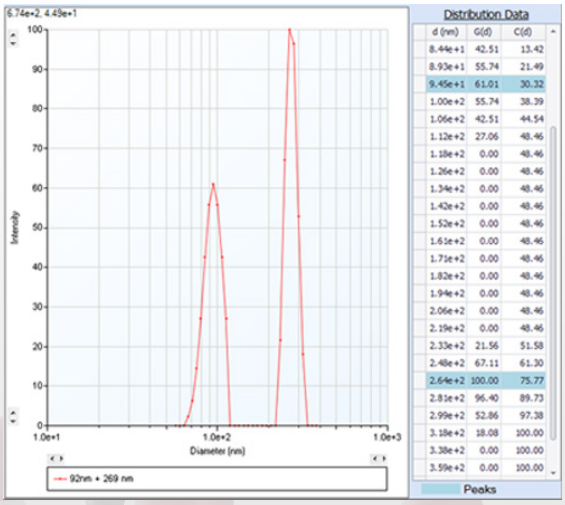
- Rapid and accurate nanoparticle size distributions
- Multimodal & unimodal size distribution software
- ISO 13321 and ISO 22412 compliant results
- Range: 0.3 nm to 10 µm
- Three measurement angles: 90°, 173° & 15°
- High power 40 mW temperature-controlled semiconductor laser
- Temperature control, -5 °C to 110 °C
- Compact bench top unit, USB connection
- Molecular weight determination (relative and absolute through Debye plot)

ZETA POTENTIAL

- Zeta potential for difficult applications
  - For proteins, peptides, mAb, RNA, and other biological samples
  - For zeta potential in organic solvents
  - For oily or viscous media
  - For high-salt suspensions
  - For samples near the I.E.P.
- PALS: 1,000 times more sensitive than other techniques
- Disposable cuvettes, no contamination or alignment
- Built in automatic procedures and parameters (SOP)

Rapid, Reliable, and Accurate Analysis

The new NanoBrook Omni particle size and zeta potential analyzer incorporates all you need for fast, routine, sub-micron measurements of size and zeta potential. Based on the principles of Dynamic Light Scattering (DLS) for particle sizing and distribution, and on Doppler velocimetry (electrophoretic light scattering, ELS) for zeta potential, most measurements only take a minute or two. The instrument also includes Phase Analysis Light Scattering (PALS) measurements for samples with low mobilities (saline, PBS, organic solvents).

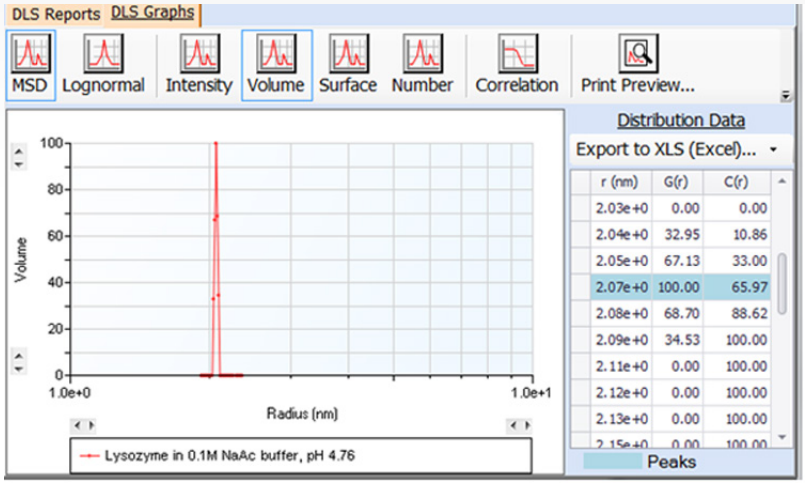


Three Scattering Angles

Measurements of traditional colloids are typically made at 90° scattering angle due to the unbiased results measured. For nanoparticles and proteins, IgG and peptides, these < 50 nm samples can be measured using the backscattering angle (173°) for best signal to noise and reproducibility of measurements. Finally the 15° detection angle can be selected for added sensitivity for trace aggregate signatures. Zeta potential measurements are always performed using the 15° detection angle to minimize diffusion broadening.

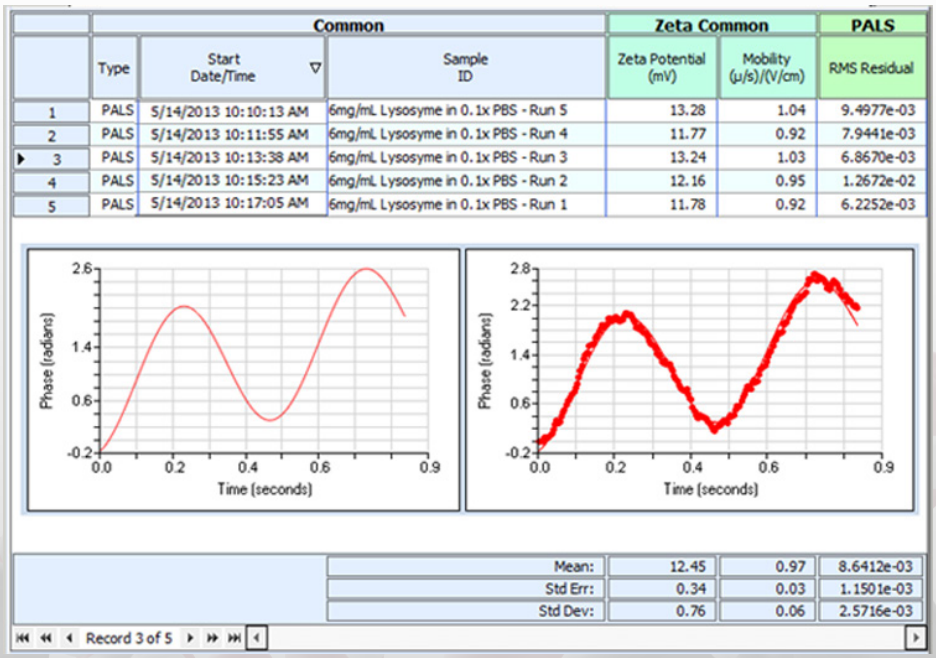
Principles of Operation - Sizing

Dilute suspensions, on the order of 0.0001 to 1.0% v/v are prepared, using suitable wetting and/or dispersing agents, if required. A small ultrasonicator is sometimes useful in breaking up loosely-held agglomerates. Sample volume may be reduced to 50 µL with a polystyrene, U-shaped, disposable cuvette and the sample is recoverable. Also available are square polystyrene or glass cuvettes (two to four mL), one as small as 10 µL (non-disposable). In addition, disposable, glass round cells with reusable Teflon stoppers are used for aggressive solvent suspensions. In all cases, only a few minutes are required for the sample and cell to equilibrate with the actively controlled temperature environment within the NanoBrook Omni. A dust rejection algorithm may be utilized to remove data resulting from dust and very large aggregates in your sample.



Principles of Operation - Zeta Potential

The NanoBrook Omni utilizes true phase analysis light scattering to determine the electrophoretic mobility of charged, colloidal suspensions. Unlike its cousin, Laser Doppler Velocimetry (LDV, [sometimes called Laser Doppler Electrophoresis, LDE]), Brookhaven's PALS technique does not require the application of large fields which may result in thermal problems or denaturation, because in the measurement of phase shift, the particles need only to move a fraction of their own diameter to yield good results. In salt concentrations up to 3 molar and with electric fields as small as 1 or 2 V/cm (with 2 to 4 volts typically applied), enough movement is induced to yield excellent results. In addition, the Autotracking feature compensates for thermal drift and particle sedimentation effects.



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Specifications

Sample Type	Sizing: nano particle and colloidal-sized materials, in any non-absorbing liquid. Zeta potential: proteins, nano particle, polymer and colloidal-sized materials, suspended in any non-absorbing liquid, with relative permittivity (dielectric constant) > 1.5 and viscosity < 30 cP.
Size Range	Sizing: 0.3 nm to 10 µm diameter, depending on refractive index and concentration Zeta potential: 1 nm to 100 µm, sample dependent Molecular Weight: ~980 Da to 20 MDa, sample dependent
Mobility Range	10^{-11} to 10^{-7} m^2 /V*s
Zeta potential range	-500 mV to 500 mV, sample dependent
Maximum sample conductivity	Sizing: unlimited Zeta potential: 220 mS/cm
Sample Cells	Sizing: 1 to 4 mL disposable plastic, 50 µL disposable, 40 µL quartz flow cell, 10 µL quartz cell minimum Zeta potential: 1250 µL, 210 µL minimum
Concentration Range	Sizing: 0.1 ppm to 50 mg/mL, depending on refractive index and concentration Zeta potential: 40% w/v, sample dependent
Signal Processing	Sizing: Dynamic Light Scattering, DLS Zeta potential: Electrophoretic & true Phase Analysis Light Scattering, ELS & PALS Molecular Weight: SLS Debye Plot & MHS Parameters (DLS)
Correlator	Brookhaven's TurboCorr, multitau, research grade with 522 hardware channels, covering the equivalent of 10^{10} linearly-spaced channels, 100% efficiency, real-time operation over the entire delay-time range
Precision	Sizing: ± 1% typical Zeta potential: ± 3% typical
Accuracy	Sizing: ± 2% on NIST traceable latex standards Zeta potential: 2.53 ±0.12 µm • cm/V • s for aqueous systems with NIST SRM1980 Molecular Weight: ± 10% typical
Temperature Control	-5 ° C to 110 ° C, ± 0.1 ° C, active control. No external circulator required.
Condensation Control	Purge facility using dry air, nitrogen preferred
Standard Laser	40 mW 640 nm temperature-controlled red semiconductor laser. Alternative wavelengths available.
Detector	Avalanche photodiode detector with highest Quantum Efficiency and low dead time
Scattering Angle	90°, 173° & 15°
Data Presentation	Average & width, lognormal fit, and multimodal size distribution for sizing Doppler Frequency Shift, electrophoretic mobility, zeta potential using Smoluchowski, Hückel, or Henry
Compliance	ISO13321 and ISO22412 compliant results for sizing
Power Requirements	100/115/220/240 VAC, 50/60 Hz, 150 Watts
Dimensions	23.3 x 42.7 x 48.1 cm (HWD)
Weight	15 kg
Environmental Characteristics	Temperature 10 ° C to 75 ° C Humidity 0% to 95%, non-condensing
CE Certificate	Class I laser product, EN 60825-1:2001, CDRH

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