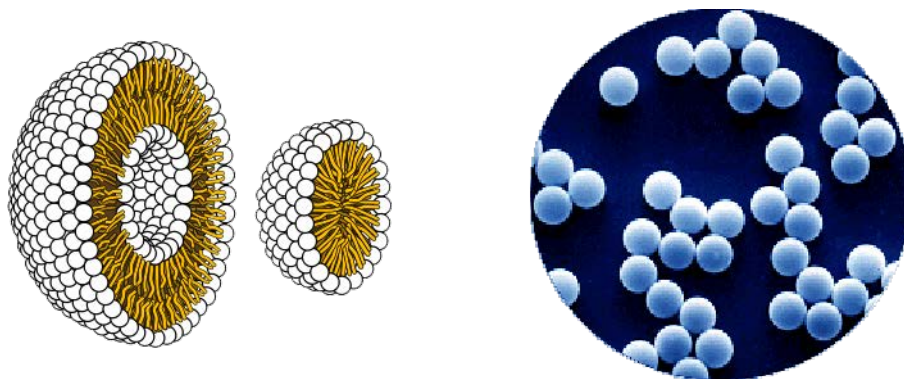


# **NanoBrook 90Plus**

Particle Size Analyzer



Nanoparticle Sizing

# NanoBrook 90Plus

## Particle Size Analyzer



- Rapid and accurate particle size distributions
- Multimodal & unimodal size distribution software
- ISO 13321 & ISO 22412 compliant results
- Range: 0.3 nm to 6  $\mu\text{m}$
- Customizable reports
- Ideal for fast, routine sizing applications in research or quality control
- High power 40 mW temperature-controlled semiconductor laser
- Avalanche Photodiode detector with highest Quantum Efficiency and low dead time
- Dynamic light scattering at 90° & 15°
- Temperature control: -5 °C to 110 °C
- Compact bench top unit, USB connection
- Molecular weight determination (relative and absolute through Debye plot)

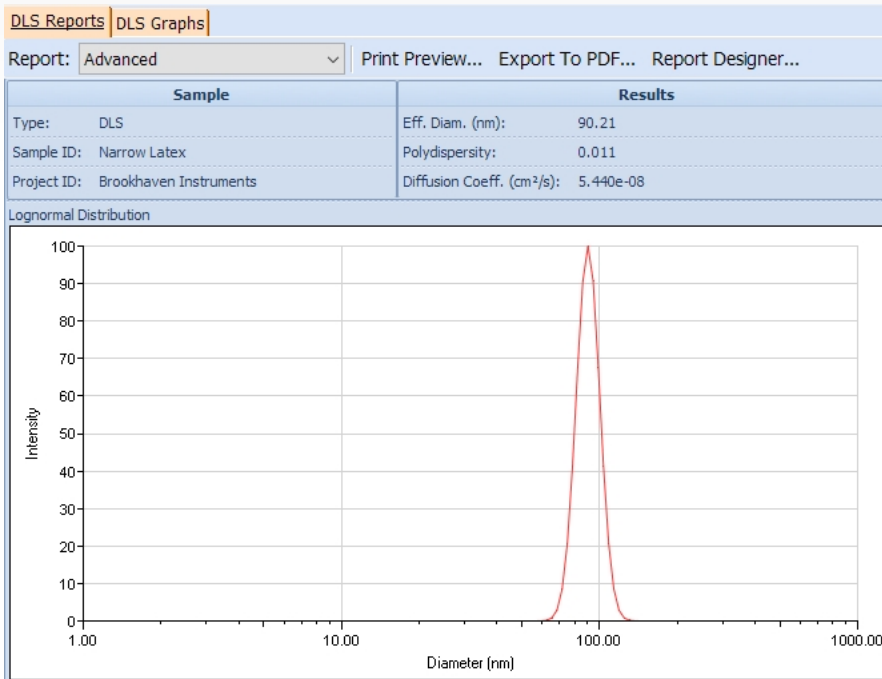
## Rapid, Reliable, and Accurate Analysis

The NanoBrook 90Plus particle size analyzer incorporates all you need for fast, routine, sub-micron measurements. Based on the principles of Dynamic Light Scattering (DLS), most measurements only take a minute or two. The instrument can be upgraded later on to include zeta potential measurement capability. Please refer to the 90Plus Zeta, 90Plus PALS or NanoBrook Omni literature for instruments combining sizing and zeta potential.

## Principles of Operation

Dilute suspensions, on the order of 0.0001 to 1.0% v/v are prepared, using suitable wetting and/or dispersing agents. A small ultrasonicator is sometimes useful in breaking up loosely-held agglomerates. Only two or three mL of suspension are required to make a measurement. Disposable, polystyrene square cells are used for aqueous and simple alcohol suspensions. Disposable, glass round cells with reusable Teflon stoppers are used for aggressive solvent suspensions. Just a few minutes are required for the sample and cell to equilibrate with the actively controlled temperature environment inside the NanoBrook 90Plus. A square glass cell is available if desired and special small-volume cells may be used to reduce the volume of material needed to just 50  $\mu\text{L}$  or 10  $\mu\text{L}$ . For aqueous samples the 50  $\mu\text{L}$  is a disposable cuvette. In all cases the sample is recoverable.

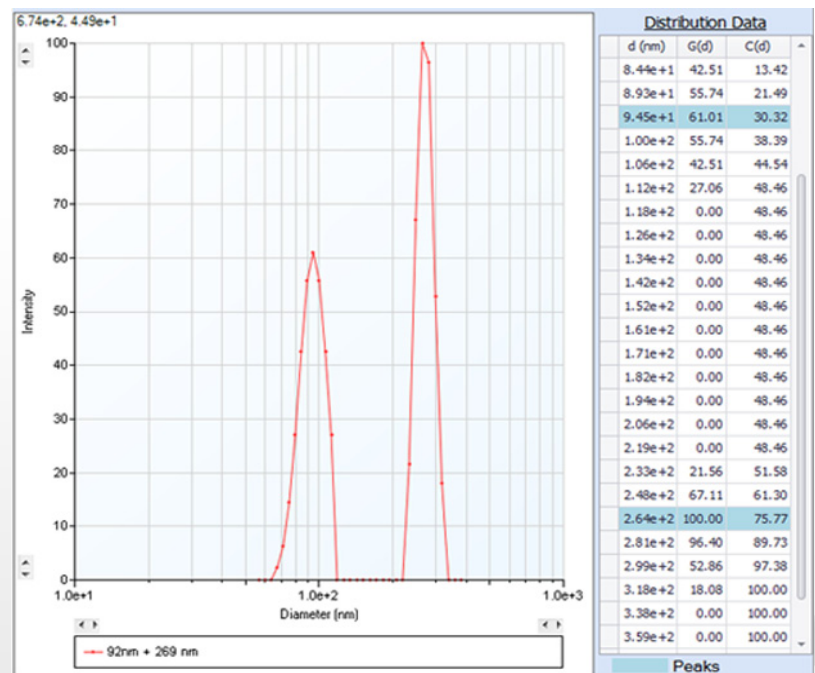
## Data Presentation



The NanoBrook 90Plus particle size analyzer offers results in a variety of formats. For routine determinations an average diameter (Effective Diameter) and a measure of the distribution width (Polydispersity) are sufficient for many applications. This is illustrated on the left for latex with a narrow size distribution. The second choice is to fit these values to a lognormal distribution, allowing the user to visualize the size distribution and to interpolate cumulative and differential results at 5% intervals.

The figure on the right shows an example of a data format suitable for more complicated, multimodal size distributions. Here, a numerical algorithm, including Mie theory, is used. These results are for a mixture of known latex particles. Positions of the measured particle sizes on the accompanying graph are in excellent agreement with the known sizes of 92 and 269 nm.

During a measurement, the display can be switched interactively between any one of the following: correlation function, lognormal, or multimodal size distribution; each shown "live" as data are accumulated. The live display is particularly useful in determining the end-point of a measurement where multimodal distribution shape may be important.



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## Particle Size Analyzer

### Specifications

<b>Sample Type</b>	Most nanoparticle, and colloidal-sized materials, in any non-absorbing liquid
<b>Size Range</b>	Sizing: 0.3 nm to 6 $\mu$ m diameter, depending on refractive index and concentration Molecular Weight: ~9,800 Da to 20 MDa, sample dependent
<b>Sample Cells</b>	1 to 3 mL disposable plastic, 50 $\mu$ L disposable, 40 $\mu$ L quartz flow cell, 10 $\mu$ L quartz minimum
<b>Concentration Range</b>	2 ppm to 50 mg/mL, depending on refractive index and concentration
<b>Signal Processing</b>	Dynamic Light Scattering, DLS
<b>Correlator</b>	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.
<b>Precision</b>	$\pm$ 1% typically
<b>Temperature Control</b>	-5 $^{\circ}$ C to 110 $^{\circ}$ C, $\pm$ 0.1 $^{\circ}$ C, active control. No external circulator required.
<b>Condensation Control</b>	Purge facility using dry air, nitrogen preferred
<b>Laser</b>	40 mW 640 nm temperature-controlled red semiconductor laser. Alternative wavelengths available.
<b>Scattering Angle</b>	90 $^{\circ}$ & 15 $^{\circ}$
<b>Data Presentation</b>	Average & width, lognormal fit, and multimodal size distribution standard
<b>Compliance</b>	ISO13321 and ISO22412 compliant results
<b>Power Requirements</b>	100/115/220/240 VAC, 50/60 Hz, 150 Watts
<b>Dimensions</b>	23.3 x 42.7 x 48.1 cm (HWD)
<b>Weight</b>	15 kg
<b>Environmental Characteristics</b>	Temperature 10 $^{\circ}$ C to 75 $^{\circ}$ C Humidity 0% to 95%, non-condensing
<b>CE Certificate</b>	Class I laser product, EN 60825-1:2001, CDRH