Multiplelabs
Turnkey Laboratories Solutions

Analytical®
Technologies Limited

# NSZA -3000 Series

## Nanoparticle Size and Zeta Potential Analyzers


EPCC / PRODUCTS / APPLICATION / SOFTWARE / ACCESSORIES / CONSUMABLES / SERVICES

**Analytical Technologies Limited**

An ISO 9001 Certified Company

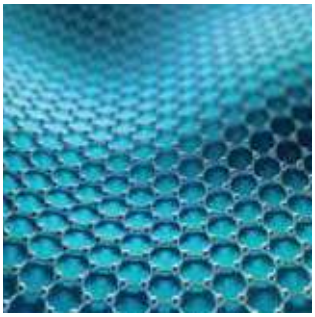
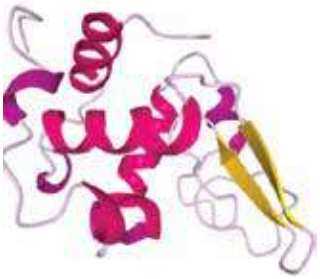
**www.analyticalgroup.net**

## Nanoparticle Size and Zeta Potential Analyzers

The NSZA Series is the latest generation of nanoparticle size and zeta potential analyzers designed by Analytical Technology Limited. Dynamic light scattering (DLS), electrophoretic light scattering (ELS) and static light scattering (SLS) are integrated into the system to provide accurate measurements on particle size, zeta potential and molecular weight.

The NSZA Series is widely applied in academic and manufacturing processes of various fields including but not limited to: chemical engineering, pharmaceuticals, food and beverage, inks and pigments, and life science.

## Applications

| Sectors | Samples | Significance |
|---|---|---|
| **Nanomaterials**  | Silver nanoparticles (AgNPs), quantum dots, titanium dioxide, zinc oxide, synthetic silica, etc. | Nanomaterials have wide applications in emerging technologies such as nanoelectronics, nanophotonics, energy conversion, etc.<br>Many of the physicochemical properties associated to nanomaterials are strongly dependent upon the size and particle-particle interaction. Using the NSZA , researchers could easily carry out the measurements of size and zeta potential. |
| **Proteins & Polypeptides**  | Lysozyme, Human serum albumin, Immunoglobulin G (IgG), etc. | For a protein formulation, the subtle changes in size and stabilityshould be detected to ensure the efficacy and safety. Proteins in poor formulations are likely to form aggregates, which will reduce the efficacy of protein drugs and, even worse, cause immunological reactions and toxicity. The NSZA provides rapid access to the characterization of proteins in terms of size and stability information. |

| Sectors | Samples | Significance |
|---|---|---|
| **Pharmaceuticals**  | Fat emulsions, liposomes, vaccines, hydrogels, etc. | In the field of pharmaceuticals, by characterizing size and zeta potential, the NSZA can evaluate the systematic stability and alleviate risks from formulations to accelerate the R&D process. The size and size distribution of drugs and drug delivery system are closely related to the manufacturing process, and impact bioavailability, efficacy, and immune response produced by the final product significantly. |
| **Foods and Beverages**  | Soft drinks, dairy products, confectioneries, plantbased products, etc. | Studies on food and beverages can be performed using the NSZA for characterizing size and zeta potential, in order to optimize the stability of dispersion and emulsification, which improves the appearance, taste and mouthfeel, and also prolongs the shelf life of products. |
| **Abrasives**  | Nano alumina, nano silicon carbide, nano diamond, cubic boron nitride (CBN), etc. | Nano abrasives is extensively used for high-precision polishing and surface finish of materials such as optical lenses, crystal, gemstones, semiconductors, etc. The stability of polishing slurry is significant for preventing the formation of aggregates that may lead to scratches on workpieces. The NSZA is capable of characterizing the size and zeta potential of slurries even with high concentration. |

| Sectors | Samples | Significance |
|---|---|---|
| **Paints, Inks & Coatings**  | Oil-based and water-based paints, organic pigments, ceramic inks, etc. | Size and size distribution of paint, inks and coatings are the crucial indicators for a long shelf life that ensure their prominent performances. Poor product quality may lead to aggregation, color inconsistencies, and blockages in the channels or nozzles. The utilization of the NSZA benefits the formulation development and improve the performance of the product. |
| **Household Chemicals**  | Cosmetics, shampoos, detergents, etc. | The nanomaterials dispersed in sun creams block ultraviolet radiation from the sun. The smaller the particle size, the bigger the surface area and the smoother the cream feels. The surfactants in the detergents may remove oil contamination by forming microemulsion. The decontamination effect depends on the type of surfactants and the size of emulsion droplets. The characterization of nanomaterials is related to all aspects of life. |
| **Academia**  | Fundamental and frontier researches related to size, zeta potential, molecular weight, etc. | Measurements of size, zeta potential and molecular weight derived from the NSZA provide a strong tool for academic researches, ranging from verifying theory extrapolations to exploring novel synthetic substances. The accurate and highly reproducible data ensure the authenticity and reliability of the research results. |

# Nanoparticle Size and Zeta Potential Analyzer

## Features and Benefits

### High-Performance Hardware

**• Solid-State Laser**

High-power solid-state laser with high beam quality and long service life

**• APD**

High sensitivity for low concentration or weak scattering samples

**• Temperature Control System**

Wide temperature range (-10~110$^0$C) suitable for wide application requirements

**• Intelligent Intensity Adjustment**

Intelligent adjustment of the intensity according to the scattering capability of the sample

**• Sensitive Optical Fiber Detection System**

Effectively increase signal-to-noise ratios due to high sensitivity of the optical system

**• Backscattering Detection Optics**

Applicability for concentrated samples and much higher sensitivity

### Research Level Software

**• Standard Operating Procedure (SOP)**

Ensures the completeness and accuracy of parameters

**• Phase Analysis Light Scattering**

Measurement of low electrophoretic mobility and zeta potential

**• Intelligent Algorithm of Result Evaluation**

Intelligent evaluation and processing of signal quality to eliminate the effect of random events

**• Versatile Calculation Modes**

Various built-in calculation modes to cover multiple scientific research and application fields

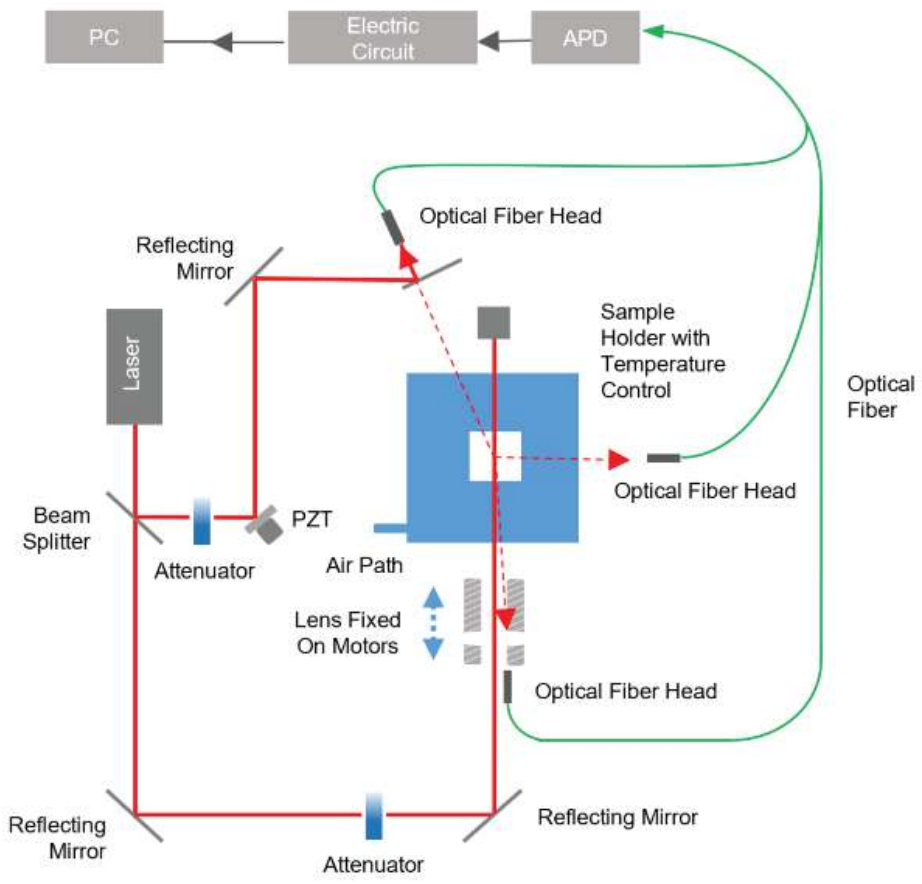
## Versatile Accessories

**• Capillary Sizing Cell**

Sample volume down to 3-5 µL and higher measurement accuracy for large particles

**• Disposable Folded Capillary Cell**

Excellent repeatability of zeta potential measurements and avoid cross-contamination




Optical Layout of the BeNano Series

**Measurement Parameters**

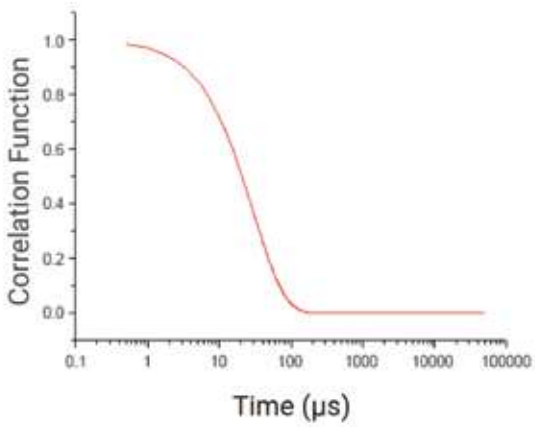
- Hydrodynamic diameter DH
- Polydispersity index PdI
- Intensity, volume, surface area and
- number distributions
- Diffusion coefficient D
- Interaction parameter kD
- Molecular weight
- Solution viscosity
- Zeta potential and its distribution

## Dynamic Light Scattering (DLS)

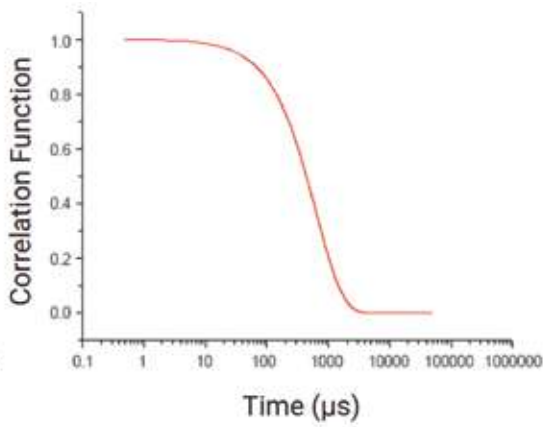
Dynamic light scattering (DLS), also known as photon correlation spectroscopy (PCS) or quasi-elastic light scattering (QELS), is a technology used to detect the fluctuations of the scattering intensities caused by the Brownian motion of particles. In the dispersant, smaller particles move faster, while larger particles move slower.

An avalanche photodiode (APD) detector aligned at 90°/173° collects the scattering intensities of the particles and records them with time. The timedependent fluctuation is converted into a correlation function using the correlator. By applying a mathematic algorithm, the diffusion coefficient D is thereby obtained. The hydrodynamic diameter DH and its distribution are calculated through the Stokes-Einstein equation:

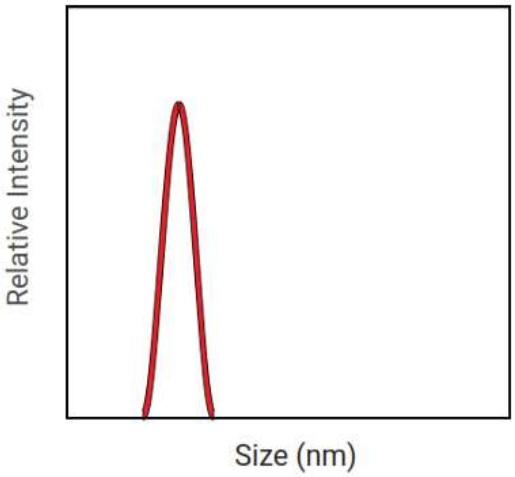
$$D = \frac{K_B T}{3\pi n D_H}$$



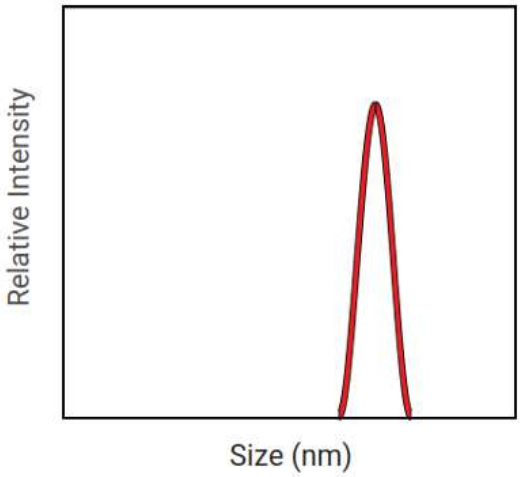

The Correlation Function of Small Particles



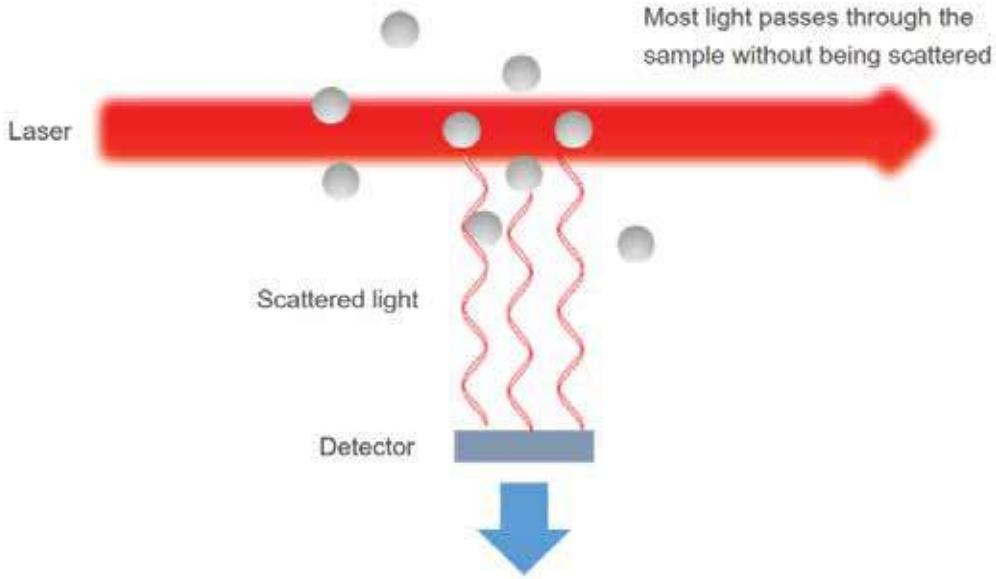

The Correlation Function of Large Particles

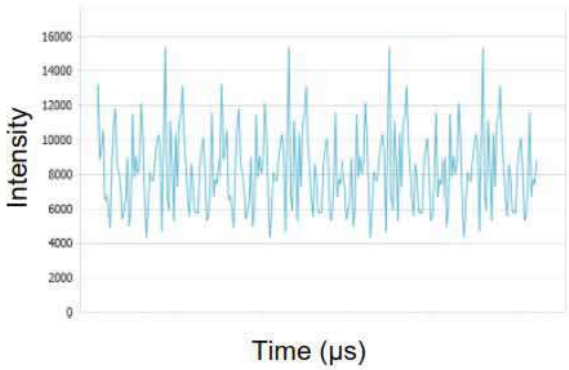



Particle Size Distribution of Small Particles

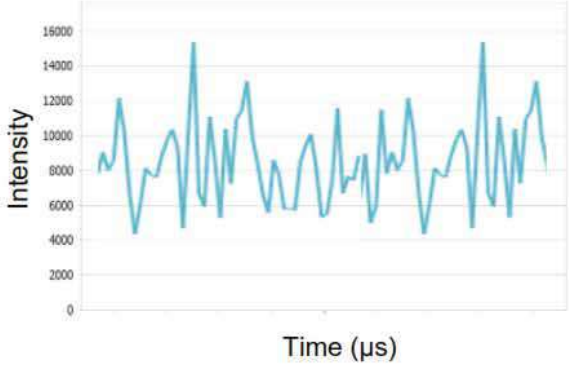



Particle Size Distribution of Large Particles

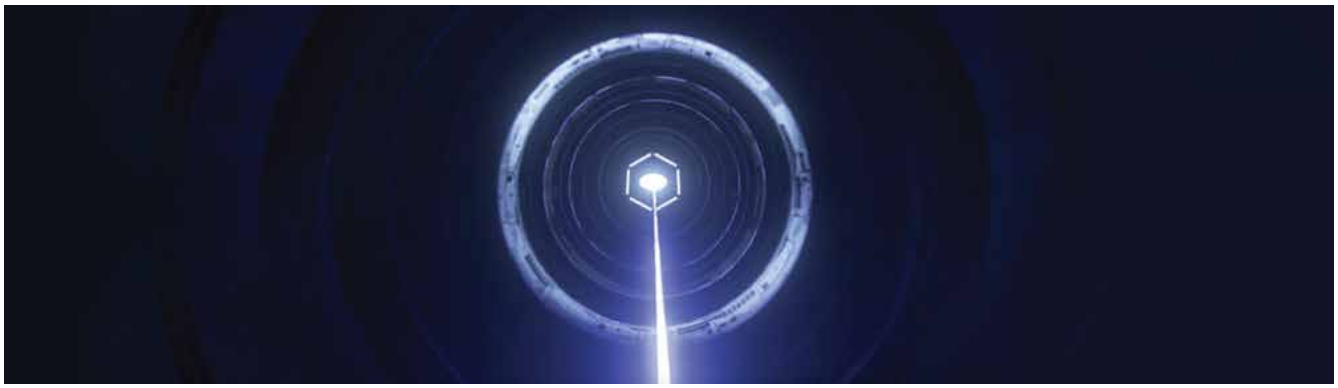



Intensity Fluctuations of Small Particles




Intensity Fluctuations of Large Particles

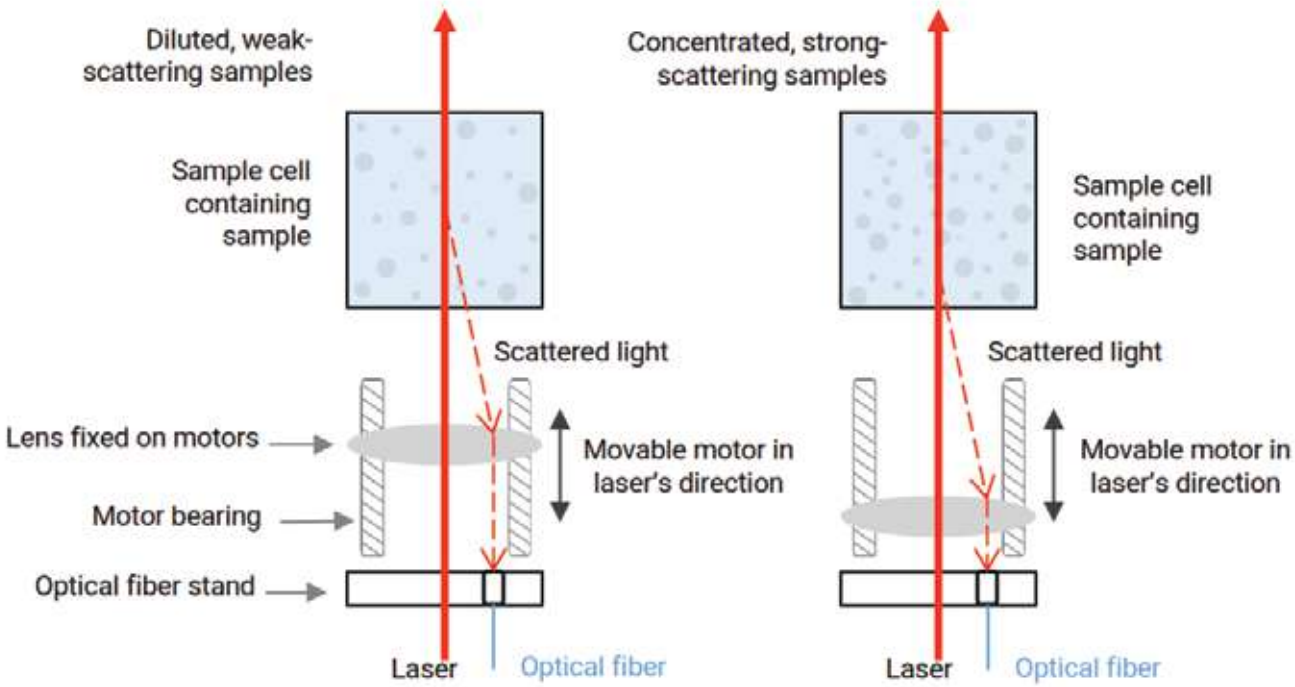


## Applications

- Particle size and distribution of polymers, colloids, self-assembling system, biomacromolecules, proteins, peptides, antigens, antibodies, nano metal/non-metal particles
- Studies on the polymerization process and reaction mechanisms
- Studies on kinetics of self-assembly and other processes of polymerization and depolymerization of macromolecules
- Research on thermal-sensitive systems, for example, PNIPAm polymer

## Backscattering Detection Technology

With Intelligent Search for the Optimal Detection Position



**The detection point is in the middle of the sample cell**

As shown in the left graphic, the backscattering volume is so large that the detector receives many scattering signals from the particles and hence increases the sensitivity of the instrument. It has better detection ability for dilute samples, which have smaller sizes and weaker scattering effects. However, the detection is not viable for samples with extremely high concentrations and very strong scattering effects. Even if the sample is barely detected, the result will deviate from the true value.

**The detection point is at the edge of the sample cell**

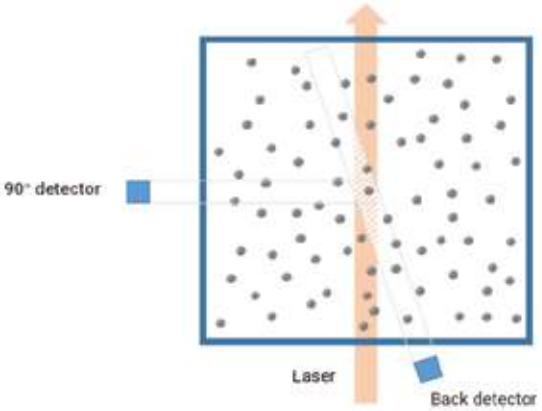
As shown in the right graphic, the detection point is fixed near the wall of the sample cell. The laser beam does not need to penetrate the sample, which can effectively avoid the multiple scattering effect of high concentration samples and ensure the accuracy and repeatability of the particle size results in the high concentration range. However, due to its optical design, the scattering volume is so small that impairs the sensitivity of the instrument, and hence the instrument is not competent to measure small particles, weakscattering samples or very diluted samples under this condition.

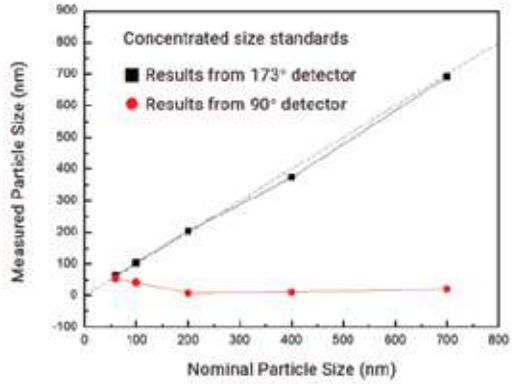
**Solution: Intelligent search for the optimal detection position**

By moving the lens, the detection point can be set at any position from the center to the edge of the sample cell. This allows the detection of different types and concentrations of samples to be considered to the extent possible. In practice, the optimal detection position and laser intensity are determined intelligently for each specific sample according to its sample concentration, size, and scattering ability in order to achieve **the highest measurement accuracy.**

## Features

- Higher detection sensitivity for samples with very low concentrations down to 0.1 ppm
- Intelligent search for the optimal detection position, which greatly avoids the multiple scattering effect of samples and can detect samples with concentrations of up to 40%
- Effectively limiting the interference of dust




When the sample is detected at 173° at the middle of the cell, the scattered volume is 8-10 times larger than at 90°, leading to much higher sensitivity, and avoiding reflections from the sample cell wall.

When measuring concentrated size standards, the results obtained from the 173° detector are in much better agreement with the nominal values, compared with the results from the 90° detector.

## Electrophoretic Light Scattering (ELS)

Particles usually carry charges on the surface in aqueous systems, surrounded by counter-ions that form a firmly inner Stern layer and an outer shear layer. Zeta potential is the electrical potential at the interface of the shear layer. A suspension system with higher zeta potential tends to be more stable and less likely to form aggregates.

Electrophoretic light scattering (ELS) is a technology for measuring electrophoretic mobility via Doppler shifts of the scattered light. When an incident light illuminates dispersed particles that are subjected to an applied electric field, the frequency of the particles' scattered light will be different from the incident light due to the Doppler effect. The frequency shift is measured and converted to provide the electrophoretic mobility and hence the zeta potential of a sample by

Henry's equation:

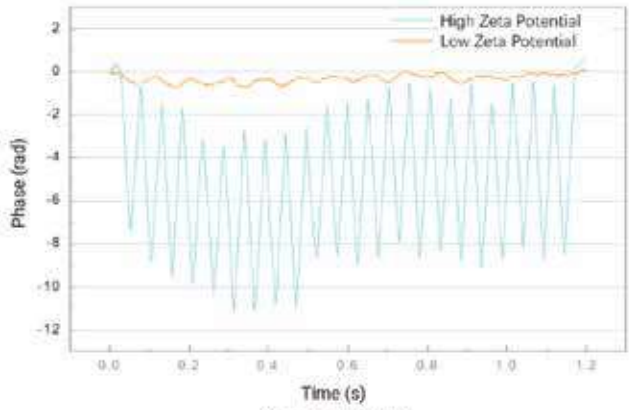
$$\mu = \frac{2\varepsilon_r \varepsilon_0 \zeta}{3\eta} f(\kappa\alpha)$$

## Phase Analysis Light Scattering (PALS)

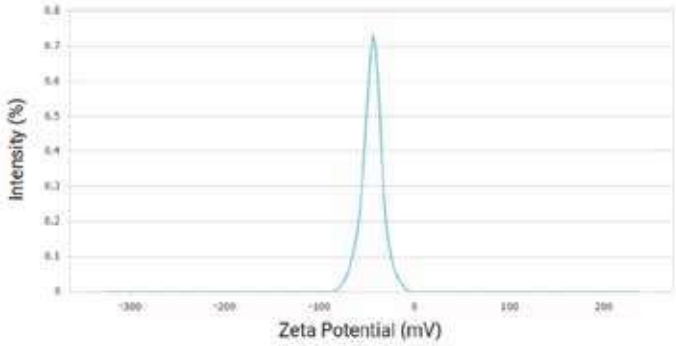
The traditional ELS converts the correlated scattering signals into frequency distribution and then calculates the frequency shift Δf of the scattered light, compared with the reference light. Phase analysis light scattering (PALS), an advanced technology based on the traditional ELS technology, has been further developed by Analytical Technology Limited. to measure zeta potential and its distribution of a sample.

By analyzing the phase information Φ of the original scattered signal, PALS obtains the frequency information of that light. The phase shift with time dΦ/dt is proportional to the frequency shift Δf.

PALS technology can suppress the influence of the Brownian motion of particles on the results, thereby providing higher statistical accuracy. In various applications, PALS can effectively measure the zeta potential of particles whose charge approaches the isoelectric point, for instance, particles with very slow electrophoretic mobility at a high salt concentration.

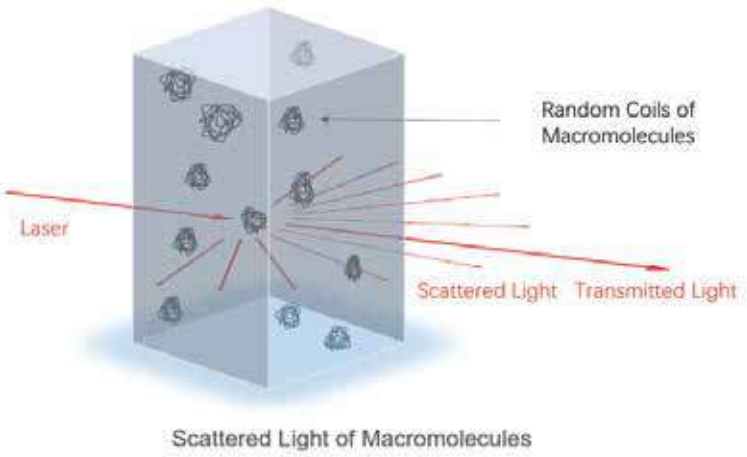


Phase Plot of PALS



Zeta Potential Distribution

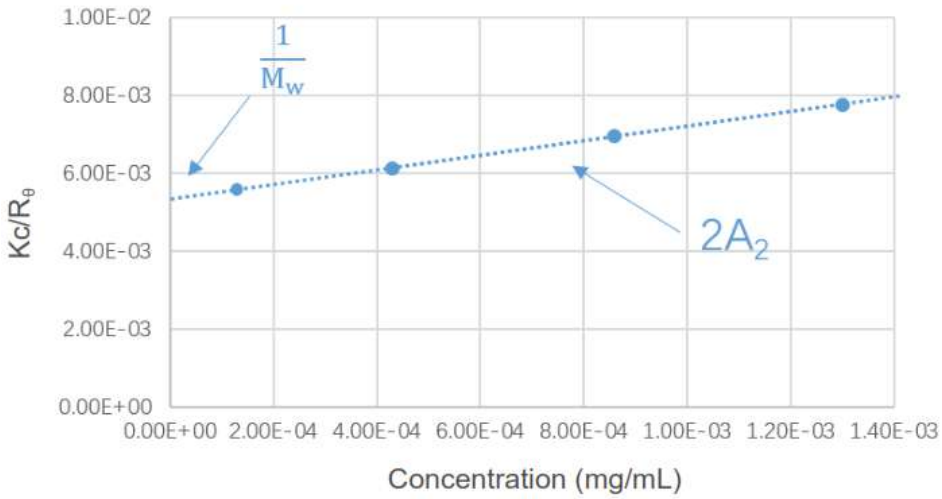
## Static Light Scattering (SLS)




Static light scattering (SLS) is a technology that measures the scattering intensities, weightaverage molecular weight (Mw) and second virial coefficient ($A_2$) of the sample through Rayleigh equation:

$$\frac{Kc}{R_\theta} = \frac{1}{M_w} + 2A_2c$$

where c is the sample concentration, θ is the detection angle, Rθ is the Rayleigh ratio used to characterize the intensity ratio between the scattered light and the incident light at the angle of θ, Mw is the sample's weight-average molecular weight, $A_2$ is the second virial coefficient, and K is a constant related to $(dn/dc)_2$.




Debye Plot

## Application

- Chemical engineering: characterization of polymers, micelles and supermolecules
- Petroleum engineering: characterization of macromolecule additives and oil-displacing surfactants
- Life science: characterization of proteins, polypeptides, and polysaccharides
- Pharmaceuticals: research on aggregation and stability of drugs
- Conformation of supermolecules, research on self-assembling aggregates

## A Research Level Software

NSZA software comes with a user-friendly interface, results previews, and various types of report pages.

## Features

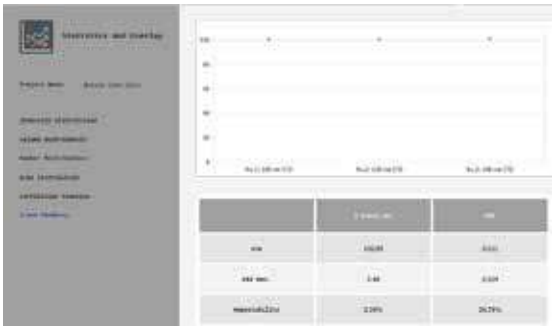
- Standard Operating Procedure (SOP) ensures the completeness and accuracy of parameters during measurements
- Measurement interface shows real-time information and results of various types
- Results and Statistics – automatic calculations of mean and standard deviation
- Statistics and Overlay – comparing results from multiple runs
- Over 100 parameters available, 100% covering the needs for research, QA, QC, and production
- Life-long upgrades provided free of charge

## Powerful Statistics and Analyzing Tools

- Display the real-time results on the measurement page
- Available mean, standard deviation, and relative standard deviation information
- Able to reanalyze historical data
- More detailed information displayed on the “Statistics and Overlay” page
- Capable of batch-processing multiple results

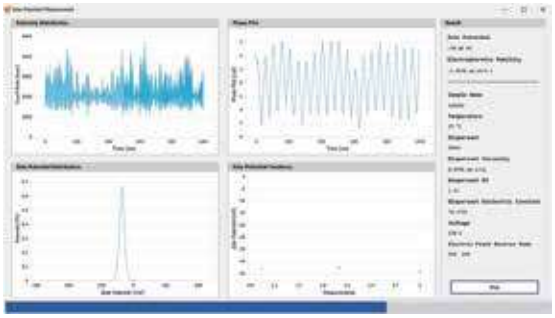
## Dynamic Light Scattering

- Intelligent selection and deletion of poor-quality data
- Results of Z-ave particle size, PdI, particle size distribution, diffusion coefficient are available
- Analysis model
    - Cumulants
    - Universal
    - CONTIN



## Electrophoretic Light Scattering

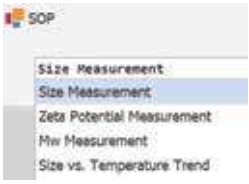
- Phase Analysis Light Scattering
- Zeta potential and its distribution are available
- Analysis model
    - Smoluchowski
    - Hückel
    - Customized



## Temperature Trend Measurement

**Temperature trend measurement includes**

- Size vs. Temperature
- Zeta Potential vs. Temperature



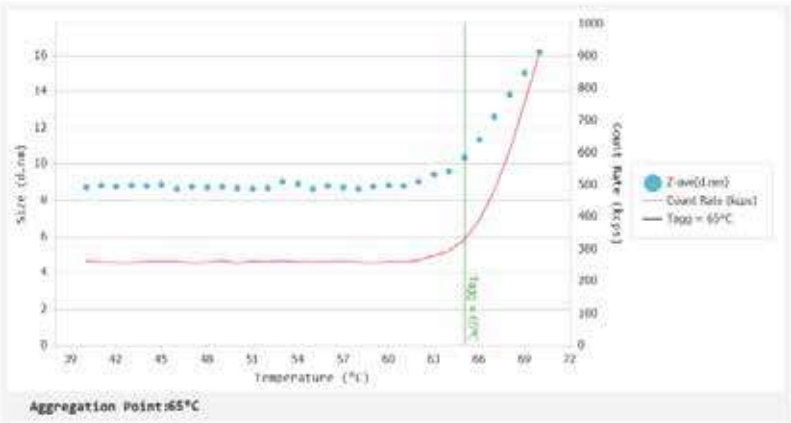

Investigating the particle size and zeta potential of the samples under different temperatures is significant in many applications.

The function of Programmed Temperature Change, ranging from -10°C to 110°C, makes Temperature Trend Measurement available in the NSZA 3000 Series.

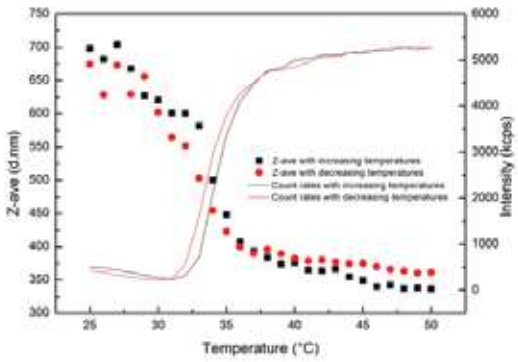
## Benefits

• This feature benefits users who need to study the stability of protein formulations. Generally, the higher the denaturation temperature of the protein, the more stable the formulation.

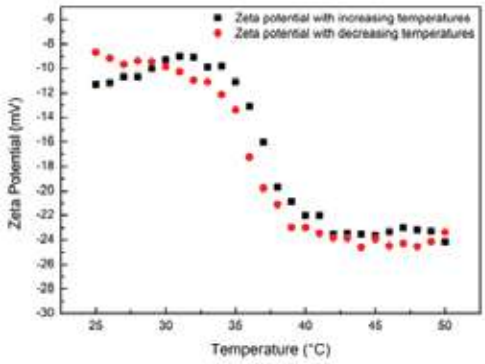
• Besides, it is useful for users who need to simulate real-time aging using elevated temperatures to manually speed up the aging process.




Size vs. Temperature trend measurement of the BSA protein




Particle sizes and count rates of PNIPAm hydrogel as a function of temperature

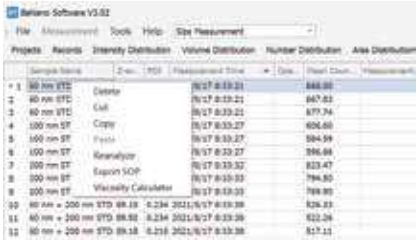



Zeta potentials of PNIPAm hydrogel as a function of temperature

## Viscosity Measurement

For the sample of unknown viscosity, the viscosity measurement could be implemented using tracer particles with known sizes (e.g., standard samples with nominal sizes). When the measurement ends, input the accurate size of the tracer particles, and the viscosity of the sample could be determined.

After the measurement, choose and right-click on the corresponding result. Click “Viscosity Calculator” on the pop-up menu.



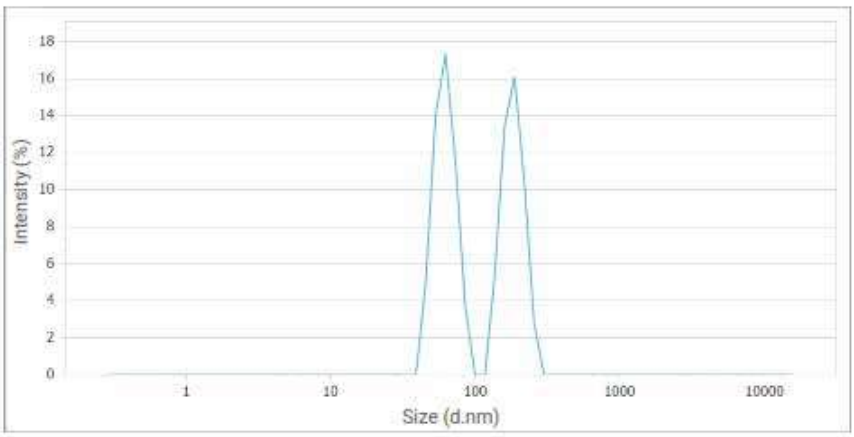
Through inputting the nominal values of the tracer particles and clicking on “Calculation”, the viscosity of the sample could be finally ascertained.

## Particle Size Measured by DLS

## Application

### Resolution

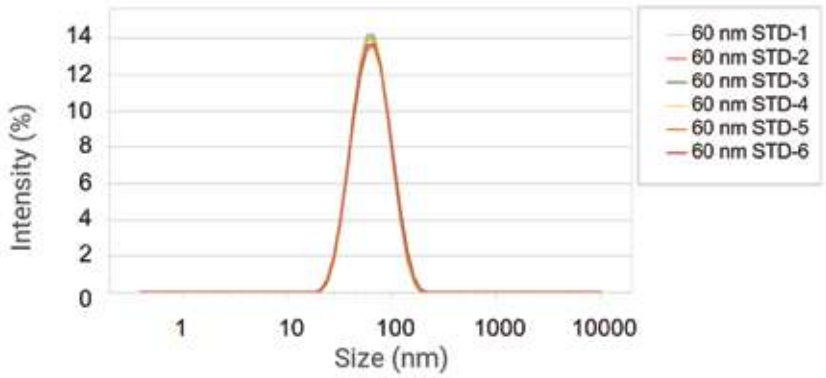
The resolution of the DLS technology depends on the algorithm. Usually, for two narrowly sized-distributed components with a size difference of over 3:1, the algorithm discerns two individual peaks by adjusting the resolution to a higher level. The NSZA 3000 Series provides several algorithms with different resolutions to meet the high-resolution requirements of different applications. The figure on the upper left is the result of a 60 nm and a 200 nm latex mixture.




Particle size distribution of a 60 nm and a 200 nm polystyrene latex mixture

## Repeatability

The optical system of the NSZA 3000 Series is robust and stable. It has an automatic intensity adjustment and intelligent signal judgment system to ensure high stability and repeatability of the measurements. The figure on the upper right shows the measurement repeatability of the 60 nm polystyrene latex. As shown, the system provides excellent repeatability with a relative standard deviation of less than 1%.




Particle size distribution of a 60 nm polystyrene latex

| | Z-ave Size |
|---|---|
| Average | 63.59 |
| Standard Deviation | 0.55 |
| Relative Standard Deviation | 0.86% |

# Molecular Weight Measured by SLS

## Application

During molecular weight measurements, scattering intensities of the sample at different concentrations are detected. By using the scattering intensity and Rayleigh ratio of a known standard (such as toluene), the Rayleigh ratios of samples at different concentrations are computed and plotted into a Debye plot. The molecular weight and the second virial coefficient are then obtained through the intercept and slope from the linear fitting of the Debye plot.

## Protein Suspensions and Formulations

Formulation 1

Formulation 2

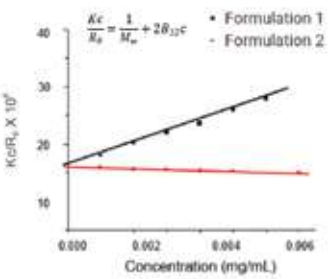
Light scattering technology can provide information of intermolecular forces and stability of a given colloidal particles suspension system. Specifically, the second virial coefficient $A_2$ ($B_{22}$) and interaction parameter $k_D$ can be determined by a concentration-dependent SLS measurement and DLS measurement, respectively. Besides, the zeta potential of the particles can be obtained by an ELS measurement.

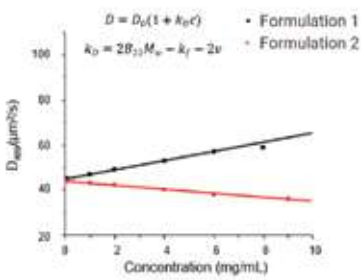
Using quantifiable parameters such as $A_2$, zeta potential, and $k_D$, users can access accurate and comparable information regarding the intermolecular forces of the particles.

The stability of a protein suspension depends on the functional groups of the protein and the solution environment. By changing the components of the solution environment, a relatively stable protein formulation with fewer protein aggregates and good thermal stability could be obtained. Examining the intermolecular forces between proteins in a formulation through light scattering technology enables stability determination.

The second virial coefficient $A_2$ ($B_{22}$) is calculated by analyzing the scattering intensity dependence on suspensions concentration in a static light scattering measurement. Typically, a larger $B_{22}$ corresponds to higher stability, while a negative value of $B_{22}$ indicates a low stability system that is more likely to form aggregates.

Another widely accepted technology, especially by the pharmaceutical industry, is to use dynamic light scattering to measure the diffusion coefficient of the suspension. The dependence of diffusion coefficient on the concentration may derive the DLS interaction parameter $k_D$. Similar to $B_{22}$, a larger $k_D$ suggests the higher stability of a protein formulation.



# Accessories

| Zeta Potential Measurement | | | | | | |
|---|---|---|---|---|---|---|
| Photo | Type | Description | Material | Sample Volume | Temperature Range | Details |
|  | Folded Capillary Cell | For aqueous samples | PC | 0.75 mL | -10 - 70 ℃ | - 5 cm electrode distance to avoid heating the sample, and provide a more uniform electric field<br>- Avoid cross-contamination<br>- Suitable for high-polarity systems<br>- Optical path of 4 mm, capable of measuring samples with a maximum concentration of 40% w/v<br>- High-tech but disposable item with a low usage cost |
|  | Dip Cell | For aqueous and organic samples | PEEK, Platinum | 1-1.5 mL | -10 - 70 ℃ | |
| Particle Size Measurement | | | | | | |
|  | Capillary Sizing Cell | For aqueous and organic samples with ultra-micro volumerequired | Glass | 3-5 μL | -10 - 70 ℃ | - Ease of use: simply dip the cell into the sample and test<br>- Low cost and disposable compared to the low volume quartz cell<br>- Extremely low sample volume required (3-5 μL)<br>- Avoid large particle sedimentation and allow for larger particle measurement up to 15 μm<br>- Smaller inner diameter of the capillary allows for a more uniform temperature field, avoiding the effect of turbulence or convection on the signal caused by the temperature field of the sample<br>- Shorter optical path (0.5 mm) - lower multiple light scattering effect |
|  | Disposable PS Cuvette | Commonly used sample cell for aqueous samples | PS | 1-1.5 mL | -10 - 70 ℃ | |
|  | Glass Cuvette (square opening) | Commonly used sample cell for aqueous and organic samples | Glass | 1-1.5 mL | -10 - 110 ℃ | |
|  | Glass Cuvette (round opening) | Commonly used sample cell for aqueous and organic samples with better sealing performance | Glass | 1-1.5 mL | -10 - 110 ℃ | |
|  | Disposable Micro-volume Cuvette | For aqueous samples with micro volume required | PMMA | 40-50 μL | -10 - 70 ℃ | |
|  | Micro-volume Glass Cuvette | For aqueous samples with micro volume required | Glass | 25 μL | -10 - 110 ℃ | |

| Function | Parameter | NSZA 3180 Zeta Pro | NSZA 3180 Zeta | NSZA 3090 Zeta | NSZA Zeta |
|---|---|---|---|---|---|
| Size measurement | Size measurement range | 0.3 nm - 15 µm* | 0.3 nm - 10 µm* | 0.3 nm - 15 µm* | N/A |
| | Sample volume | 3 µL - 1 mL* | 40 µL - 1 mL* | 3 µL - 1 mL* | N/A |
| | Detection angle | 90° & 173° & 12° | 173° & 12° | 90° & 12° | N/A |
| | Analysis algorithm | Cumulants, Universal Mode, CONTIN | Cumulants, Universal Mode, CONTIN | Cumulants, Universal Mode, CONTIN | N/A |
| | Upper limit of concentration range | 40% w/v* | 40% w/v* | Optical clear† | N/A |
| | Detection position | Movable position 0 - 5 mm | Movable position 0 - 5 mm | Fixed position 5 mm | N/A |
| Zeta potential measurement | Detection angle | 12° | 12° | 12° | 12° |
| | Zeta potential measurement range | No actual limitation | No actual limitation | No actual limitation | No actual limitation |
| | Electrophoretic mobility | > ± 20 µm·cm/V·s | > ± 20 µm·cm/V·s | > ± 20 µm·cm/V·s | > ± 20 µm·cm/V·s |
| | Conductivity | 0 - 260 mS/cm | 0 - 260 mS/cm | 0 - 260 mS/cm | 0 - 260 mS/cm |
| | Sample volume | 0.75 - 1 mL | 0.75 - 1 mL | 0.75 - 1 mL | 0.75 - 1 mL |
| | Sample size | 2 nm - 110 µm | 2 nm - 110 µm | 2 nm - 110 µm | 2 nm - 110 µm |
| Other measurements | Molecular weight (Mw) | 342 Da - 2 x $10^7$ Da* | 342 Da - 2 x $10^7$ Da* | 342 Da - 2 x $10^7$ Da* | N/A |
| | Viscosity | 0.01 cp - 100 cp* | 0.01 cp - 100 cp* | 0.01 cp - 100 cp* | N/A |
| | Interaction parameter $K_D$ | No actual limitation | No actual limitation | No actual limitation | N/A |
| | Trend measurement | Time and temperature | Time and temperature | Time and temperature | Time and temperature |
| System parameters | Temperature control range | -10℃ - 110℃, ±0.1℃ | -10℃ - 110℃, ±0.1℃ | -10℃ - 110℃, ±0.1℃ | -10℃ - 110℃, ±0.1℃ |
| | Condensation control | Dry air or nitrogen | Dry air or nitrogen | Dry air or nitrogen | Dry air or nitrogen |
| | Laser source | 50 mW Solid-state laser, 671 nm | 50 mW Solid-state laser, 671 nm | 50 mW Solid-state laser, 671 nm | 50 mW Solid-state laser, 671 nm |
| | Correlator | Up to 4000 channels, $10^{11}$ linear dynamic range | Up to 4000 channels, $10^{11}$ linear dynamic range | Up to 4000 channels, $10^{11}$ linear dynamic range | Up to 4000 channels, $10^{11}$ linear dynamic range |
| | Detector | Avalanche photodiode (APD) | Avalanche photodiode (APD) | Avalanche photodiode (APD) | Avalanche photodiode (APD) |
| | Intensity control | 0.0001% - 100%, manual or automatic | 0.0001% - 100%, manual or automatic | 0.0001% - 100%, manual or automatic | 0.0001% - 100%, manual or automatic |
| | Dimensions (L x W x H) | 62.5 x 40 x 24.5 cm (22 kg) | 62.5 x 40 x 24.5 cm (22 kg) | 62.5 x 40 x 24.5 cm (22 kg) | 62.5 x 40 x 24.5 cm (22 kg) |
| | Power supply | AC 100-240 V, 50-60 Hz, 4A | AC 100-240 V, 50-60 Hz, 4A | AC 100-240 V, 50-60 Hz, 4A | AC 100-240 V, 50-60 Hz, 4A |
| | Conformity to standards | ISO 13321, ISO 22412-2017, ISO 13099-1, ISO 13099-2 | ISO 13321, ISO 22412-2017, ISO 13099-1, ISO 13099-2 | ISO 13321, ISO 22412-2017, ISO 13099-1, ISO 13099-2 | ISO 13321, ISO 22412-2017, ISO 13099-1, ISO 13099-2 |
| Accessories | Disposable micro-volume cuvette | 40 - 50 µL | 40 - 50 µL | 40 - 50 µL | N/A |
| | Micro-volume glass cuvette | 25 µL | N/A | 25 µL | N/A |
| | Glass cuvette with round opening | 1 mL | 1 mL | 1 mL | N/A |
| | Capillary sizing cell | 3 - 5 µL | N/A | 3 - 5 µL | N/A |
| | Dip cell kit | 1 - 1.5 mL, zeta potential measurementfor organic-based samples | 1 - 1.5 mL, zeta potential measurementfor organic-based samples | 1 - 1.5 mL, zeta potential measurementfor organic-based samples | 1 - 1.5 mL, zeta potential measurementfor organic-based samples |
| | | | | | |
| * Dependent on samples and accessories<br>† Up to 40% w/v using capillary sizing cell | | | | | |

| Function | NSZA 3180 Pro | NSZA 3180 | NSZA 3090 |
|---|---|---|---|
| Size measurement | 0.3 nm - 15 µm* | 0.3 nm -10 µm* | 0.3 nm - 15 µm* |
| | 3 µL - 1 mL* | 40 µL - 1 mL* | 3 µL - 1 mL* |
| | 90° & 173° | 173° | 90° |
| | Cumulants, Universal Mode, CONTIN | Cumulants, Universal Mode, CONTIN | Cumulants, Universal Mode, CONTIN |
| | 40% w/v* | 40% w/v* | Optical clear† |
| | Movable position 0 - 5 mm | Movable position 0 - 5 mm | Fixed position 5 mm |
| Zeta potential measurement | N/A | N/A | N/A |
| | N/A | N/A | N/A |
| | N/A | N/A | N/A |
| | N/A | N/A | N/A |
| | N/A | N/A | N/A |
| | N/A | N/A | N/A |
| Other measurements | 342 Da - 2 x $10^7$ Da* | 342 Da - 2 x $10^7$ Da* | 342 Da - 2 x $10^7$ Da* |
| | 0.01 cp - 100 cp* | 0.01 cp - 100 cp* | 0.01 cp - 100 cp* |
| | No actual limitation | No actual limitation | No actual limitation |
| | Time and temperature | Time and temperature | Time and temperature |
| System parameters | -10°C - 110°C, ±0.1°C | -10°C - 110°C, ±0.1°C | -10°C - 110°C, ±0.1°C |
| | Dry air or nitrogen | Dry air or nitrogen | Dry air or nitrogen |
| | 50 mW Solid-state laser, 671 nm | 50 mW Solid-state laser, 671 nm | 50 mW Solid-state laser, 671nm |
| | Up to 4000 channels, $10^{11}$ linear dynamic range | Up to 4000 channels, $10^{11}$ linear dynamic range | Up to 4000 channels, $10^{11}$ linear dynamic range |
| | Avalanche photodiode (APD) | Avalanche photodiode (APD) | Avalanche photodiode (APD) |
| | 0.0001% - 100%, manual or automatic | 0.0001% - 100%, manual or automatic | 0.0001% - 100%, manual or automatic |
| | 62.5 x 40 x 24.5 cm (22 kg) | 62.5 x 40 x 24.5 cm (22 kg) | 62.5 x 40 x 24.5 cm (22 kg) |
| | AC 100-240 V, 50-60 Hz, 4A | AC 100-240 V, 50-60 Hz, 4A | AC 100-240 V, 50-60 Hz, 4A |
| | ISO 13321, ISO 22412-2017, ISO 13099-1, ISO 13099-2 | ISO 13321, ISO 22412-2017, ISO 13099-1, ISO 13099-2 | ISO 13321, ISO 22412-2017, ISO 13099-1, ISO 13099-2 |
| Accessories | 40 - 50 µL | 40 - 50 µL | 40 - 50 µL |
| | 25 µL | N/A | 25 µL |
| | 1 mL | 1 mL | 1 mL |
| | 3 - 5 µL | N/A | 3 - 5 µL |
| | N/A | N/A | N/A |
| | | | |
| | | | |

Analytical®
Technologies Limited

## HPLC Servicing, Validation, Trainings and Preventive Maintenance :

**HPLC Servicing** :HPLC Servicing : We have team of service engineers who can attend to any make of HPLC promptly @the most affordable cost.

**Trainings** :We also take up preventive Maintenace to reduce downtime of HPLC's Trainings.

**AMC's/CMC** :AMC's/CMC :We offer user training both in-House and at customer sites on HPLC principles, operations, trouble-shooting.

**Validations** :Validations :We have protocols for carrying out periodic Validations as per GLP/GMP/USFDA norms.

**Instruments** :Instruments :We offer instruments/Renting Services Modules like pumps,detector etc. on Rent.

## About Analytical Technologies

Analytical Technologies is synonymous for offering technologies for doing analysis and is the Fastest Growing Global Brand having presence in at least 96 countries across the global. Analytical Technologies Limited is an ISO:9001 Certified Company engaged in Designing, Manufaturing, Marketing & providing Services for the Analytical, Chromatography, Spectroscopy, Bio Technology, Bio Medical, Clinical Diagnostics, Material Science & General Laboratory Instrumentation. Analytical Technologies, India has across the Country operations with at least 4 Regional Offices, 6 Branch Offices & Service Centers. Distributors & Channel partners worldwide.

## Our Products & Technologies

UV/VIS Spectro 2080+ Double Beam

Infra FTIR

Optima Gas Chromatograph 3007

Optima Gas Chromatograph 2979 Plus

Flash Chromatograph

Atomic Absorption Spectrophotometer

Liquid Partical Counter

Optical Emission Spectrophotometer

DSC/TGA

Semi Auto Bio Chemistry Analyzer

HEMA 2062 Hematology Analyzer

Micro Plate Reader/Washer

URINOVA 2800 Urine Analyzer

Total Organic Carbon 3800

Fully Automated CLIA

NOVA-2100 Chemistry Analyzer

PCR/Gradient PCR/ RTPCR

TOC Analyzer

Laser Particle Size Analyzer

Ion Chromatograph

Water purification system

## Regulatory compliances

## Corporate Social Responsibility

Analytical Foundation is a nonprofit organization (NGO) found for the purpose of:

1.Research & Innovation Scientist's awards/QC Professional Award : Quality life is possible by innovation only and the innovation is possible by research only, hence ANALYTICAL FOUNDATION is committed to identify such personallities for their contributions across various field of Science and Technology and awarding them yearly. To participate for award, send us your details of research / testing / publication at Info@analyticalfoundation.org

2. Improving quality of life by offering YOGA Training courses, Work shops/Seminars etc.

3. ANALYTICAL FOUNDATION aims to DETOXIFY human minds,souls and body by means of yoga, Meditation, Ayurveda, Health Care, Awards, Media, Events, Camps etc.


**Analytical®**
Technologies Limited

HPLC Solutions | MultipleLabs | Analytical Bio-Med | Analytical Distributors | Analytical Foundation (Trust)

**Corporate & Regd. Office:**
Analytical House, # E67 & E68,
Ravi Park, Vasna Road, Baroda,
Gujarat 390 015. INDIA

T: +91 265 2253620
+91 265 2252839
+91 265 2252370
F: +91 265 2254395

E: info@hplctechnologies.com
info@multiplelabs.com
info@analyticalgroup.net
info@analyticalbiomed.com

W. www.analycalgroup.net
www.hplctechnologies.com
www.multiplelabs.com
www.ais-india.com

Sales & Support Offices:
across the country :
Distributors & Channel
partners World Wide

 Ver. 22.06 *T&C