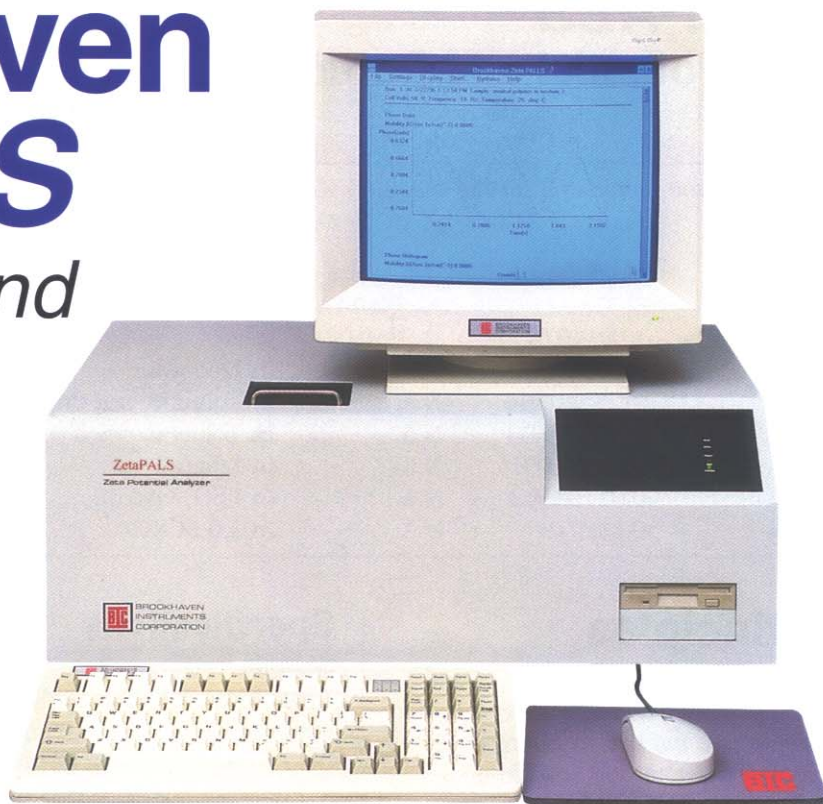


Brookhaven ZetaPALS

Zeta Potential and Particle Size Analyzer

For measurements in

- Solvents
- High salt
- Oils
- Near the I.E.P.



ZetaPALS— A Whole New Concept

For measurements of low mobility, the unique, Brookhaven **ZetaPALS** is the answer. There is nothing else like it. With concepts developed at Bristol University and Brookhaven Instruments, the **ZetaPALS** determines zeta potential using *Phase Analysis Light Scattering*: a technique that is up to 1000 times more sensitive than traditional light scattering methods based on the shifted frequency spectrum.

Electrostatic repulsion of colloidal particles is often the key to understanding the stability of any dispersion. A simple, easy measurement of the electrostatic mobility—even in nonpolar liquids—yields valuable information. Measurements in water and other polar liquids is easy and fast with the Brookhaven ZetaPlus. Such measurements cover the range of typically ± 6 –100 mV, corresponding to a range of mobilities of 0.5 – 8×10^{-8} m²/V·s.

Measurements in low dielectric liquids, or in high viscosity oils, or in high salt concentrations, or even

very near to the I.E.P. involve mobilities 10, 100, and even 1000 times smaller. Traditional approaches simply fail under these conditions or suffer from poor repeatability. With the **ZetaPALS** such measurements are made in typically 30–50 s, and the repeatability is typically 1–2 %.

Carrying On The Tradition—A Unique Cell Design

The same unique cell design that made the Brookhaven ZetaPlus the standard instrument for use in polar liquids is also used in the ZetaPALS. A design that eliminates electroosmosis, eliminates the need to find the stationary planes, allows the user to eliminate calibration or alignment: there simply isn't any.

The standard **ZetaPALS** cell is made of quartz or glass with Kevlar supporting Pd electrodes. When used with water or other simple, nonaggressive liquids, an alternate choice is an inexpensive, disposable plastic cell with Pd electrodes, the same type used in the ZetaPlus.

The precision Peltier temperature control allows measurements from 6 °C to 100 °C.

The **ZetaPALS**, like its cousin the ZetaPlus, is a compact single unit incorporating a computer, color monitor and printer.

The internal computer is Windows compatible, and may be used as a stand-alone computer. Optionally, an external computer may be used.

Particle Sizing Option

An optional feature of the **ZetaPALS** is the measurement of particle size by dynamic light scattering. Based on the well established technique used in the Brookhaven 90Plus, particle size and distribution information are obtained in minutes.

Particle size measurement and zeta potential determination are made in the same cell. There is even a choice of two scattering angles, 15° or 90°, for particle sizing.

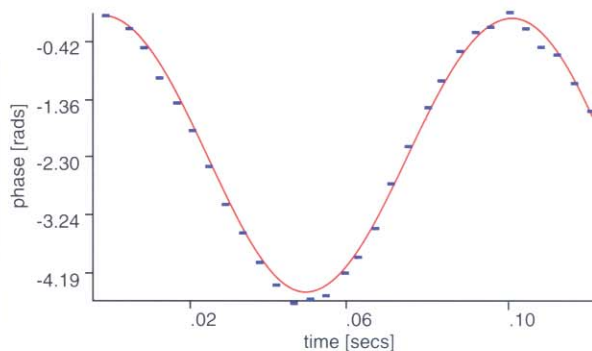
ZetaPALS

Zeta Potential and Particle Size Analyzer

Iron Oxide in Dodecane

Some interesting results obtained with the **ZetaPALS**
(Units $10^{-8} \text{ m}^2 / \text{V}\cdot\text{s}$)

Sample	PALS Result	Lit. Value	Comments
NIST 1980	+2.51±0.11	+2.53±0.12	Goethite
Blood Cells	-1.081±0.015	-1.08±0.02	saline
Fe ₂ O ₃	+0.013±0.0015	N.A.	In Dodecane
TiO ₂	+0.255±0.010	N.A.	In Toluene, not dried
TiO ₂	+0.155±0.011	N.A.	In Toluene, dried
TiO ₂	-0.503±0.0015	N.A.	In Ethanol
Casein	-0.025±0.002	N.A.	In PEG, viscous
SiO ₂	-0.73±0.04	N.A.	In 2.0 M KCl



Mobility: -5.85E-03 [$\text{m}^2/\text{Vs} \times 10^{-8}$]
Zeta potential: -2.56 mV [Hückel]

Principles

The **ZetaPALS** utilizes phase analysis light scattering to determine the electrophoretic mobility of charged, colloidal suspensions. Unlike its cousin, laser Doppler electrophoresis, the PALS technique does not require the application of large fields which may result in thermal problems. Because in the measurement of phase change, the particle need only move a fraction of its own diameter to yield good results.

Thus, in salt concentrations up to 3 M fields as small as 1 or 2 V/cm yield enough movement to get excellent results. In addition, the **Autotracking** feature compensates for thermal drift.

Since the PALS technique eliminates diffusional broadening, you can work with very small colloidal sizes.

The **ZetaPALS** provides readout of pH, conductance, and temperature.

Specifications

Sample

Type: Most colloidal samples suspended in *any clear liquid*.
Size Range: Material dependent
Electrophoresis: 0.005 to 30 μm
Particle Sizing: <0.001 to 6 μm
Volume: 1 mL to 1.5 mL
pH Range: 2 to 12
Conductivity Range: 10^{-12} to 30 S/m
Mobility Range: 10^{-11} to $10^{-7} \text{ m}^2 / \text{V}\cdot\text{s}$
Temp. Range: 6°C to 100 °C
Measurement Duration: 10 to 250 s, typically 30 s.

Electrophoresis Chamber

Field Strength: 0 to 60 kV/m, automatically selected
Temperature Control: +/-0.1°C
Electrodes: Pd standard, Au optional
Cells: Plastic or Glass (solv)
Supports: Acrylic or PEEK (solv)

Power Requirements

100/115/220/240 VAC, 50/60 Hz
300 Watts

Dimensions*

Size:
267(H) x 625(W) x 445(D) mm
Weight: 37 kg
*excluding monitor

Standard

BI-Zeta: Allows mobility distribution measurement in water and other polar liquids

Options

BI-MAS: Particle size analysis
BI-DPSS: High power diode laser
BI-APD: Super sensitive detector

Applications

Numerous technical and biological processes are substantially affected by changes in the zeta potential. It is often the key to solving aggregation and dispersion problems. And, now, for the first time such problems in nonpolar liquids and high salts can be solved with the **ZetaPALS**.

A policy of continual improvement may lead to specification changes



Brookhaven Instruments Corporation

750 Blue Point Road
Holtsville, New York 11742-1896 U.S.A.
Phone: +1(631)758-3200
Fax: +1(631)758-3255
e-mail: info@bic.com
www.bic.com

With distributors around the world. Contact us for one nearest you.