BI-XDC
Xray Disc Centrifuge

High Resolution Particle Size Analysis

Die BI-XDC uses sedimentation detection through a low energy X-ray beam and is designed to measure particle size of anorganic sample materials. It offers two important advantages due to the extremely short wavelength of the X-ray signal it is not scattered but only absorbed. Therefore no Mie-correction is necessary to get distribution values. An additional gravitational mode expands size range from below 10 nm up to 100 microns.

•Accurate and quantitative

•Resolves mixtures

•X-ray detection - no optical corrections

•Range 10nm to 100m

•Scanning head for high speed

•Simple operation

•Clear text and graphical reports

Specifications

Size Range: 0.01-100 microns, depends on particle and liquid density and liquid viscosity

Centrifuge Speed: 500-6000 rpm, +/-0.01%, high speed disc available see options

Disc: PMMA construction, 10-30 mL volume, solvent resistant disc available see options

Scanning Speed: 0.05-10 mm/min, 1 mm/min typical

Measurement Time: 3-30 min, typically 8 min/decade in particle diameter,

Data System: High-performance Windows™ system with color printer. Contact factory for latest specifications

Software: Written for Windows™, control, archiving and data analysis,

Power Requirements: 100/115/240 VAC, 50/60 Hz, 300 Watts,

Dimensions: 230(H) x 460(W) x 600(D), mm

Weight: 35 kgs

Environment: No special requirements. Bench top installation, quiet, no water or air handling needed. Suitable for use either in a laboratory or in many production environments.

Certifications: CE Marked

Typical Applications

The versatile BI-XDC offers high resolution results to particle sizing problems where the particles are dispersed in a liquid and cover the size range from 0.01 to 30 microns. This range is useful for a variety of materials and many applications:

Abrasives

Inorganic pigments

Catalysts

Metal oxides

Cements

Metal powders

Ceramics

Clays

Minerals

Features at a glance

By providing both centrifugal and gravitational sedimentation in one instrument the BI-XDC brings these well established methods of particle sizing up to date for today's fine particle

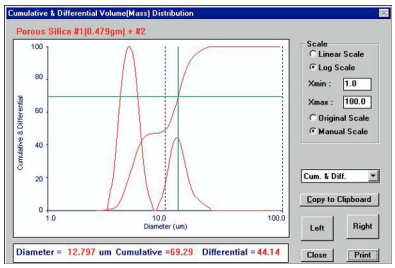
technology. With an X-ray technology to give error free measurements, fast and accurate size distributions across the "one-micron" transition region are easily obtained. Now, with a single instrument you can get true high resolution, accurate, particle size distributions from 10 nanometers right up to 100 microns. Brookhaven's advanced scanning detector technology and wide disc speed range lets you optimize analysis times and broaden the range of samples you can analyze.

With the Brookhaven BI-XDC there are no optical corrections and no optical properties to worry about, just a simple mass sensitive response based on X-ray absorption.

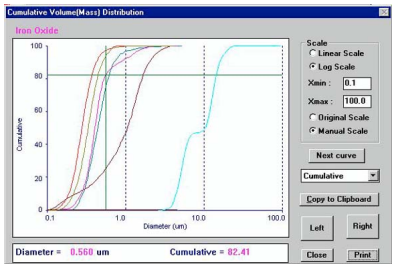
Data Presentation

Typical runs take 3-30 minutes and are dependent upon the particle size range to be determined. Real-time progress of the experiment is plotted on the screen. Standard plots include differential and cumulative distributions of particle sizes weighted by volume, surface area and number on linear and logarithmic scales. Up to six plots can be overlayed for comparisons. Additional tabular and other choices of display provide customized reports for a wide variety of purposes including SPC charts. A menu of data files allows easy analysis of multiple experiments.

Cumulative and Differential Distributions from Two Silicas



Comparison of Cumulative Distributions of Six Samples



Principles of Operation

Particles suspended in a liquid medium which has a density lower than that of the particles will eventually settle to the bottom. In either the gravitation or centrifugation settling mode, large particles move faster than small ones. Hence particles separate on the basis of their size and this method of particle size analysis yields excellent results of even complex mixtures. The concentration gradient that is produced results in good resolution. The settling phenomena are accurately described by Stokes' Law. Based on a homogeneous start, the exact equations are solved for the size versus cumulative mass undersize distribution. X-ray detection ensures accurate and quantitative measurement. Stokes law may be written as below.

$$t = \frac{18\,\eta \ln\left(\frac{R_d}{R_i}\right)}{\omega^2 d^2 \Delta\rho}$$

where
R_d, R_i are detection & injection radii
η is the liquid viscosity
ω is the centrifuge angular velocity
$\Delta\rho$ is the difference between liquid & particle density