

Elzone[®] II 5390

Particle Size Analyzer



Superior Particle Sizing/Counting Capability in a Small Package

Elzone® II 5390 Particle Size Analyzer

Widely accepted as a primary particle characterization technique, the electrical sensing zone method is recognized as a highly effective method of counting and sizing a wide variety of organic and inorganic materials. Unlike other measurement techniques, the electrical sensing zone method can analyze samples that have assorted optical properties, densities, colors, and shapes. Micromeritics' Elzone particle size analyzer uses this powerful particle

characterization technique to determine quickly and accurately the size, number, concentration, and mass of finely divided materials. The instrument determines particle size in a range suitable for a wide variety of industrial, biological, and geological specimens down to 0.4 μm . The Elzone's high level of accuracy and resolution, speed, and ease of use make it equally suitable for industry, quality control, and research and development laboratories.

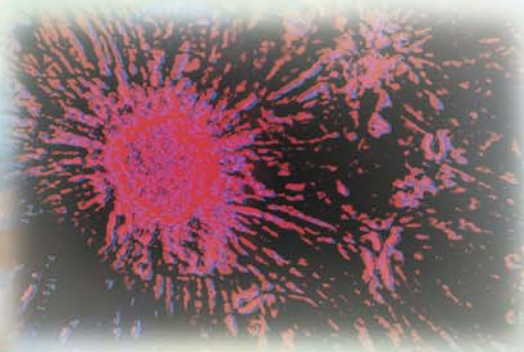


Ease of Use

- The Elzone features automatic start-up, run, and shut-down routines. Operator attention is not required after a run is initiated.
- Automated blockage detection and clearing allows uninterrupted analysis.
- Automated flushing/rinsing. There is no need to perform this task manually prior to or after an analysis.
- Automatic or manual calibration can be performed to accommodate different particle types and shapes.

New, Improved Design

- The use of mercury is not required to perform concentration analysis. A metering pump allows for precise concentration analysis, eliminating the need for a mercury manometer.
- A grease-free connect/disconnect mechanism for the orifice tube eliminates problems with particles getting trapped in a grease film. Orifice cleaning is simplified since hydrophobic grease does not have to be removed.
- A Faraday shield allows detector electronics to be shielded from external sources of electronic interference. In reduced electrical interference areas, it is possible to operate the instrument with its doors open.
- Orifice tubes from older Elzone models and certain competitive instruments can be used with the new Elzone II.





Typical Elzone Applications

Biological Materials – Biotech research depends on accurate measurements. Particle sizing of blood cells, platelets, bacteria, plant cells, mammalian cells, yeast, pollen, spores, and many other types of materials is typically done by population (number). Data collected are the number of cells per milliliter and/or the population distribution of cells. For example, these data can indicate to a researcher if a process adequately reduces the bacteria population in drinking water. Population data can also be used to evaluate fermentation processes.

Abrasives – For an abrasive material to perform as specified, it is important that it have an appropriate size distribution with no particles above or below the intended size range. To make sure that each batch meets specifications, the sample must be analyzed as a volume (weight) and population (number) distribution. The volume distribution is used to ensure that the range and mean sizes are within specifications, and also that there are no oversized particles in the sample.

Emulsions – Elzone results can be used to determine shelf life, proper emulsification, and droplet size of a wide variety of emulsions including pharmaceuticals, foods, and lubricants. Because the Elzone measures the volume of a particle, the data are little affected if the droplets change shape as they pass through the orifice tube.

Toner and Inks – It is important that the particles have a narrow size distribution in toners or inks for printing. If there are any large particles, printer nozzles can clog or streaks can be left on prints. Both volume and population data are useful in analyzing toners and inks.

Filtration – Population data illustrate how much material is being removed by a filter. Volume data will determine the minimum size particles the filter is capable of removing. Therefore, Elzone results can be used to determine how a filter is performing. This is useful for water treatment, beverage processing (beer, soft drinks, etc.), injectables (pharmaceuticals), pollution control, and many other filtration applications.

Elzone II Advantages

- Counts and sizes organic and inorganic materials
- Suitable for analyzing samples of mixed optical properties, densities, and shapes
- Higher resolution than with other particle sizing methods
- Low quantities of sample are analyzed accurately and easily
- Compact size conserves laboratory bench space
- Plot overlays to compare analysis results with those of product standards or other analysis results
- Extensive statistical analysis features included
- 21 CFR part 11 software option



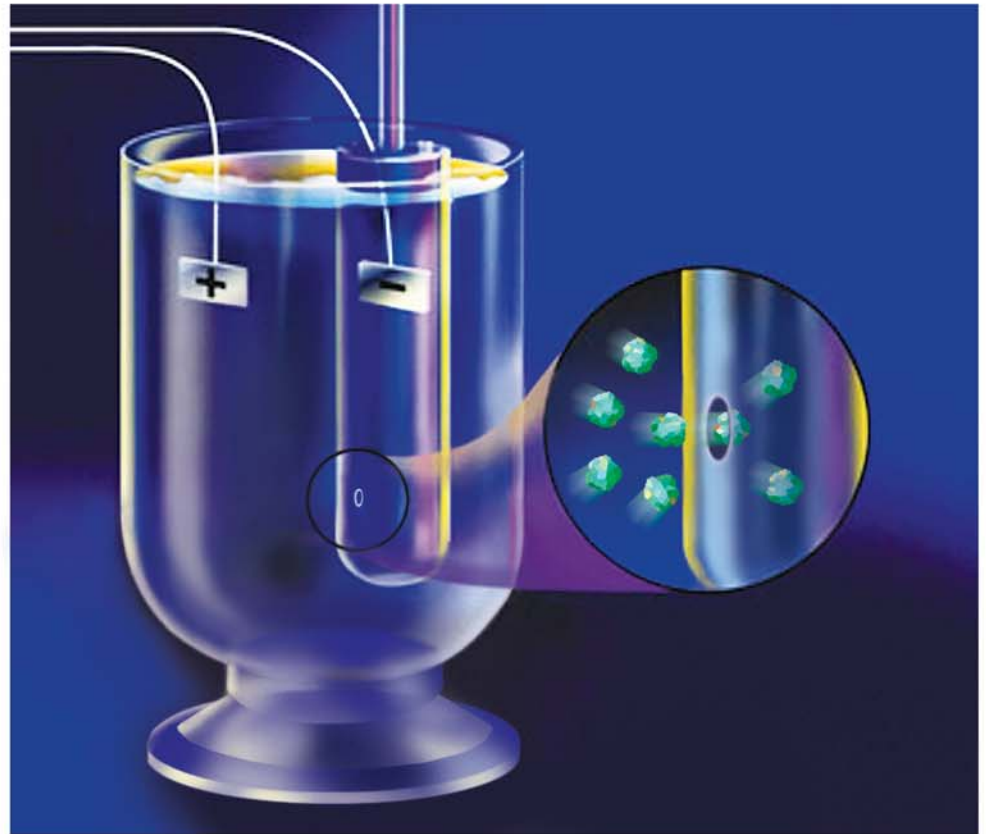
Effective Method for Sizing/Counting Organic and Inorganic Materials

Electrical Sensing Zone Method

The Elzone uses the electrical sensing zone method (Coulter principle) of particle measurement. One advantageous characteristic of this measurement technique that differentiates it from the laser light scattering method is that Elzone data are unaffected by samples that have mixed optical properties, colors, and shapes. Furthermore, samples composed of materials having different densities also can be measured accurately. Particle size determination is dependent only on the volume of electrolyte displaced by a particle as it flows through the sensing zone.

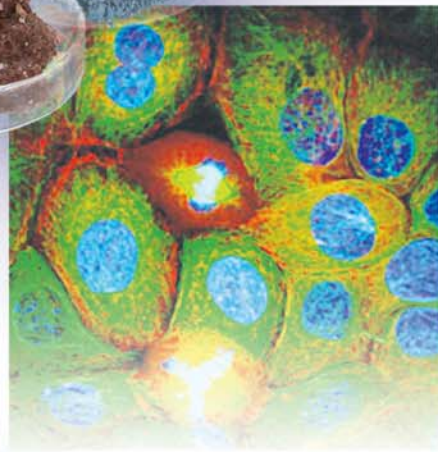
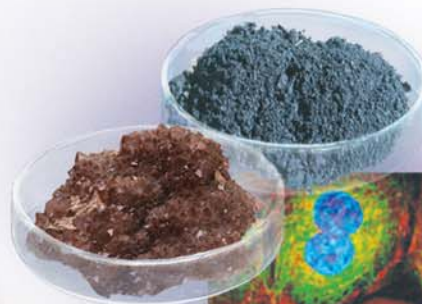
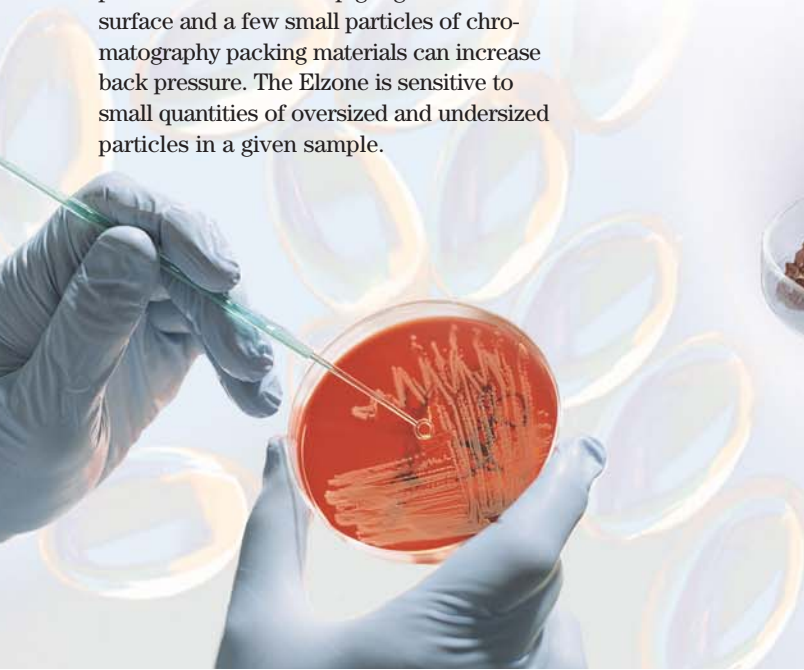
Another advantage of this technique is that the size distribution is determined by analyzing, one at a time, each particle from a representative subset of the introduced sample quantity. This particle-by-particle analysis technique provides accurate particle count data and, when combined with Micromeritics' precision volume metering option, provides accurate number concentration data.

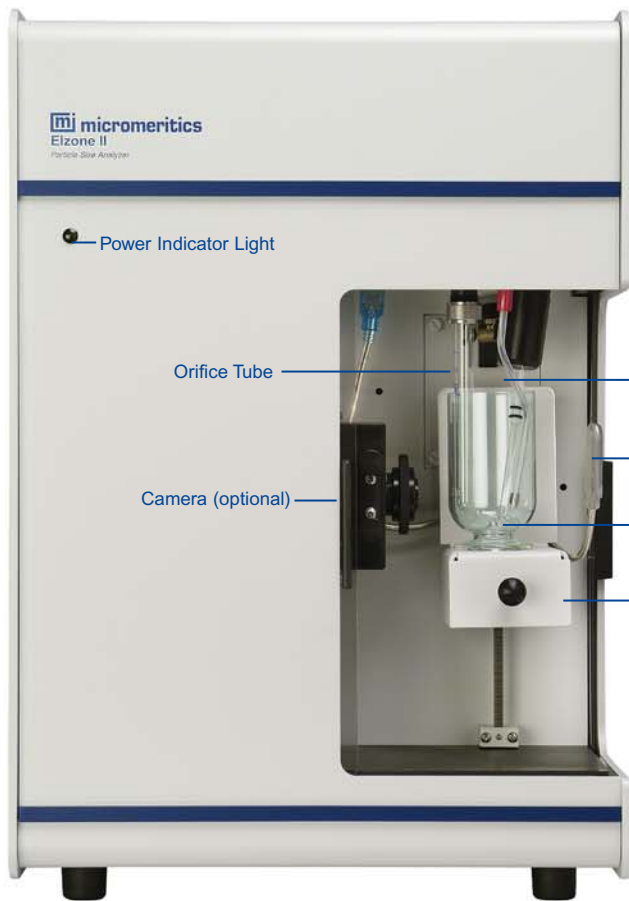
Sensitivity as it relates to particle size analysis is the ability to detect small changes in the amount of material at a given size. This ability is very important to processes where a few particles either larger than or smaller than the bulk of the population is critical. As examples, a few large abrasive particles can leave deep gouges in a finished surface and a few small particles of chromatography packing materials can increase back pressure. The Elzone is sensitive to small quantities of oversized and undersized particles in a given sample.



The sample (a dry powder, paste, or emulsion) is dispersed at low concentration in an electrolyte solution. This dispersion is placed in a sample cup that also contains an electrode. A closed end glass tube is immersed in the dispersion. In the side of

this tube and below the liquid surface is a precision hole (orifice) and within the glass tube is a second electrode. Applying a partial vacuum to the tube interior causes the dispersion to be drawn through the orifice forming a conductive path between the electrodes.





The small diameter of the orifice, its short path length, and the dilute dispersion assures that for the great majority of the time particles pass through the orifice one at a time. Each particle while in the orifice displaces a volume of electrolyte equal to its own volume. Displacement of the electrolyte impedes the

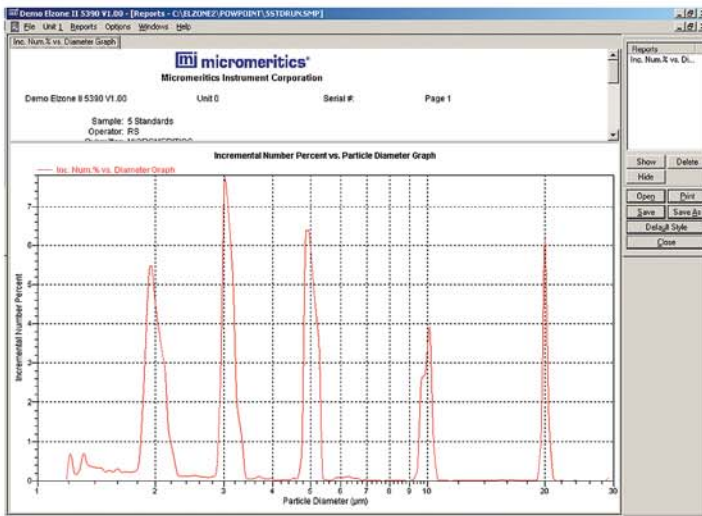
current flow between the electrodes and produces an electrical pulse, the amplitude of which is proportional to the particle volume. The Elzone counts the pulses and sorts them by amplitude and pulse width. This provides the data from which is calculated the particle population.



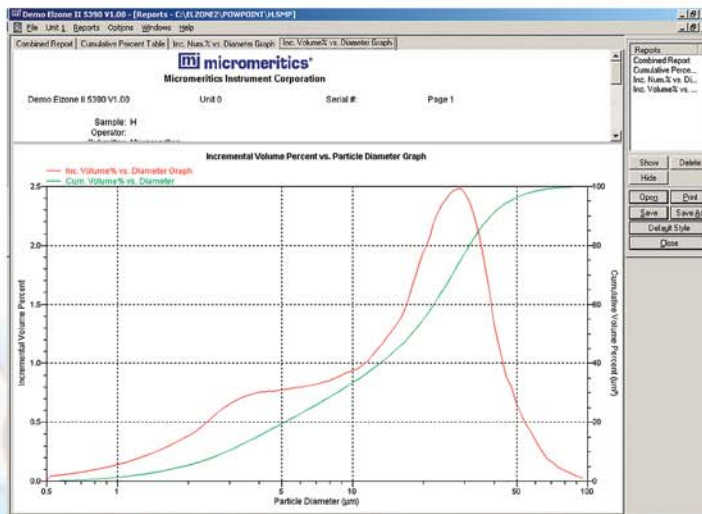
Superior Data Presentation Capability

Data Reduction and Presentation

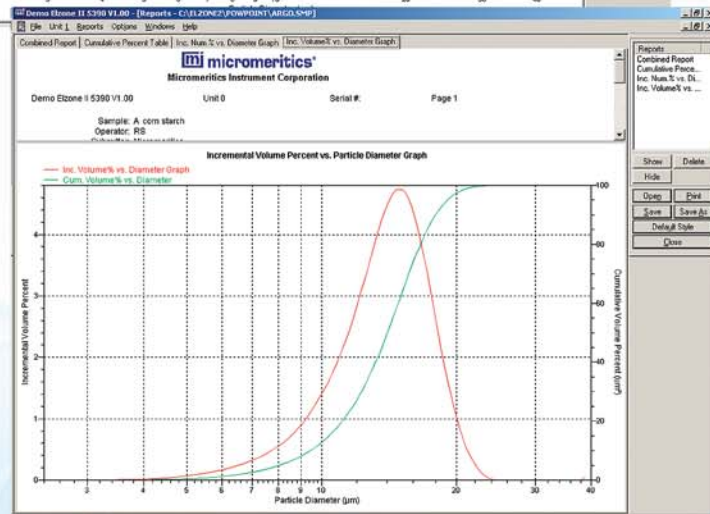
- Off-line software allows the user to work with data or design analysis protocols without being at the instrument.
- Capability to cut and paste data tables and export data as spreadsheet and ASCII files.
- Plot overlays make it possible to compare analysis results directly with the results of product standards or other analysis results.
- The new Elzone allows you to read, reduce, and report data obtained from a previous Elzone. Additionally, you have the capability to read and overlay data from the SediGraph and the Saturn DigiSizer[®], and to read text data files.
- Compare data from other instruments by reading formatted text files or by manually entering information.
- Elzone II is fully compatible with International Standard ISO 13319 Determination of particle size distribution – Electrical sensing zone method.



Simultaneous analysis of 5 monodisperse latex standards - Standards such as these are used to calibrate diameters determined using the Elzone II. Here the high degree of size resolution possible with the Elzone II is illustrated.



Complete analysis of broadly dispersed chocolate sample, a mixture of cocoa powder, sugar, and milk solids. Analysis data from three orifice tubes are merged together automatically by the Elzone II software.



Volume and number distributions calculated for an analysis of a commercial cornstarch. The number distribution is comparable to a microscope analysis. The volume distribution is comparable to the results from the other particle size analyzers such as the Micromeritics SediGraph and Saturn DigiSizer, or that from sieve analysis. Note that the Elzone II produces directly a number-based distribution. The equivalent spherical volume distribution is calculated from the number distribution.

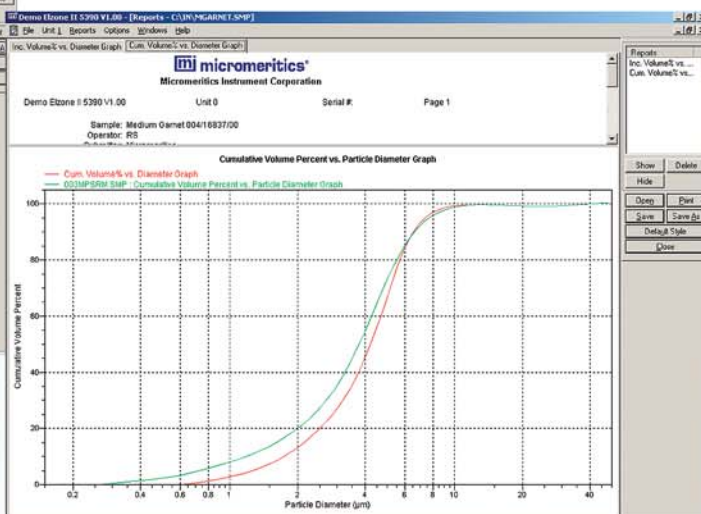
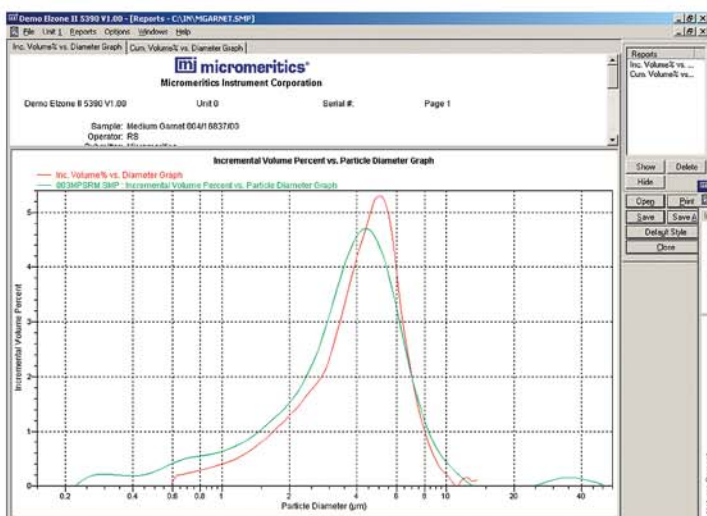
Confirm Software for the Elzone

The optional **Confirm** software addresses FDA's 21 CFR Part 11 requirements for submitting documentation in electronic form. Its features include assuring data security, maintenance of time-stamped audit trails, authority checks, password aging, and data reporting. You can rest assured that we have provided you with all of the features and tools necessary to

maintain compliance with the highest level of data integrity possible. Service includes verification of instrument calibration and a comprehensive test of the complete system using established conditions and reference materials. If your company needs record-keeping and validation capabilities, **Confirm** software makes it extremely useful across all industries. It's a great way for all companies to keep track of their data and provide verification of their analyses.

Sales and Service Support

With U.S. corporate headquarters in Norcross (Atlanta), Georgia, Micromeritics has an extensive worldwide sales and service network. The company offers direct coverage located in the United States, England, Germany, Benelux, Switzerland, France, Italy, and China. In addition, the company's customers are served by a specially trained local distribution network covering over sixty-five countries who both sell and service Micromeritics' instruments. A training facility at the Norcross headquarters offers a regular schedule of instrument operator training courses.



Overlay of cumulative volume percent finer than diameter and volume frequency, for a medium garnet abrasive powder, analyzed with the Elzone II and the Micromeritics SediGraph. The Elzone II reporting system can report size distributions determined using other Micromeritics particle size analysis instruments such as the SediGraph and Saturn DigiSizer.



To request a quote or additional product information, visit Micromeritics' website at www.micromeritics.com, contact your local Micromeritics sales representative, or our Customer Service Department at (770) 662-3636.



The Science and Technology of Small Particles™

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