The Electrical Sensing Zone Method

presented by Micromeritics Instrument Corporation

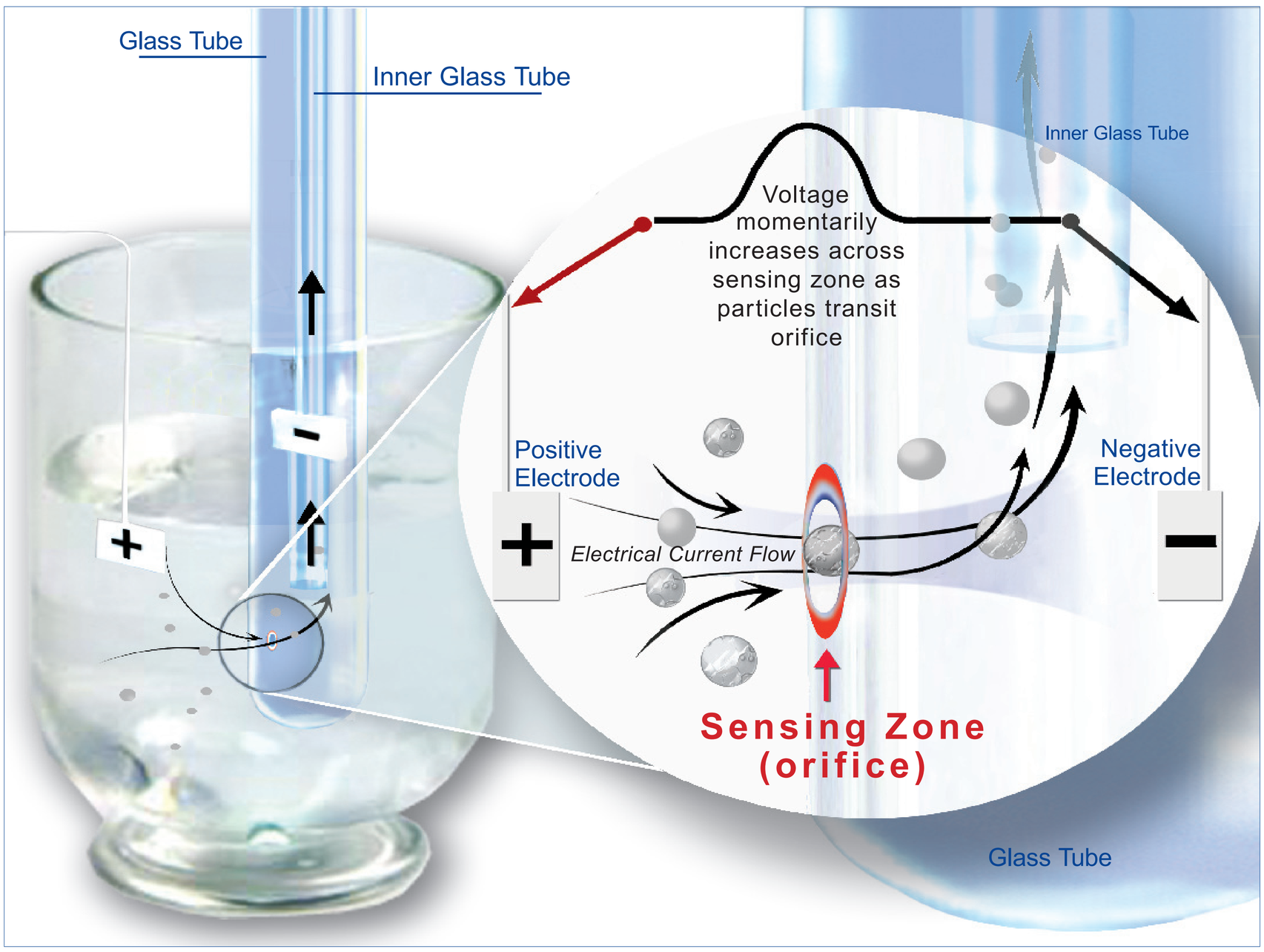
MEASUREMENT TECHNIQUE

The Electrical Sensing Zone (ESZ) technique is recognized as an effective way to count and size an extensive array of organic and inorganic materials. The technique has three major advantages over other particle sizing techniques:

1) Particle volume analysis accuracy not affected by optical properties, density, color or shape of particles.
2) Exceptional resolution
3) Determines particle concentration

ANALYTICAL METHOD

The sealed end of a glass tube is immersed in a cup containing a dispersion of sample material and electrolyte solution. The opposite end of the tube is connected to a pump. In the side of the tube and below the liquid surface is a precisely sized opening (orifice) through which the dispersion is pumped. An electrode is positioned in the glass tube and one of opposite polarity is positioned in the cup. Current flows between the electrodes through the orifice by way of the electrolyte conductor.



THEORY OF OPERATION

A) When electrolyte is pumped through the orifice, so are suspended particles.
B) As each particle transits the orifice, it displaces a volume of the electrolyte conductor equal to the particle's own volume, thus reducing electrical conductance across the orifice.
C) An electrical pulse is produced in the electrode circuit, the amplitude and width of which are recorded.
D) Pulse amplitude is proportional to the particle volume. Optional pulse width measurement is related to transit time.
E) The instrument counts the pulses and sorts them by amplitude thus providing data from which is calculated the particle population by size class.

When a precision metering pump is used to draw the dispersion through the orifice, both the volume of liquid and the quantity of particles are measured, allowing solid concentration to be determined.

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The Science and Technology of Small Particles

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