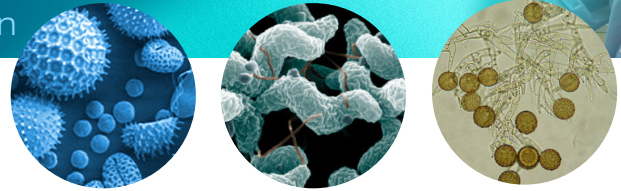


Ultrasonic Nozzle Systems

for Dynamic Aerosol & Bioaerosol Generation



Aerosol generation using ultrasonic spray also enables evaluation of bioaerosol sensors or filtration devices used to rapidly identify/remove pathogenic agents including: spores, bacteria, viruses, and toxins.

Sono-Tek ultrasonic nozzles are often used in aerosol generation processes for early detection of harmful biological agents and environmental monitoring of pollutants. Standoff detection of bioaerosols provides important data for environmental monitoring and consequences of an actual agent release. By spraying dissolved agents in solution using an ultrasonic nozzle, simulations enable spectroscopic data collection to measure concentrations of biological toxins present in the air. These procedures are important for researchers and government agencies in ensuring early warning and rapid response to potential threats.



OPERATING FREQUENCY (kHz)	MEDIAN DROP DIAMETER (μ)
25	55
35	49
48	38
60	31
120	18
180	13



Tight control of drop size is critical to bioaerosol testing processes. The frequency of the ultrasonic nozzle used and the concentration of the liquid being atomized determine the size of dry particles.

Sono-Tek's aerosol generation nozzle features a unique liquid isolation microtube channel, with flange designs available for easy attachment to spray chambers.



Sono-Tek Ultrasonic Nozzles Feature:

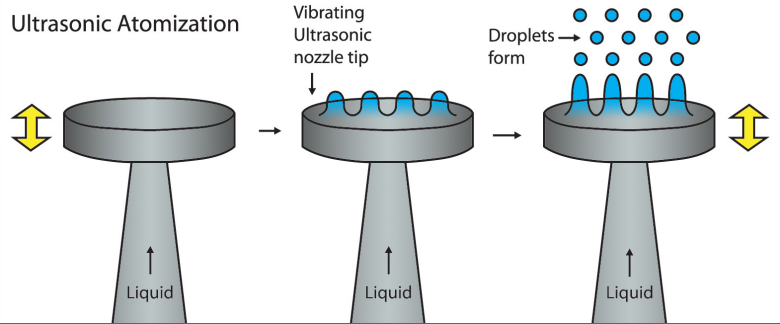
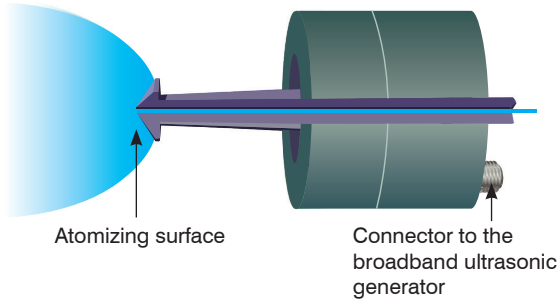
- Patented non-clogging ultrasonic design
- High precision aerosol generation
- No air/gas necessary to generate the aerosol allows testing chamber to maintain integrity
- Bio-contamination microtube design allows isolation of liquid solutions and easy clean up
- Low velocity spray produces a fine mist of droplets with tight drop distribution
- Highly controllable spray produces reliable, consistent results
- Corrosion-resistant titanium and stainless steel construction
- No moving parts to wear out
- Controllable drop size with many different operating frequencies

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How do ultrasonic nozzles work?

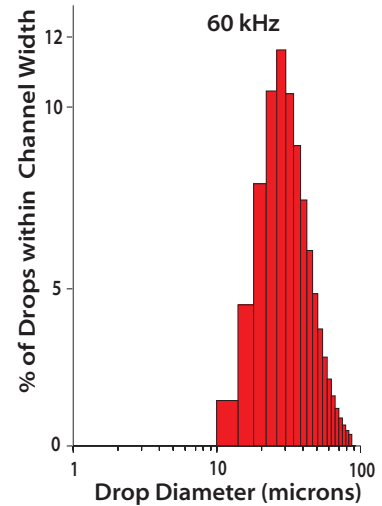
Sono-Tek ultrasonic nozzles convert high frequency sound waves from an ultrasonic generator into mechanical vibrations. These ultrasonic vibrations induce capillary waves in a liquid traveling down the center of the nozzle. When the liquid emerges onto the atomizing surface, the waves break into tiny droplets that fall off the tip of the nozzle in a soft, atomized mist.



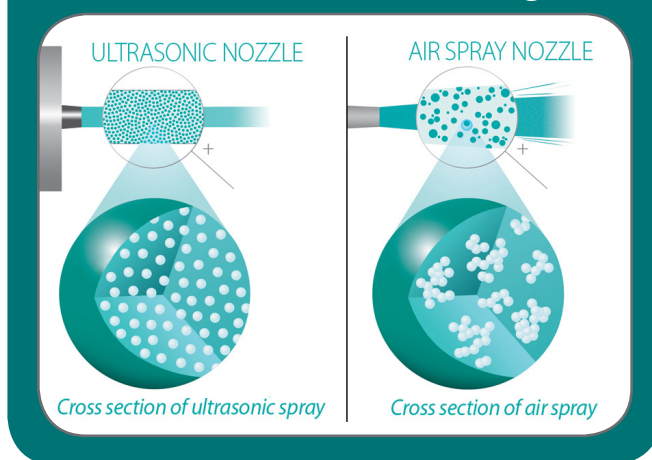
Drop Distribution

Drop distribution is obtained by dividing the drop population into a set of size ranges (channels) and counting the fraction of drops having diameters that fall within each channel. 4 microns was chosen as the channel width.

For the 60 kHz nozzle distribution shown at right, 2% of all drops fall in the channel that covers the 10-14 μ range, 4.5% fall in the 14-18 μ range, etc. Based on the frequency of the nozzle used, droplet size can be customized and tightly controlled.



The Ultrasonic Advantage



Compared to air spray nozzles, ultrasonic nozzles have the ability to break up any agglomerations of suspended particles when spraying nanosuspensions, due to the ultrasonic vibration of the nozzle.

Sono-Tek's patented air shaping systems shape the atomized spray into defined spray patterns using low pressure air. The Vortex nozzle (right) creates a conical spray pattern that is 2" – 6" (50-152mm) in diameter.

