

Advanced in vitro exposure systems



APPLICATION NOTE

AN-16

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VITROCELL® Cloud Systems

Single Droplet Sedimentation

Single Droplet Sedimentation Systems are specifically designed for dose-controlled and spatially uniform deposition of liquid aerosols onto cells. Test substances include chemicals or particles suspended in a suitable medium, such as PBS.

The aerosol is applied for a short exposure time of approximately 7–10 minutes.

This method is particularly well suited for scarce and expensive materials, such as new drug candidates, chemical compounds,

environmental particles, as well as biological samples, including peptides, oligonucleotides, bacteria, and viruses.

Nebulization volumes typically range from 15–300 µl (Cloud Alpha Move: up to 500 µl). Aerosolization is performed directly into the cell culture exposure chamber. The process can be repeated several times to generate a dose–response profile.

VITROCELL® Nebulizer Overview

	Aerogen Solo	Aerogen Lab	Advanced Nebulizer	Advanced Nebulizer Stainless Steel
Droplet Size	2.5 – 6.0 µm	2.5 – 4.0 µm 4.0 – 6.0 µm	5 µm, 8 µm, 12 µm, 20 µm	5 µm, 8 µm, 12 µm, 20 µm
Product				
Autoclavability	No	Yes	No	Yes
Suitable Solvents	water-based only	water-based, 70 % ethanol, max. 20 % DMSO	higher viscosity liquids, 70 % ethanol, up to 100 % DMSO	higher viscosity liquids, 100 % ethanol, up to 100 % DMSO
Output Rate	ca. 5 µL/s	ca. 3 – 5 µL/s	ca. 5 - 25 µL/s	ca. 5 - 25 µL/s
Applications	Drug screening, if single use of nebulizer is required (e.g. virus research)	Nanoparticle suspensions, low-viscosity chemicals, academic research, cost- sensitive applications.	Viscous chemicals, particle suspensions up to PM 2.5.	Viscous chemicals, bacterial solutions, viral applications, and sensitive products such as peptides, proteins, micelles, and lipid nanoparticles (LNPs).

A range of different nebulizer types is available to ensure the optimal solution for virtually every application scenario in aerosol and inhalation research.

The **Aerogen Solo Nebulizer** is ideally suited for high-throughput screening approaches, particularly when large numbers of chemicals or formulations need to be tested. Its disposable design effectively prevents cross-contamination and simplifies handling in routine workflows.

The **Aerogen Lab Nebulizer** represents a well-established and widely proven technology in inhalation research. It offers certified output rates, autoclavability, and excellent durability under continuous operation, making it a reliable all-round solution for a broad range of applications.

The **Advanced Nebulizer (polymer version)** is specifically designed for viscous substances and pharmaceutical formulations where cleaning with standard detergents is sufficient. It combines flexibility with compatibility for challenging liquid formulations.

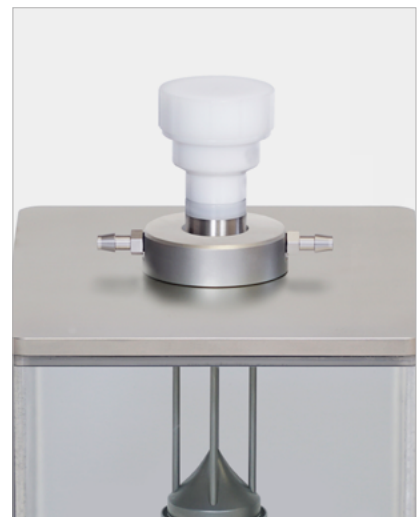
For applications requiring maximum robustness, sterilization capability, and intensive cleaning procedures, the **Advanced Nebulizer Stainless Steel** version is available. It is autoclavable, highly durable, and suitable for ultrasonic bath cleaning, making it particularly attractive for pathogens and samples from the environment.



Nebulizer Controller



Cloud with Aerogen Solo Nebulizer

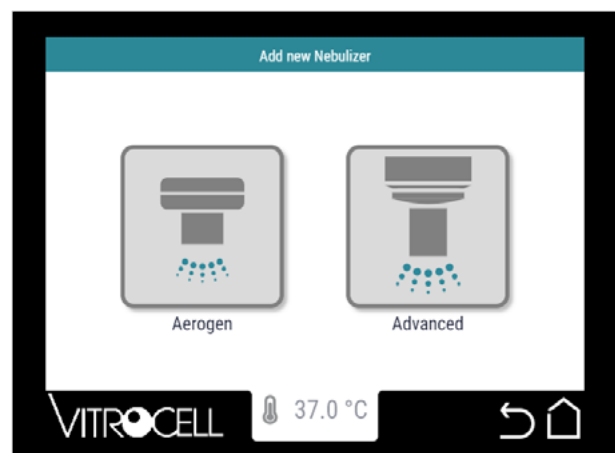


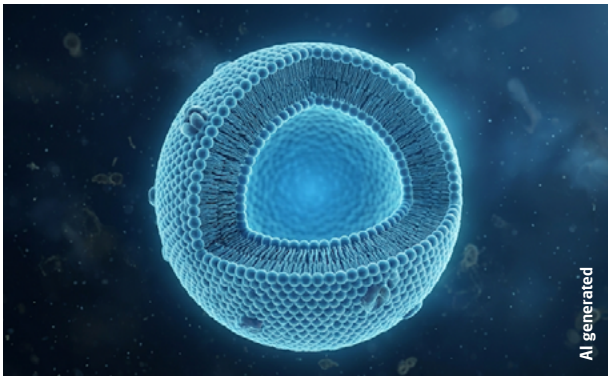
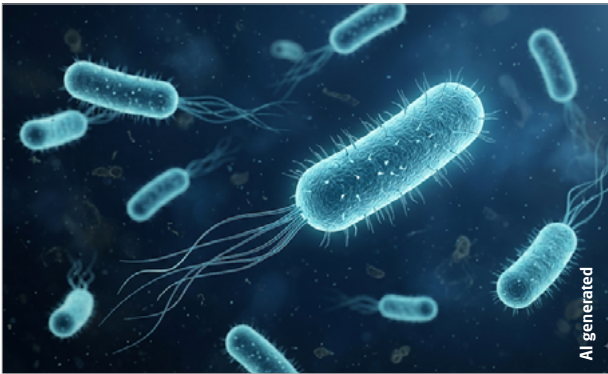
Cloud with Advanced Nebulizer and passive diffuser

One Technology for all VITROCELL Cloud Systems

The new nebulizer generation is also backwards compatible, allowing seamless Integration with existing Cloud systems. Older Cloud systems can be operated using cable adapters or, alternatively, through a stand-alone configuration featuring an integrated display and dedicated controller.

Cloud Alpha models receive a software update, so the nebulizers are fully operable via the system software.



**Micelle/Liposom****Bacteria****Antibodies**

The Advanced Nebulizer is particularly well suited for highly viscous formulations, including compounds dissolved in DMSO. It also enables efficient nebulization of buffer systems containing proteins or bacterial stocks, ensuring broad applicability across a wide range of biological and chemical test materials.

For sensitive test articles such as shear-sensitive lipid nanoparticles (LNPs), micelles, or antibodies, the output rate can be precisely adjusted. This allows a gentle aerosolization process that helps preserve the structural integrity of fragile formulations.

The patented passive diffuser ensures a uniform distribution of larger droplets, ranging from 12 to 20 μm , within the Cloud Exposure Chamber.

To prevent any issues caused by larger droplet formation, the system is equipped with an integrated drainage channel.

For particle suspensions with a tendency toward agglomeration, larger pore sizes in the mesh, generating droplets in the range of 12 or 20 μm are recommended. To ensure uniform distribution of these larger droplets, the system can be equipped with a patented passive diffuser.

**Diffuser (only required for 12 and 20 μm droplets)**

About VITROCELL®

VITROCELL® exclusively concentrates on the developing, producing, installing, training and servicing of advanced *in vitro* exposure systems.

The VITROCELL® Systems' team is driven by their vision for new in-vitro standards through state-of-the-art technology, highly qualified workmanship and absolute client dedication. VITROCELL® has successfully collaborated with clients from leading research institutes, contract research organizations, regulatory authorities or industrial laboratories across the world. Working with our team experts, all modules have been tailored to create durable and complete turnkey-systems for *in vitro* inhalation toxicology. Gases, environmental atmospheres, nano particles and complex mixtures are analyzed on lung cells at the air/liquid interface using these systems. VITROCELL® technologies are also applicable to solutions for skin research.

Over a decade of devotion to research in this specific field has given our team of design & precision manufacturing specialists the opportunity to mentor highly diversified and complex projects from conception to completion. We strive to become a constructive member of each research team, providing support when it is needed, advice when it is required and modules of the highest quality, which are even polished by hand before leaving here to be integrated into your workspace. Every piece of our German engineered equipment is manufactured to the highest of standards – yours.

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