Advanced in vitro exposure systems

Cloud Alpha Plate Platform

VITROCELL® SYSTEMS

VITROCELL® Cloud α Plate Standard Exposure Top

Interchangeable base modules for 24- and 96-well HTS plates

The latest innovation of the VITROCELL® Cloud Alpha can now be equipped with 24-well and 96-well HTS plates. With its modular design, this advanced platform is tailored for higher throughput demands and enables a rapid and efficient execution of experimental series.

Developed on the foundation of the renowned VITROCELL® Cloud formats, this member of the Cloud Alpha Family represents a major step forward in experimental flexibility, enabling users to expose either 24- or 96-positions with minimal test substance investment.

Potential applications range from testing chemicals, nanoparticles, viruses, bacteria, as well as coating plastic inserts, transfecting cell populations in HTS formats, and preconditioning cells with the desired test substance.

Developed with the focus on streamlined workflows

The fully modular design of VITROCELL® Cloud Alpha Plate Version allows for the rapid and efficient execution of experimental series. Users benefit from the removable, easy to clean base modules. These precisely manufactured, stainless-steel parts allow for aerosol deposition without significant influence from electrostatic effects and are compatible with all commercially available HTS Transwell geometries.

Edition: September 2025

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Dosimetry using Quartz Crystal Microbalance (QCM)

The sQCM 12 sensor seamlessly integrates into the Cloud Alpha Plate exposure module. It offers precision measurement of deposited mass, down to nanograms/cm^2.

All results are logged within the VITROCELL® Monitor Software, where they are presented graphically and can be effortlessly exported as .csv files for for further analysis.

Choice of three types of nebulizers

VITROCELL® offers a selection of three types of vibrating mesh nebulizers, each with specific droplet MMAD ranges: 2.5–6.0 µm, 2.5–4.0 µm, and 4.0–6.0 µm. An advanced version is also available with a range of 9.0–12.0 µm. This versatility makes it particularly suitable for testing whenever limited quantities of testing materials are available.

24- and 96-well HTS plates

24- and 96-well HTS insert plates enable efficient, reproducible, and scalable in vitro testing. They allow for robust readouts and easier handling. Both combine flexibility and efficiency, supporting a wide range of applications.

Features:

- Suitable for nebulization of solutions and suspensions
- Higher throughput in using HTS plates
- Uniformly distributed Cloud exposure of cells in 24- and 96-well HTS plates
- Base modules made of stainless steel for minimized electrostatic effects
- Optional sQCM 12 microbalance
- Optional PowerVent function: evacuation of residual aerosols via vacuum pump
- Designed for exposure of inhaled drugs, toxicity testing of inhaled substances such as chemicals or nanoparticles and virus research

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VITROCELL® Cloud α Plate Exposure Top Four/24

Multiple doses or compounds for 24-well HTS plates and inserts

The VITROCELL® Cloud Alpha Plate platform has continued to evolve and is now available with the new Exposure Top Four/24. With its modular design, the system is tailored to higher throughput demands and enables rapid, efficient execution of experimental series.

In addition to established applications such as testing chemicals, nanoparticles, viruses, bacteria, coating plastic inserts, transfecting cell populations in HTS formats, and preconditioning cells, the Cloud Alpha Plate platform can now also be used for drug screening approaches.

With the Exposure Top Four/24, researchers can aerosolize up to six different compounds or six different doses of a single substance simultaneously on four 24-well inserts. This capability accelerates the identification of promising drug candidates, which can then be seamlessly upscaled on the Cloud Alpha Plate system with integrated dosimetry via QCM.

This advancement represents an important step toward streamlining exposure workflows and increasing experimental throughput at the Air/Liquid Interface (ALI).

Six different doses:

The Exposure Top Four/24 enables efficient dose-response studies by exposing cells to six different doses simultaneously.

Six different substances:

The Exposure Top Four/24 stream-lines drug candidate screening exposing six different substances simultaneously.

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Easy cleaning and sterilization

The modular design of the Exposure Top Four/24 allows for easy cleaning and sterilization of all components that come into contact with cells, culture media, or the aerosol.

Cloud Alpha Controller

The six nebulizers are controlled centrally by the Cloud Alpha controller. Individual recipies can be edited by sets of two nebulizers or for simultaneous nebulisation.

Features:

- Enables efficient dose–response studies
- Application of up to six different compounds or six different doses of single substance
- Easy to clean design fully made from stainless steel
- Base modules made of stainless steel for minimized electrostatic effects
- For 24-well HTS plates and 24-well single inserts

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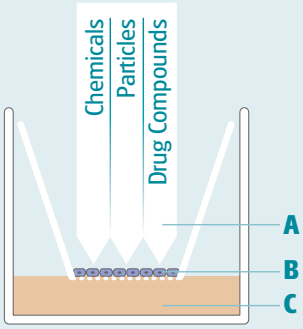
VITROCELL® Exposure Systems for Inhalation Toxicology

Direct Exposure Technology at Air/Liquid Interface

Air/liquid cultivation and exposure in Exposure Module

- **A** Direct and controlled exposure of test atmosphere to cells
- **B** Cells on membrane
- **C** Media below cells



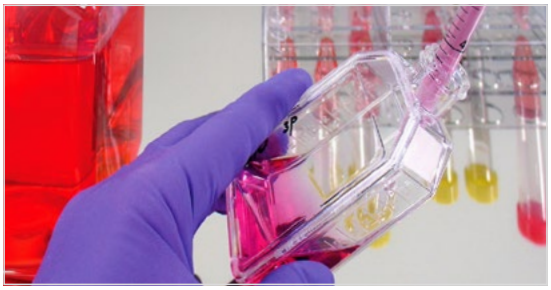
In response to the scientific need to expose in physiologically relevant conditions, VITROCELL® exposure modules have been specifically designed and engineered to enable direct exposure of mammalian cells or tissue at the Air/Liquid Interface where the cell systems are not covered with culture medium.

Researchers can thus use all cell types cultivated on microporous membranes.

This approach allows for more credible and authentic results than by submerged exposure due to a closer replication of the human physiology.

The advantages

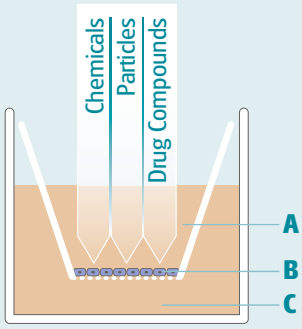
- **No losses**
- **No dissolution**
- **No reaction of constituents with culture medium**
- **High sensitivity**



Disadvantages of submerged exposure

Submerged cultivation and exposure in incubator

- **A** Medium above cells
- **B** Cells on membrane
- **C** Media below cells



The exposure of mammalian cells or tissues to airborne substances is frequently performed under submerged conditions. In doing so, the test substances are dosed into the culture medium. This procedure results in an undesired interaction of the formerly airborne substances with the medium, causing limitations for authentic analysis.

Therefore VITROCELL® recommends the air/liquid interface exposure technology.

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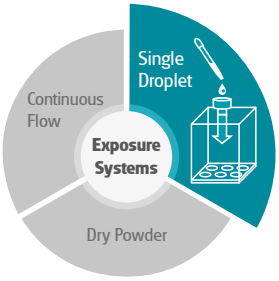
Exposure Principle



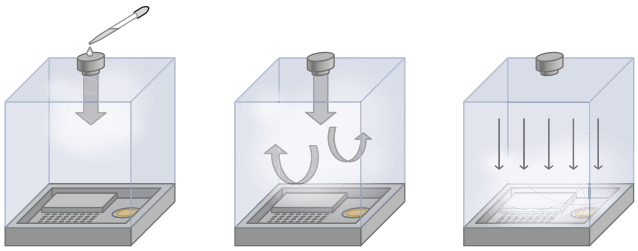
Single Droplet Sedimentation (Cloud Exposure)

Single Droplet Sedimenation Systems are specifically designed for dose-controlled and spatially uniform deposition of liquid aerosols on cells. Test substances are chemicals or particles brought into suspension with e.g. PBS.

The aerosol is applied for a short time of approx. 3–6 minutes.

This method is well suited for scarce and expensive materials, such as new drug candidates or particle samples from the environment.

Nebulization volumes range from 15 to 300 µl. Aerosolization is performed directy into the cell culture exposure chamber. Aerosolization can be repeated several times to obtain a dose-response profile.



Phase 1
Emission of Cloud

Phase 2
Homogeneous Mixing

Phase 3
Gravitational Settling

Main application areas

- Particles/nanoparticles in suspensions
- Pharmaceutical compounds/liquids
- Chemicals
- Virus research

Cloud Exposure Systems

Cloud Alpha 12

Cloud Alpha MAX

Cloud Alpha MOVE

Cloud Alpha TRIO

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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