

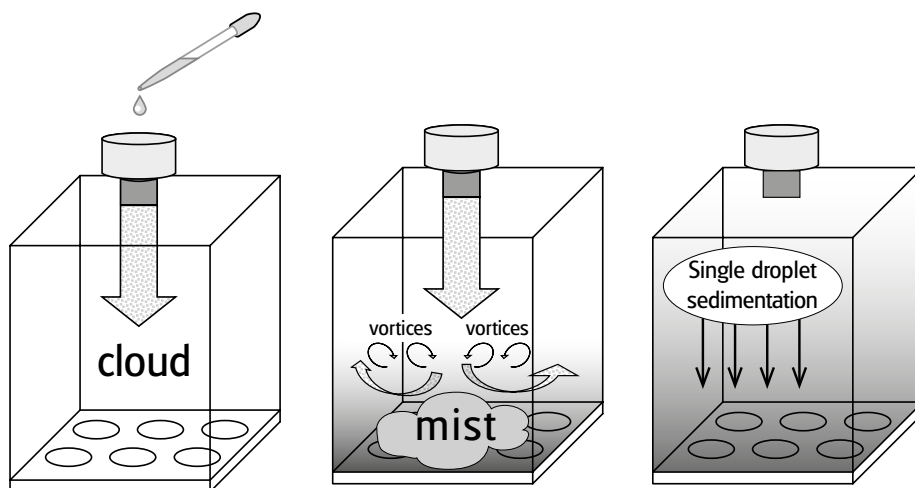
Advanced in vitro exposure systems



A new milestone for *in vitro* inhalation toxicology: aerosolization of liquids and suspensions

Testing of chemicals, nanomaterials and drugs on cell cultures

CLOUD α



How it works

Phase 1
Emission Of Cloud

Phase 2
Homogeneous Mixing

Phase 3
Gravitational Settling

The VITROCELL® Cloud system is specifically designed for dose-controlled and spatially uniform deposition of liquid aerosols on cells cultured at the air/liquid interface. The aerosol is applied for a short time of approx. 3 – 4 minutes.

This exposure system can be used for aerosols generated from liquids and suspensions. Possible fields of application are screening for inhaled drugs and toxicity testing of inhaled substances including nanoparticle suspensions.

The Cloud aerosol chamber is made of Polycarbonate.

Please download the VITROCELL® Cloud demonstration video from our website.

VITROCELL® Cloud α

The next generation of the VITROCELL® Cloud device family

Years of experience and customer feedback led to the development of the new VITROCELL Cloud Alpha. The design and enhanced functionalities offer an exceptional user experience.



Keeping the validated dimensions and underlying concept of the Cloud exposure process, our newest innovation presents a great leap forward in terms of automation and accessibility.

It preserves the known and tested VITROCELL® Cloud formats (6-well, 12-well, 24-well) and functionality while enabling fully automated processes with its all-in-one control unit.

Everyday experiments have never been easier thanks to the improved base module and aerosol chamber designs.

◀ VITROCELL® Cloud Alpha 12 for 12- and 24-well sized inserts

VITROCELL® Cloud Alpha 6 ▶ for 6-, 12- and 24-well sized inserts



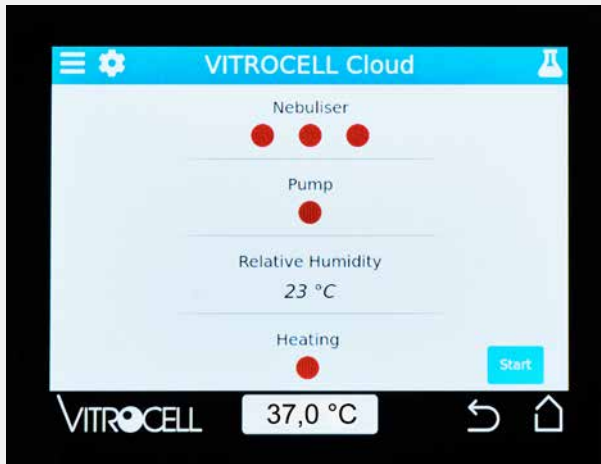
New key features

- Integrated controller for three aerosol generators
- Optional integrated microbalance controller
- Optional humidity and temperature sensors monitored by the control unit
- Interconnection of several VITROCELL® Cloud Alpha control units as master/slave setup
- Defined experiment recipes, automating:
 - Nebulization times or nebulization of user-defined volumes via an integrated output rate database
 - Exposure and Cloud settling duration
 - Optional PowerVent function: evacuation via vacuum pump

VITROCELL® Cloud Alpha – Touch Screen Display

for easy definition of the experimental parameters

4



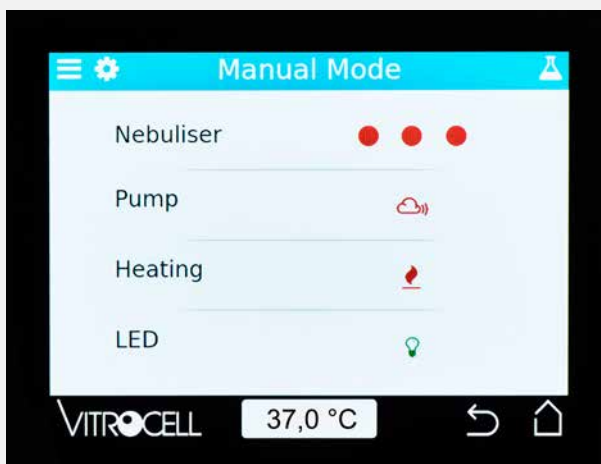
Home Screen

After defining the sequence of an experiment, there is only a single tap on “Start” required to perform a completely automated exposure. This ensures higher reproducibility and gives a perfect ease of use. The deposited particle mass is monitored by the integrated microbalance dosimetry tool (option).



Recipes

Recipes may be set according to the experimental design. The integrated nebulizer and linked output rate data base allows to use the nebulizer as a reservoir and generate an aerosol out of a defined volume. Alternatively a time-based nebulization may be chosen. Additionally, settling and evacuation times (for the optional PowerVent version) may be defined according to individual needs.



Manual Mode

While offering fully automated, recipe-controlled experiments, the VITROCELL® Cloud Alpha control unit has the option to control each of its functions manually. There is only a touch of your finger required to switch individual nebulizers on or off, evacuate the exposure chamber after an experiment or toggle a LED light for better visibility.

VITROCELL® Cloud Alpha – insert holder system

A guarantee for maximum flexibility in insert sizes

The VITROCELL® insert holder system is integrated into the VITROCELL® Cloud Alpha series. It ensures maximum compatibility to different brands of cell culture inserts and offers the capability to use different formats (6-, 12- or 24-Well) within a single device.



Insert holders for 6-, 12- and 24-well sized inserts

5

VITROCELL® Cloud Quartz Crystal Microbalance Sensor

Measuring at a resolution of 10 nanogram/cm² and second

The sensors may be placed easily in the base modules, ensuring a real-time insight to the experimental course and precise dosimetry.



Features

- Exposure system for liquid aerosols
- High droplet output rate – cloud dynamics
- No external air-flow required (simple)
- No humidity control required
- Dose-controlled and spatially uniform aerosol deposition
- Small residual volume in nebulizer reservoir
- Low insert-to-insert variabilities
- Easy handling
- Clinically relevant
- Integrated electronic heating system

The VITROCELL® Cloud can be used for aerosols generated from liquids and suspensions.

There is a choice among 4 options of Aeroneb® nebulizers:

- 4.0 – 6.0 µm
- 2.5 – 6.0 µm
- 2.5 – 4.0 µm
- 10 µm (special version)

VITROCELL® 48 PLUS Climatic Chamber

For 56 Cell Culture Inserts in 6-, 12- and 24-well size as well as for Petri dishes (35 mm size)

The VITROCELL® 48 PLUS module system has been specifically engineered to facilitate the research of mammalian cell cultures or bacteria in direct exposure to airborne substances such as gases, complex mixtures, nanoparticles and fibers.

Only one system is required: 7 dilutions with 7 compartments for exposure to the substances and 7 compartments in the same system for clean air control. One compartment in each row can be used for dosimetry tools such as microbalance sensors or stainless steel inserts for trapping liquids.

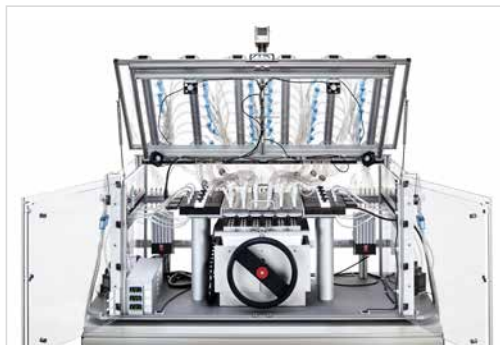
A complete dose/response profile can be obtained in one experiment. The bacteria are directly exposed using controlled aerosol flow rates. After exposure, the cultures are further processed to measure the number of revertants.



The entire system with integrated humidification system is housed in a climatic chamber.



Exposure Module on Drawer



Easy access to all components



Heating Systems for base module and climatic chamber

Features

- Suitable for 56 Cell Culture Inserts (6-, 12- and 24-well size) as well as for Petri dishes (ø 35 mm)
- Hyperboloid geometry of inlets for optimized particle deposition and distribution
- Direct flow control for each inlet
- Base module compartments made of stainless steel for maximum durability
- 7th compartment in each row for dosimetry (for liquid trapping or microbalance)
- Base module compartments autoclavable at 121° C (250° F)
- Option: Integrated humidification system
- Option: VITROCELL® Monitor software for flow controllers



VITROCELL® Shisha Testing Device

Testing of water pipe tobacco according to ISO 22486

The new device is designed for machine smoking of water pipe tobacco. It is used in combination with the renowned VC 1 Smoking Machine featuring an increased puff volume.

Emissions of water pipe tobacco may be used for chemical analysis or in

vitro exposure. The device can be combined with any VITROCELL® Exposure System. All parameters such as puff volume, frequency, puff duration and puff profiles are set according to ISO. The water pipe head is made of ceramics and can be operated either with charcoal or electrical heating.

7



Integrated electrical heating device



Heating via charcoal



Delivered with a VC 1 Smoking Machine



Usefull tools for charcoal operation

Features

- Puff duration: 2,6 s ± 0,1 s.
- Puff volume: 530 ml ± 10 ml
- Puff frequency: 20 s ± 0,5 s
- Square puff profile
- Electrical heating: 280 °C ± 10 °C
- User-friendly temperature control unit

VITROCELL® TEM Grid Holder

Easy and reproducible analysis of deposited particles

To expand the analytical possibilities inside the Vitrocell exposure modules, special analytical inserts have been developed together with the Karlsruhe Institute of Technology.

They can be equipped with sample carriers for transmission electron

microscopy (TEM-Grids) to analyse number and morphology of deposited particles. The grids are located on the same level as the cells during a regular exposure. Furthermore, the grids can be fixed on different radii on the insert surface. The TEM Grid Holders are available for the 6- and 12-well format.



6- and 12-well sized holder equipped with TEM-Grids

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.

YOUR GLOBAL PARTNER FOR ***IN VITRO*** EXPOSURE SYSTEMS

VITROCELL® Systems GmbH
Fabrik Sonntag 3
79183 Waldkirch
Germany

Tel. +49 7681 497 79-50
Fax +49 7681 497 79-79
Email: info@vitrocell.com
www.vitrocell.com

