# Advanced in vitro exposure systems







Cloud Alpha TRIO



## VITROCELL<sup>®</sup> Cloud **23** TRIO

For exposure of 12- and 24-well sized cell culture inserts in three separated compartments: Testing of up to three dose ranges or three different substances in one experiment.

The VITROCELL® Cloud Alpha TRIO presents another innovative leap forward in the exposure of cell cultures. This versatile device enables the acquisition of three dose relationships in a single experiment or facilitates working with three different substances simultaneously. The latter procedure is particularly interesting for users which need to test and compare larger numbers of different substances.

The development is based on the well-known and frequently published VITROCELL® Cloud formats.



Higher Throughput

3 doses @ 4 replicates 3 substances @ 4 replicates

Cloud Alpha TRIO with three separated compartments

#### Developed with a focus on versatility

The new Cloud Alpha TRIO is capable to expose mammalian cell cultures in 12-and 24-well sized inserts.

The Cloud system is suitable for nebulization of solutions and suspensions. Fields of application are screening of inhalable drugs, assessing the toxicity of inhaled substances like chemicals or nanoparticles, and conducting research on viruses.

#### Choice of three types of nebulizers

It comes with a choice of three types of vibrating mesh nebulizers having droplet MMAD ranges of  $2.5-6.0 \ \mu m$ ,  $2.5-4.0 \ \mu m$ ,  $4.0-6.0 \ \mu m$ , and in an advanced version with  $9.0-12.0 \ \mu m$ .

The device is particularly suitable for testing whenever limited quantitities of testing materials are available.



Every chamber of the Cloud Alpha TRIO has its own nebulizer and can be eqiupped with one of three nebulizer types.



# 12-well: Three individual doses or three different substances.

Exposure of 12-well sized culture inserts in three rows at four replicates.

# 24-well: Three individual doses or three different substances.

Exposure of 24-well sized culture inserts in three rows at four replicates.



Both 12-well and 24-well inserts can be used with special adapters.

#### Dosimetry using Quartz Crystal Microbalances (QCM)

The sQCM 12 sensor can be fitted in all rows of the Cloud Alpha TRIO exposure module.

It is capable of measuring the deposited mass in nanogram/cm<sup>2</sup>. Results are recorded in the VITROCELL<sup>®</sup> Monitor Software. Data is presented in graphs and stored in MS Excel<sup>®</sup>.





The sQCM 12 sensor (left) can be fitted in all rows of the Cloud Alpha TRIO exposure module (right).

#### **Key Features**:

- $\circ$  Suitable for nebulization of solutions and suspensions
- Row-by-row exposure of 12- and 24- well sized cell culture inserts
- Exposure of three different dose ranges in one experiment or of three different substances in one experiment
- Optionally, up to three sQCM 12 microbalances can be connected to one controller

- $\circ$  Heating system
- Optional PowerVent function: evacuation of residual aerosols via vacuum pump
- Designed for screening of inhaled drugs, toxicity testing of inhaled substances such as chemicals or nanoparticles and virus research



# **VITROCELL® Exposure Systems for Inhalation Toxicology**

## Direct Exposure Technology at Air/Liquid Interface



- 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

- $\circ$  No losses
- $\circ$  No dissolution
- $\circ$  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.



# **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



Single Droplet

Exposure Systems

Dry Powder

Continuous Flow

Phase 3 Gravitational Settling

### Main application areas



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

#### **Cloud Exposure Systems**



Cloud Alpha 12



**Cloud Alpha MOVE** 



**Cloud Alpha MAX** 







# 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.

For more information please scan the QR-Code:



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