



Working with toxic chemicals – Osmium tetroxide

CAS: 20816-12-0

Hazards		Reference values
Acute toxicity	Corrosive	TLV
		0.002 mg/m ³ (i)
Dermal Cat 1, Oral Cat 2, Inhalation Cat 2	K1B	

Sources: CLP and SUVA 2025

Legend:

TLV: Recommended airborne exposure limit for 8h work/day (SUVA)

i: Airborne dust concentration = breathable dust

CLP: Regulation on Classification, Labelling and Packaging of substances and mixtures

SUVA: Swiss National Accident Insurance Fund

More information in the Safety Data Sheet of the product. Read chapters 2 (hazards), 4, 5, 6 (first aid and intervention measures), 7 (handling & storage), 8 (PPE) and 10 (reactivity & stability).

Health hazards

OsO₄ is highly volatile both as a solid and as a solution. For this reason, exposure to vapors is highly likely whenever OsO₄ is open to the ambient air.

The acute toxicity of osmium tetroxide is high, and it is a severe irritant of the eyes and respiratory tract. Exposure to osmium tetroxide vapor can damage the cornea of the eye. Irritation is generally the initial symptom of exposure to low concentrations of osmium tetroxide vapor, and lacrimation, a gritty feeling in the eyes, the eyes can temporarily cloud, and the appearance of rings around lights may also be noted. In most cases, recovery occurs in a few days. Concentrations of vapor that do not cause immediate irritation can have an insidious cumulative effect; symptoms may not be noted until several hours after exposure. Contact of the eyes with concentrated solutions of this substance can cause severe damage and possible blindness. Inhalation can cause headache, coughing, dizziness, lung damage, and difficult breathing and may be fatal. Contact of the vapor with skin can cause dermatitis, and direct contact with the solid can lead to severe irritation and burns. Exposure to osmium tetroxide via inhalation, skin contact, or ingestion can lead to systemic toxic effects involving liver and kidney damage. Chronic exposure to osmium tetroxide can result in accumulation of osmium compounds in the liver and kidney and damage to these organs. Osmium tetroxide has been reported to cause reproductive toxicity in animals; this substance has not been shown to be carcinogenic or to show reproductive or developmental toxicity in humans.

Personal protective equipment

- Safety glasses (marked EN 166)
- Nitrile gloves (minimum 0.11 mm) and marked EN374 (two pairs)
- Closed cotton lab coat with sleeves extended

Contaminated PPE must not leave the lab! Wash hands thoroughly immediately after working with any concentration of osmium tetroxide.

Storage and handling

Because of its high acute toxicity and powerful oxidizing ability, osmium tetroxide must be handled in the laboratory using prudent practices. All work with osmium tetroxide must be conducted in a fume hood or glove box to prevent exposure by inhalation, and personal protective equipment (see section above) must be worn at all times to prevent eye and skin contact.

Periodic cleaning of surfaces that could be contaminated is recommended to limit the risk of exposure.

OsO₄ is kept in its commercial packaging *in a restricted area (locked away)*, inaccessible to non-authorized/trained people. Secondary containers can be used to prevent vapours from escaping. Pay attention: Osmium tetroxide can penetrate plastic!

Label all containers, including the secondary one, with the chemical name and hazard pictograms.

The user **respects incompatibilities** also during storage and disposal: a list of incompatible materials is found in section 10 of the SDS.

Disposal protocol

The waste is disposed of as toxic chemical waste containing osmium.

Make sure to consider all the hazards and check [the waste decision tree](#) to find the right OMoD code and labelling information before disposing of the waste.

Contaminated sharp objects must be collected in a plastic waste container or a "Sharpesafe" container (for needles).

Occupational exposure risk assessment

In the event of pregnancy (or pregnancy project), employees should contact the Occupational Health Service as soon as possible and complete the online maternity announcement form ([Maternity protection - EPFL](#)).

IN CASE OF EMERGENCY

Contact the intervention team - **dial 115 (or +41.21.693.30.00 from mobile phone)**

In case of projections

In the eyes: use the eye-washer until the bottles are empty, then follow the instructions from the intervention team.

On the hands: immediately wash with tap water and continue until the intervention team arrives.

On the body: 1) go under the security shower immediately and, under the running water, remove your soiled clothes. 2) go under a shower (in a changing room, for example) with a mixer tap and a curtain. There you can keep rinsing while removing the remaining clothes at a more comfortable temperature. Follow the instructions of the intervention team.

In case of a spill: call 115. Only the intervention team deals with the spill.

Reference: Sigma Aldrich SDS revision date 04.03.2024, Gestis consulted 2025