

## Working with a toxic chemical – arsenic derivatives

Hazards		Reference values	
Chronic toxicity	Acute toxicity	TLV	BEI
		0.01 mg/m <sup>3</sup> i	35 µg/l in urine based on the sum of inorganic and methylated species

SUVA March 2025

Legend:	
TLV:	Recommended airborne exposure limit for 8h work/day (SUVA)
BEI:	Biological exposure index (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

Arsenic and its derivatives are categorised as Class 1 carcinogens by IARC with risk of lung cancer, recognised as being an occupational disease. Skin, bladder and kidney cancers are also associated with arsenic.

The acute toxicity of arsenic comes from its easy absorption by the body and the disruption of the synthesis of certain proteins or nucleoproteins it induces. Some common derivatives of arsenic are poisons. The most dangerous routes for poisoning are ingestion and inhalation. Dermal exposure can occur: the possibility of intoxication by transcutaneous resorption can take place because the substances enter the body not only via the respiratory tract, but also through the skin. The result is a significant increase of the internal toxic load of the exposed individual.

The relative toxicity of arsenic depends on its oxidation state, inorganic or organic form, solubility, physical state and rate of absorption and elimination. In general, arsenic compounds can be ranked from highest to lowest toxicity:

- Inorganic trivalent compounds,
- Organic trivalent compounds,
- Inorganic pentavalent compounds,
- Organic pentavalent compounds, and
- Elemental arsenic

Inorganic arsenic is generally more toxic than organic arsenic. Forms of arsenic that are more rapidly absorbed are more toxic, while those most rapidly eliminated tend to be less toxic. Arsenite and arsenate forms are highly soluble in water. The metabolism of arsenic includes a series of methylation and oxidation steps that form toxic mono- and dimethyl As (III) and As(V) that are then cleared through the urine, so all exposure to arsenic can have toxic effects.

Arsenic is one of the WHO top 10 chemicals of concern due to the high dietary exposure and its carcinogenicity.

## Medical follow up

High risk of exposure from experiments involving work with arsenic warrant medical follow up. Anyone working with arsenic should complete the [Occupational Exposure Assessment form](#).

## Personal protective equipment

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

## Storage and handling

The arsenic derivatives must be stored in a closed container *locked away* with restricted access (inaccessible to unauthorized personnel).

The user works in a **fume hood or in a glove box** and wears **nitrile gloves** whenever handling arsenic compounds.

The user **respects incompatibilities** (also during storage and disposal). The chemical incompatibilities are found in the SDS, sections 7 and 10.

Dedicate an area in the lab for work with arsenic compounds. Label the area with the appropriate hazard pictograms and indicate that it concerns work with arsenic. All contaminated material (like spatulas, gloves, pipettes etc.) must be decontaminated before being moved from the area. Decontamination is done by washing with large amounts of water.

## 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](#)).

## Disposal protocol

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

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).

### **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.