

Safety document Doc # :		Version	1.1
Creation:	D. Vanhecke	Date :	23/01/2017
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Osmium tetroxide handling policy

1. Goal

Ensuring appropriate management and use of osmium tetroxide during research operations at AMI.

2. Applicability/Scope

This policy applies to all Adolphe Merkle Institute personnel, including those who as a form of collaboration with the Adolphe Merkle Institute, store, handle or use osmium tetroxide in its diluted form (OsO₄ solution). The use of solid, crystalline OsO₄ is not allowed.

3. Responsibilities

- The Adolphe Merkle Institute enforces and controls this policy.
- All Principal Investigators, administrators, laboratory personnel and their collaborators working at AMI are required to comply with this policy.
- All PIs, administrators, staff and students working in laboratories at the Adolphe Merkle Institute are required to comply with the safety training requirements as well as any task specific training required by either a laboratory PI or Senior Lab Staff member.

4. Definitions

Osmium tetroxide (OsO₄):

Osmium tetroxide (CAS# 20816-12-0) is a highly toxic colorless to pale yellow solid with an odor like chlorine; sharp and choking. The permissible exposure limit is 0.002mg/m³ is extremely low in comparison to other chemicals.

5. Procedures

5.1. Access and training

Before the first use of osmium tetroxide, inform the safety board that you will purchase this product, inform the lab manager of the designated lab of your experiment design.

Make sure you received the proper introduction to work with this substance: The use of OsO₄ is only possible after a safety training. Contact the lab manager or the microscopy responsible to receive the necessary training.

The Safety Data Sheet (SDS) for OsO₄ should be consulted prior to use.

5.2. Purchase of osmium tetroxide

Only low percentage aqueous solutions of osmium tetroxide must be purchased. The labs are not equipped for solid OsO₄. OsO₄ is available for purchase as a four percent aqueous solution in 5mL vials (e.g. 75632-5ML at Sigma-Aldridge).

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Do not purchase crystals of osmium tetroxide. Do not purchase osmium tetroxide in organic solutions (e.g. acetone) Do not store OsO₄: Design your experiment, purchase the necessary amount and use up all OsO₄.

5.3. Designated area for osmium tetroxide use

There is only one fume hood, which is dedicated to the use of OsO₄: BioNano powder lab, third fume hood on the left. Notify the lab manager well ahead of time before you start using osmium tetroxide. The fume hood contains the sign "OsO₄ in use". Furthermore, proper and sufficient vegetable oil (for spills) and waste is present as well (see below). Before starting work, the sign should be put up notifying lab staff that the chemical is being used.

5.4. Handling of osmium tetroxide

- Prior to starting work with OsO₄, a sign should be put up notifying lab staff that the chemical is being used.
- Preparation of stock solutions and any operations capable of generating OsO₄ dust or aerosols must be conducted in the certified chemical fumehood as mentioned above, to prevent inhalation. Additionally, all OsO₄ work should be done in low recipients (e.g. a wide petri dish), filled with bench pads or disposable covers or towels.

5.5. Personal protection

Two pairs of nitrile gloves, a lab coat, and chemical goggles should be worn at all times, as with working with any hazardous material.

5.6. Practical considerations

- Where practical, purchase pre-made dilute stock solutions from chemical manufacturers in lieu of preparing solutions.
- All processes involving OsO₄ must be performed inside the chemical fume hood to minimize inhalation exposures.
- If OsO₄ must be transported, prevent accidents by transporting only small quantities of OsO₄ and seal them in a secondary containment.
- The storage of the chemical is directly under the designated fume hood, reducing the distanced the chemical has to be transported.

5.7. Collection of OsO₄ waste

OsO₄ must be collected and managed as a hazardous chemical waste. OsO₄ waste will be collected by a specialized company (Thommen Furler) in a procedure similar to other dangerous chemical waste (e.g. arsenic and cyanide).

- All solid chemical, concentrated or dilute liquid solutions, and OsO₄ contaminated debris or material must be collected in the designated brown flask (labeled: OsO₄ waste) in the same room as the OsO₄ storage. Do not open this flask unless under the designated chemical fume hood.
- Pipette tips, razor blades, needles or other sharps contaminated with OsO₄ must be collected and decontaminated by treating them with vegetable oil. A 1:1 volume ratio oil:OsO₄ is sufficient to bind all OsO₄. Pack all solid contaminated material in a plastic bag and seal it airtight. Repeat with a second plastic bag. Put the bags in the white plastic container labelled OsO₄ solid waste. Do not open the container unless under the designated fume hood.

5.8. Disposal of OsO₄ waste

- Top the bottle with olive oil and close firmly

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- Prepare a Thommen-Furler waste container
- Mark the container with a dedicated heavy metal waste sticker sign
- Write the following code on the bottle: UN: 2471, clearly visible on the sticker form. Fill in all necessary entries on the form.
- Fill the container with shock absorbing material (e.g. sytrofoam filling beads). The bottle cannot break during transport.
- Place the bottle in the middle of the container
- Firmly close the container and leave it in the same room. It will be picked up at the next TF visit
- Prepare a new 1L brown glass bottle and fill it with at least 1 dl of olive oil.

5.9. Personal Exposure

In the event of personal exposure the following steps should be followed:

- Flush the area (eyes or skin) with water for 15 minutes.
- Seek further medical evaluation from a doctor or hospital. The emergency number for toxic accidents in Switzerland is 145.
- Complete the University Incident Form.
- Immediately inform your PI, the AMI safety board and the lab manager.

5.10. Spill Response

- As with all hazardous materials, only manageable spills should be cleaned up by laboratory staff. If a spill is considered unmanageable, beyond the means of the laboratory worker, the AMI safety committee must be contacted immediately (contact:).
- If there is a spill of OsO_4 and it is deemed manageable (i.e., quantity spilled is less than approximately 2 mL), lab personnel should:
 - Alert other personnel in the area and isolate the area.
 - Don appropriate personal protection equipment including, at a minimum, double nitrile gloves, a lab coat, a face mask and appropriate protective eyewear.
 - Supply the double amount (2:1 volume ratio) of vegetable oil (supplied and also stored next to the OsO_4 storage) and wait for the oil to react (turns black in a matter of seconds). Then, place absorbing material or pads carefully on the spill and wait a few minutes for the oil to absorb.
 - Scoop the material up and place it in a sealed plastic bag. Double bag it.
 - Label the bag with appropriate "hazardous chemical waste" label and write osmium tetroxide clearly on the label. Place it in the white bucket for solid waste.

5.11. Emergency Contacts

Safety committee responsible for chemicals: Anita Roulin (Phone: +41 26 300 8963, office C126b)

5.12. Medical Surveillance

If persons working with Osmium Tetroxide experience any illness or other health effects from possible exposure, they must report to an MP, a hospital or other healthcare provider as soon as possible to seek medical consultation.