Standard Operating Procedure

**Dimethylmercury or Methylmercury**

*This is an SOP template and is not complete until: 1) lab specific information is entered into the box below 2) lab specific protocol/procedure is added to the protocol/procedure section and
3) SOP has been signed and dated by the PI and relevant lab personnel.*

 Print a copy and insert into your
*Laboratory Safety Manual* and *Chemi Hygiene Plan*.
Refer to instructions for assistance.

|  |  |
| --- | --- |
| **Department:** | Click here to enter text. |
| **Date SOP was written:** | Click here to enter a date. |
| **Date SOP was approved by PI/lab supervisor:** | Click here to enter a date. |
| **Principal Investigator:** | Click here to enter text. |
| **Internal Lab Safety Coordinator/Lab Manager:** | Click here to enter text. |
| **Lab Phone:** | Click here to enter text. |
| **Office Phone:** | Click here to enter text. |
| **Emergency Contact:** | Click here to enter text. |
| *(Name and Phone Number)* |
| **Location(s) covered by this SOP:** | Click here to enter text. |
| *(Building/Room Number)* |

**Type of SOP:** [ ]  Process [x] Hazardous Chemical [x]  Hazardous Class

**Purpose**

Dimethylmercury (CH3)2Hg is an organomercury compound. This colorless liquid is one of the strongest known neurotoxins. It is known to be fatal if absorbed through skin and if ingested. Dimethylmercury is extremely dangerous. Absorption of doses as low as 0.1 mL has proven fatal. The risks are enhanced because of the high vapor pressure of the liquid. Dimethylmercury crosses the blood-brain barrier easily, probably owing to formation of a complex with cysteine. It is eliminated from the organism slowly, and therefore has a tendency to bio-accumulate. The symptoms of poisoning may be delayed by months, possibly too late for effective treatment.

If not stored and handled properly, this can pose a serious threat to the health and safety of laboratory personnel, emergency responders and chemical waste handlers. This SOP helps to understand how to properly store, handle and dispose of dimethylmercury.

\*Dimethylmercury has almost no applications because of the risks involved. In toxicology, it is used as a reference toxin. It has also been used to calibrate Nuclear Magnetic Resonance (NMR)instruments for detection of mercury; although less toxic mercury salts are preferred.

**Physical & Chemical Properties/Definition of Chemical Group**

CAS#: 593-74-8

Class: **Neurotoxin**

Molecular Formula: C2H6Hg

Form (physical state): Liquid

Color: Colorless

NOTE: Dimethylmercury is a volatile liquid. It is described as having a slightly sweet smell, although inhaling vapors to detect its odor would be highly hazardous. It is not reactive toward water.

Boiling point: 93 - 94 °C (199 - 201 °F) - lit.

Flash point: 5 °C (41 °F) - closed cup

**Potential Hazards/Toxicity**

**Emergency Overview**

**OSHA Hazards**

Flammable liquid - Target Organ Effect - Toxic by inhalation - Highly toxic by ingestion - Highly toxic by skin absorption.

**Target Organs**

Nerves, Kidneys

**GHS Label elements, including precautionary statements**

Pictogram

  

Signal word

**Danger!**

**Potential Health Effects**

**Inhalation -** Toxic if inhaled. May cause respiratory tract irritation

**Skin -** May be fatal if absorbed through skin. May cause skin irritation

**Eyes -** May cause eye irritation.

**Ingestion -** May be fatal if swallowed.

**Personal Protective Equipment (PPE)**

**Respirator Protection**

Respirators should be used only under any of the following circumstances:

* As a last line of defense (i.e., after engineering and administrative controls have been exhausted).
* When Permissible Exposure Limit (PEL) has exceeded or when there is a possibility that PEL will be exceeded.
* Regulations require the use of a respirator.
* An employer requires the use of a respirator.
* There is potential for harmful exposure due to an atmospheric contaminant (in the absence of PEL)
* As PPE in the event of a chemical spill clean-up process

Lab personnel intending to use/wear a respirator mask must be trained and fit-tested by ORS and should contact occhealt@uga.edu. This is a UGA requirement described in more detail in the [UGA Respiratory Protection Plan](https://esd.uga.edu/sites/default/files/respiratoryprotection.pdf) and supported by the [Office of Research Occupational Health and Safety Program](https://research.uga.edu/ohsp/).

**Hand Protection**

**NOTE:** *Dimethylmercury passes through latex, PVC, butyl & neoprene rapidly (within seconds) and is absorbed through the skin*. Therefore, most laboratory gloves do not provide adequate protection from it. It is fatal if absorbed through the skin. The only safe precaution is to handle dimethylmercury while wearing highly resistant laminated gloves underneath long-cuffed neoprene or other heavy-duty gloves.

*\*The toxicity of dimethylmercury was highlighted with the death of the inorganic chemist of Dartmouth College in 1997, months after spilling no more than a few drops of dimethylmercury on her latex-gloved hand.*

Gloves: Always handle with ***Silver Shield laminate gloves***. \*This type of gloves is impermeable to dimethylmercury for at least 4 hours. **Note:** The Silver Shield glove should be worn under an outer glove that would be resistant to abrasion and tears (such as long-cuffed neoprene or other heavy-duty gloves).

Gloves must be thoroughly inspected prior to each use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with dimethylmercury. Wash hands with hot/warm water & soap immediately. Dry hands thoroughly.

**NOTE:** Read about a skin exposure incident, to know the highly hazardous property of dimethylmercury: <http://en.wikipedia.org/wiki/Karen_Wetterhahn>

**Eye Protection**

ANSI approved Safety goggles & a long face shield (8” in length).

**Skin and Body Protection**

Fire/flame resistant lab coat (100% cotton based)

Cotton based clothing/attire

Full length pants and full-arm shirt/top

Closed-toe shoes

**Hygiene Measures**

Take extra care to avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling dimethylmercury.

**Note:** Lab coats and clothes contaminated with dimethylmercury must be sent to laundry/dry cleaning immediately.

**Engineering Controls**

Always handle dimethylmercury inside a properly functioning, EH&S inspected & certified *chemical fume hood*. The fume hood certification is an annual requirement. If the fume hood has not been certified by EH&S within the last one year, call 310-825-9797 immediately.

**First Aid Procedures**

**General advice:** Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

**If inhaled**

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

**In case of skin contact**

Wash off with soap and plenty of water. **Take victim immediately to hospital.** Consult a physician.

**In case of eye contact**

Flush eyes with water as a precaution.

**If swallowed**

**Take victim immediately to hospital.** Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

**Special Handling and Storage Requirements**

**Precautions for safe handling**

* Avoid contact with skin and eyes.
* Avoid inhalation of vapor or mist.
* Keep away from sources of ignition.
* Take measures to prevent the build-up of electrostatic charge.

**Conditions for safe storage**

* Keep container tightly closed in a dry and well-ventilated place.
* Containers which are opened must be carefully resealed and kept upright to prevent leakage. Store in cool place

**Note:** To safely store and handle dimethylmercury, it is very important to also know the stability & reactivity properties of dimethylmercury.

**Possibility of hazardous reactions: \***Vapors may form explosive mixture with air.

**Conditions to avoid:** Heat, flames/sparks, extremes of temperature and direct sunlight.

**Materials to avoid:** Strong oxidizing agents/Oxidizers

**Hazardous decomposition products:** Hazardous decomposition products formed under fire conditions. - Carbon oxides, Mercury/mercury oxides.

**SALIENT POINTS TO REMEMBER**

**Fire extinguishing media**

* For small (incipient stage) fires, use media such as "alcohol" foam, dry chemical, or carbon dioxide.
* For large fires, apply water from as far as possible.
* Use very large quantities (flooding) of water applied as a mist or spray; solid streams of water may be ineffective.
* Cool all affected containers with flooding quantities of water.

**Special protective equipment for fire-fighters**

Wear Self-Contained Breathing Apparatus (SCBA) for fire-fighting

**Further information**

Use water spray to cool unopened containers.

**Accidental release:**

* Wear SCBA respirator.
* Avoid breathing vapors, mist or gas.
* Ensure adequate ventilation.
* Remove all sources of ignition.
* Evacuate personnel to safe areas.
* Beware of vapors accumulating to form explosive concentrations.
* Vapors can accumulate in low areas.

**Spill and Accident Procedure**

**Chemical Spill Dial 911**

**24-7 On-Call Response to Research, Environment, Health or Safety Concerns Dial 2-5561 from a campus phone or 706-542-5561 from a non-campus line.**

**Spill** – Follow the procedures set out in the [UGA Chemical and Laboratory Safety Manual.](http://research.uga.edu/docs/units/safety/manuals/Chemical-Laboratory-Safety-Manual.pdf)

[If there are any chemical-specific protocols for responding to a spill, insert them here or mark “none”:]

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

# **Medical Emergency Dial 911**

**Life Threatening Emergency, After Hours, Weekends And Holidays** – Dial **911** or the emergency phone numbers listed at the beginning of the UGA Chemical and Laboratory Safety Manual

*Note: All incidents that result in an injury or property damage must be reported to ORS / ESD using a University Incident/Accident Report.*

**Non-Life Threatening Emergency** – Follow the instructions in the UGA Chemical and Laboratory Safety Manual.

*Note: All incidents that result in an injury or property damage must be reported to ORS / ESD using a University Incident/Accident Report.*

**Decontamination/Waste Disposal Procedure**

**For general hazardous waste disposal procedures, see Appendix H of the UGA Chemical and Laboratory Safety Manual.**

**Chemical Specific Procedures: [to be inserted or marked as “none”]**

Even the empty containers (irrespective of the size) which once held dimethylmercury must be disposed of as hazardous waste with an on-line hazardous waste tag affixed on the container.

All dry hazardous waste must be double bagged (*use only transparent bags*) and affixed with an on-line waste tag.

On the on-line waste tag for the dry waste generated from dimethylmercury;

In the contents section, mention as   Dry Waste            99%

                                                      Dimethylmercury 1%

                                                      Type: Solid

**Safety Data Sheet (SDS) Location**

UGA personnel can access Online SDS through a link in the upper left corner of the ESD home page (<https://esd.uga.edu>) and logging in by using their UGA email user name and password.

**Protocol/Procedure (Add lab specific Protocol/Procedure here)**

Click here to enter text.

**NOTE**

Any deviation from this SOP requires approval from PI.

**Documentation of Training** (signature of all users is required)

* Prior to conducting any work with dimethylmercury., designated personnel must provide training to his/her laboratory personnel specific to the hazards involved in working with this substance, work area decontamination, and emergency procedures.
* The Principal Investigator must provide his/her laboratory personnel with a copy of this SOP and access to the SDS provided by the manufacturer.
* The Principal Investigator must ensure that his/her laboratory personnel have attended appropriate laboratory safety training or refresher training within the last 12 months.

**Principal Investigator SOP Approval**

Print name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Signature\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Approval Date:

I have read and understand the content of this SOP:

|  |  |  |
| --- | --- | --- |
| **Name** | **Signature** | **Date** |
| Click here to enter text. |  | Click here to enter a date. |
| Click here to enter text. |  | Click here to enter a date. |
| Click here to enter text. |  | Click here to enter a date. |
| Click here to enter text. |  | Click here to enter a date. |
| Click here to enter text. |  | Click here to enter a date. |
| Click here to enter text. |  | Click here to enter a date. |
| Click here to enter text. |  | Click here to enter a date. |
| Click here to enter text. |  | Click here to enter a date. |
| Click here to enter text. |  | Click here to enter a date. |
| Click here to enter text. |  | Click here to enter a date. |
| Click here to enter text. |  | Click here to enter a date. |
| Click here to enter text. |  | Click here to enter a date. |
| Click here to enter text. |  | Click here to enter a date. |
| Click here to enter text. |  | Click here to enter a date. |
| Click here to enter text. |  | Click here to enter a date. |