

Standard Operating Procedure

Tetrahydrofuran

Purpose

Tetrahydrofuran is a flammable liquid that is also an irritant, and should be treated with care by researchers. It is also a peroxidizable compound and care should be taken when handling it as it may become shock sensitive. It is generally used as a reaction solvent. This compound should be inspected prior to use for peroxide crystals that may have collected around the cap, on the inside, or on the outside of the bottle by a starch iodide test paper.

Physical & Chemical Properties/Definition of Chemical Group

CAS#: 109-99-9

Class: Peroxide Former, Irritant, Flammable,

Molecular Formula: C₄H₈O

Form (physical state): Liquid

Color: Colorless

Boiling point: 65.0 - 67.0 °C

Potential Hazards/Toxicity

Inhalation May be harmful if inhaled. Causes respiratory tract irritation. Vapours may cause drowsiness and dizziness.

Skin Harmful if absorbed through skin. Causes skin irritation.

Eyes Causes eye irritation.

Ingestion Harmful if swallowed.

Acute toxicity

Oral LD50

LD50 Oral - rat - 1,650 mg/kg

LD50 Oral - guinea pig - 2,300 mg/kg

Inhalation LC50

LC50 Inhalation - rat - 3 h - 21000 ppm

Remarks: Drowsiness Lungs, Thorax, or Respiration:Respiratory stimulation. Ingestion may cause gastrointestinal

irritation, nausea, vomiting and diarrhoea.

Dermal LD50

LD50 Dermal - rat - > 2,000 mg/kg

Skin corrosion/irritation

Skin - rabbit - Mild skin irritation - Draize Test

Serious eye damage/eye irritation

Eyes - rabbit - Risk of serious damage to eyes. - Draize Test

Specific target organ toxicity - single exposure (Globally Harmonized System)

Inhalation - May cause respiratory irritation.

May cause drowsiness or dizziness. - Nervous system

Specific target organ toxicity - repeated exposure (Globally Harmonized System)

The substance or mixture is not classified as specific target organ toxicant, repeated exposure.

Personal Protective Equipment (PPE)**Respirator Protection**

Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type AXBEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

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 EH&S. This is a regulatory requirement.

Hand Protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

NOTE: Consult with your preferred glove manufacturer to ensure that the gloves you plan on using are compatible with hydrochloric acid.

Refer to glove selection chart from the links below:

http://www.ansellpro.com/download/Ansell_8thEditionChemicalResistanceGuide.pdf

OR

<http://www.allsafetyproducts.biz/page/74172>

OR

<http://www.showabestglove.com/site/default.aspx>

OR

<http://www.mapaglove.com/>

Eye Protection

Tightly fitting safety goggles. Faceshield (8-inch minimum). Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin and Body Protection

Lab personnel working with the chemical need to wear full-length pants or its equivalent, closed-toe footwear with no skin being exposed, and a lab coat.

Hygiene Measures

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Engineering Controls

Work with tetrahydrofuran should be conducted in a fume hood. Sash height should be kept low to avoid escaping fumes. Use explosion proof equipment like a blast shield to protect from explosions in the case of peroxide detonation

First Aid Procedures**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. Consult a physician.

In case of eye contact

Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed

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 vapour or mist. Use explosion-proof equipment. Keep away from sources of ignition - No smoking. 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.

All containers with tetrahydrofuran should be labeled as potentially explosive and stored in secondary containment. These secondary containment should also be labeled as potentially explosive, and stored in a cabinet (if needed) that is also labeled as potentially explosive.

Spill and Accident Procedure**Chemical Spill Dial 9-911 and 228-7864**

Spill – Assess the extent of danger. Help contaminated or injured persons. Evacuate the spill area. Avoid breathing vapors. If possible, confine the spill to a small area using a spill kit or absorbent material. Keep others from entering contaminated area (e.g., use caution tape, barriers, etc.).

Small (<1 L) – If you have training, you may assist in the clean-up effort. Use appropriate personal protective equipment and clean-up material for chemical spilled. Double bag spill waste in clear plastic bags, label and take to the next chemical waste pick-up.

Large (>1 L) – Dial 9-911 and EH&S at 228-7864 for assistance.

Chemical Spill on Body or Clothes – Remove clothing and rinse body thoroughly in emergency shower for at least 15 minutes. Seek medical attention. *Notify supervisor and EH&S at 228-7864 immediately.*

Chemical Splash Into Eyes – Immediately rinse eyeball and inner surface of eyelid with water from the emergency eyewash station for 15 minutes by forcibly holding the eye open. Seek medical attention. *Notify supervisor and EH&S at 228-7864 immediately.*

Medical Emergency Dial **9-911** or **228-7864**

Life Threatening Emergency, After Hours, Weekends And Holidays – Dial **9-911** *Note: All serious injuries must be reported to EH&S at 228-7864 within 8 hours.*

Non-Life Threatening Emergency – Go to the Olivewood Meadows Occupational Health 374 Olive during regular business hours. All other times report to Mercy Medical Center 315 Mercy Ave. *Note: All serious injuries must be reported to EH&S at 228-7864 within 8 hours.*

Needle stick/puncture exposure (as applicable to chemical handling procedure) – Wash the affected area with antiseptic soap and warm water for 15 minutes. For mucous membrane exposure, flush the affected area for 15 minutes using an eyewash station. Go to the Olivewood Meadows Occupational Health 374 Olive during regular business hours. All other times report to Mercy Medical Center 315 Mercy Ave. *Note: All needle stick/puncture exposures must be reported to EH&S at 228-7864 within 8 hours.*

Decontamination/Waste Disposal Procedure

Schedule a hazardous waste pickup with EH&S. The container should be labeled with a waste tag that is labeled as potentially explosive.

Contaminated packaging

Dispose of as unused product.

General hazardous waste disposal guidelines:

Label Waste

- Affix an on-line hazardous waste tag on all waste containers using the Online Tag Program <http://otp.ucop.edu/> as soon as the first drop of waste is added to the container

Store Waste

- Store hazardous waste in closed containers, in secondary containment and in a designated location
- Double-bag dry waste using transparent bags
- Waste must be under the control of the person generating & disposing of it

Dispose of Waste

- Dispose of regularly generated chemical waste within 90 days
- Call EH&S at 228-7864 for questions
- Empty Containers
 - Dispose as hazardous waste if it once held extremely hazardous waste (irrespective of the container size) A list can be found at <http://ehs.ucla.edu/Pub/ExtremelyHazardousWaste.pdf>

Prepare for transport to pick-up location

- Check on-line waste tag
- Use secondary containment

Safety Data Sheet (SDS) Location

Online SDS can be accessed at <http://ehs.ucmerced.edu/material-safety-data-sheets>.

Protocol/Procedure

For dissolving polystyrene beads from electrodeposition electrodes. Soak electrode in neat THF solution for 5 minutes, rinse with hexane followed by ethanol and then water.

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 hydrochloric acid, 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 a copy of 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 one year.

I have read and understand the content, requirements, and responsibilities of this SOP:

Name	Signature	Date
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