Standard Operating Procedure

**Diethyl Ether**

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| **Department:** | Chemistry |
| **Date SOP was written:** | July 21, 2014 |
| **Date SOP was approved by PI/lab supervisor:** | July 21, 2014 |
| **Principal Investigator:** | Sarah Keller |
| **Location(s) covered by this SOP:** | BAG 005 |
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**Type of SOP:** ☐ Process ☒Hazardous Chemical ☐ Hazardous Class

**Purpose**

Diethyl ether is a Peroxide Forming Chemical (PFC). It forms explosive mixtures with air. Ether peroxides are contact explosives when dry. Diethyl ether is also extremely flammable. The auto-ignition temperature of diethyl ether is 160°C (320°F) and can therefore it can be ignited by a hot surface without a flame or spark. 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. Hence, it is important to follow safety protocols to handle this chemical.

Diethyl ether is a common laboratory solvent used in liquid-liquid extractions. It is particularly important as a solvent in the production of cellulose plastics such as cellulose acetate.

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

CAS#: 60-29-7

Class: Highly Flammable and Peroxide Former

Molecular Formula: C4H10O

Form (physical state): Liquid

Color: colorless

Boiling point: 34.6°C

**Potential Hazards/Toxicity**

Prolonged storage of diethyl ether could lead to the formation of explosive peroxides. It has also been shown to have mutagen effects. Causes skin, eye, and respiratory tract irritation. Inhalation of vapors may cause narcosis, nausea, loss of consciousness, dizziness and drowsiness. May cause digestive tract irritation and central nervous effects through ingestion. Symptoms include headache, excitement, fatigue, nausea, vomiting, stupor, and coma.

**Personal Protective Equipment (PPE)**

**Respiratory Protection**

Use a full-face respirator with organic vapor cartridges as a backup to engineering controls. When a respirator is the sole means of protection, use a full-face supplied air respirator.

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. (<http://map.ais.ucla.edu/go/1004655>)

**Hand Protection**

When handling the chemical, laminate film, polyvinyl alcohol, neoprene or nitrile gloves are recommended.

NOTE: Consult with your preferred glove manufacturer to ensure that the gloves you plan on using are compatible with diethyl ether

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**

Wear chemical splash goggles or a face shield to protect from splash hazards and chemical vapors.

**Skin and Body Protection**

Wear full-length pants, closed-toe shoes, and a flame-resistant lab coat.

**Hygiene Measures**

Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

**Engineering Controls**

Work with this chemical in a certified ducted fume hood. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower.

**First Aid Procedures**

**If inhaled**

Move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

**In case of skin contact**

Take off contaminated clothing immediately. Wash off with soap and plenty of water for 15 minutes. Take victim immediately to hospital. Consult a physician.

**In case of eye contact**

Rinse thoroughly with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid immediately. Continue to wash eyes during transport to the hospital.

**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** Be sure there are no white crystals forming on the outside of the bottle. Work in an area with adequate ventilation. When handling the chemical, use it away from shock, friction, and open flames. Prevent electric static build-up with a grounding cable. Wash thoroughly after handling.

**Conditions for safe storage** Please label the date received and the date opened, prior to working with diethyl ether. If there are white crystals around the cap of the bottle, do not attempt to move the bottle and call EH&S immediately. The white crystals are a sign of explosive peroxide formation and needs to be removed from the lab by a professionally trained person. Keep the chemical in a tightly sealed container in dry and well-ventilated area. Containers of diethyl ether should be protected from physical damage, direct sunlight, and ignition sources. It should be stored separately from strong oxidizing agents, strong acids, halogens, interhalogens, sulfur and sulfur compounds. Segregate the chemical and store in secondary containment. Label the bottle, secondary containment, and storage cabinet as “Potentially Explosive Chemical.” Write the date the chemical was received and date the chemical was opened.

**Spill and Accident Procedure**

**Chemical Spill Dial 911 and x59797**

**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 **911** (or 310-825-1491 from cell phone) and EH&S at x59797 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 x59797 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 x59797 immediately.*

# **Medical Emergency Dial 911**

**Life Threatening Emergency, After Hours, Weekends And Holidays** – Dial **911** *Note: All serious injuries must be reported to EH&S.*

**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. *Note: All needle stick/puncture exposures must be reported to EH&S.*

**Decontamination/Waste Disposal Procedure**

Wearing proper PPE, please decontaminate equipment and bench tops using soap and water. Please dispose of the used diethyl ether and disposables contaminated with diethyl ether as hazardous waste.

*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 <http://map.ais.ucla.edu/go/1002774>
* 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 x61887 for questions
* Empty Containers
* Dispose as hazardous waste if it once held extremely hazardous waste (irrespective of the container size) <http://ehs.ucla.edu/Pub/ExtremelyHazardousWaste.pdf>
* Consult waste pick-up schedule <http://ehs.ucla.edu/pub/HazWaste%20Pickup%20Schedule.pdf>

Prepare for transport to pick-up location

* Check on-line waste tag
* Write date of pick-up on the waste tag
* Use secondary containment

**Safety Data Sheet (SDS) Location**

Online SDS can be accessed at [http://msds.ehs.ucla.edu](http://msds.ehs.ucla.edu/).

Any deviation from this SOP requires approval from PI.

**Principal Investigator SOP Approval**

Print name Sarah Keller

Signature

Approval Date: 7/17/2014