**Standard Operating Procedure**

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| **Chemical name/class:** | **Diethyl ether (ether, ethyl ether)** | **CAS #:** |  | **60-29-7** |
| **PI:** |  | **Date:** |  |  |
| **Building:** |  | **Room #:** |  |  |

1. **Circumstances of Use:**

***This SOP must be customized for each lab using Diethyl Ether. Use this section to describe the circumstances of use, including concentration and quantity as well as identification of a designated work area.***

2. **Potential Hazards:**

 Ether is highly volatile and extremely flammable as a liquid or vapor. It is considered one of the most dangerous fire hazards commonly used in the lab due to its volatility and extremely low ignition temperature.

 Ether will spontaneously ignite at temperatures at or above 160°C (320°F).

 Ether vapor forms explosive mixtures in air at concentrations of 1.9-36% by volume.

 Ether may react violently with halogens or strong oxidizers (e.g. perchloric acid, nitric acid).

 Ether can form explosive peroxides upon storage in contact with air. This reaction is promoted by light.

 Inhalation of high concentrations of ether vapor can result in sedation, unconsciousness, and respiratory paralysis.

 Ether is mildly irritating to the eyes and skin. Repeated skin contact can result in dryness and cracking due to

removal of skin oils.

 Chronic exposure to ether vapors can lead to loss of appetite, exhaustion, dizziness, drowsiness, and other central nervous system effects.

 The OSHA Permissible Exposure Limit (PEL) and ACGIH Threshold Limit Value (TLV) are both 400 ppm as an 8- hour time-weighted average. ACGIH has a short-term exposure limit (STEL) of 500 ppm over 15 minutes.

 For more information, refer to *Prudent Practices in the Laboratory* (National Academies Press)

[http://www.nap.edu/openbook.php?record\_id=4911&page=296](http://www.nap.edu/openbook.php?record_id=4911&amp;page=296)

3. **Engineering Controls:**

All work with diethyl ether should be done in a chemical fume hood because of its high volatility.

4. **Work Practice Controls:**

 Maintain the smallest amount necessary for ongoing work. Use in the smallest practical quantities for the experiment being performed.

 Never open a dented or otherwise compromised container of ether.

 Purchase ether with inhibitors added (for peroxide-forming) when possible.

 Due to its peroxide-forming hazard, ether containers should be dated upon receipt and at the time they are opened. If tested, note the date it was tested.

 Periodically test ether containers with peroxide test strips.

 Do not allow to evaporate to near dryness unless absence of peroxides has been shown.

 Consult the MSDS to determine how long an opened container can be used safely, and dispose of unused amounts after that period of time has passed (or if peroxides are found to be present by testing).

 Know the location of the nearest fire extinguisher before beginning work.

 Eliminate ignition sources such as open flames, hot surfaces, steam baths, and operation of mechanical and electrical equipment that is not intrinsically safe.

 Ensure proper grounding and avoid creating static electricity. Be sure to ground metal containers when transferring flammable liquids.

5. **Personal protective equipment (PPE):**

Wear standard nitrile laboratory gloves, lab coat, and safety glasses for all work with ether. If a splash may occur, chemical splash goggles must be worn. Note that ether permeates nitrile laboratory gloves in less than 14 minutes;

thus, tasks should be planned to minimize glove contact with liquid ether.

6. **Transportation and Storage:**

 **Group I – Peroxide Formers, Flammable**

 Transport diethyl ether in secondary containment, preferably a polyethylene or other non-reactive acid/solvent bottle carrier.

 Ether should be stored with other flammables. Do not store ether near halogens or strong oxidizing agents.

 Ether must be stored in an air-impermeable container and placed in a dark area to prevent further promotion of the peroxide-forming reaction.

 Suitable fire control devices (such as fire extinguishers) must be available at locations where flammable or combustible liquids are stored. Contact EHS for installation of appropriate devices.

 Open flames shall not be permitted in flammable or combustible liquid storage areas. A “No Open Flames” sign

must be conspicuously posted in these areas.

 Avoid storing ether on the floor.

 Consult EHS for further information on storage (including allowed quantities) and transport of flammable substances.

 Flammable liquids shall not be stored in unapproved or residential-type refrigerators.

7. **Waste Disposal:**

***Contact EHS at 704-687-1111 immediately to arrange for pick-up and disposal if:***

***(1) crystals are found around the lid of an ether container (do NOT open the container!) or***

***(2) the container tests positive for peroxides.***

Handle and store ether waste following the guidelines above while accumulating wastes and awaiting chemical waste pickup. Waste must be disposed of following your laboratory-specific chemical hygiene plan and the requirements of UNC Charlotte’s Laboratory Chemical Waste Management Practices <https://safety.uncc.edu/services/laboratory-research-safety/hazardous-universal-waste>

8. **Exposures/Unintended contact:**

In the event of:

 Skin contact, immediately wash with soap and water and remove contaminated clothing.

 Eye contact, immediately rinse eyes with copious amounts of water for 15 minutes while occasionally lifting upper and lower eyelids. Seek medical attention.

 Inhalation, move the person to fresh air immediately and seek medical attention if large amounts were inhaled.

 Ingestion, seek medical attention immediately.

Contact the Student Health Center at 704-687-7400 for medical advice on occupational chemical exposures. For an actual chemical exposure, complete the work-related injury or illness report found at: <https://safety.uncc.edu/services/laboratory-research-safety/hazardous-universal-waste>

9. **Spill Procedure:**

Spills of ether inside a chemical fume hood, or small spills outside a hood may be cleaned by laboratory personnel. Since ether is a peroxide-forming material, do not allow clean-up materials to dry – seal them inside a compatible container. Only use non-flammable material to absorb spills. Contact EHS for pick-up of spill clean-up materials. On the UNC Charlotte campus, “large” spills of volatile hazardous materials such as ether must be referred to the

Campus Police by calling 911 from a campus phone or 704-687-1111 from any phone.

10. **Training of personnel:**

All personnel are required to complete the UNC Charlotte EHS Laboratory Environment Training Checklist. This checklist includes an introduction to general chemical safety as well as review of the laboratory specific safety plan. Furthermore, all personnel shall read and fully adhere to this SOP when handling the chemical.

**“I have read and understand this SOP. I agree to fully adhere to its requirements.”**

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| **Last** | **First** | **UNC Charlotte ID** | **Signature** |
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