

Diethyl ether Standard Operating Procedure

Revision: May 11, 2022

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Laboratory Director (LD) Approval is Required Prior to Performing this Procedure

This standard operating procedure (SOP) outlines the handling and use of Diethyl ether. Review this document and supply the information required in order to make it specific to your laboratory. In accordance with this document, laboratories should use appropriate controls, personal protective equipment, and disposal techniques when handling Diethyl ether.

Description [Provide additional information as it pertains to your research protocol]

Diethyl ether is commonly used as a solvent and for liquid-liquid extraction. Diethyl ether liquid and vapor are highly flammable and must be kept away from heat/sparks/open flames/hot surfaces. Avoid breathing vapor. Diethyl ether may form explosive peroxides.

Process [Write the steps for using the chemical in your research protocol]

Potential Hazards [Provide additional information as it pertains to your research protocol]

- Diethyl 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.
- Diethyl ether will spontaneously ignite at temperatures at or above 160°C (320°F).
- Diethyl ether vapor forms explosive mixtures in air at concentrations of 1.9-36% by volume.
- Diethyl ether may react violently with halogens or strong oxidizers (e.g. perchloric acid, nitric acid).
- Diethyl 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.
- Diethyl 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.
- For more in-depth information, refer to Prudent [Practice's Laboratory Chemical Safety Summary](#) for Diethyl ether.

Occupational Exposure Limits (OELs):

- MIOSHA and ACIGH: **400 ppm Ethyl ether, 8-hour TWA**

- MIOSHA and ACGIH: **500 ppm Ethyl ether, 15- minute STEL**

Contact Environment, Health & Safety (EHS) for assistance in performing an exposure assessment.

Engineering Controls [Provide additional information as it pertains to your research protocol]

All work with diethyl ether should be done in a chemical fume hood because of its high volatility. Provide exhaust ventilation or other engineering controls to minimize the airborne concentrations of vapors. Ensure that eyewash stations and safety showers are proximal to the workstation location.

Work Practice Controls [Provide additional information as it pertains to your research protocol]

- 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 diethyl ether with inhibitors added (to help reduce peroxide formation) when possible.
- Due to its peroxide-forming hazard, ether containers must 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 it to evaporate to near dryness.
- Consult the SDS 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.
- Open and dispense diethyl ether in a fume hood and store in an appropriate area like inside a flammable liquid storage cabinet.
- Ensure proper grounding and avoid creating static electricity. Be sure to ground metal containers when transferring flammable liquids.

Personal Protective Equipment [Provide additional information as it pertains to your research protocol]

Wear chemical protective gloves (i.e. PVA), lab coat, respirator (only when the concentration of vapor in the breathing zone exceeds the PEL) and safety glasses for all work with diethyl ether. If a splash may occur, chemical splash goggles must be worn.

Note: Respirators are masks designed to protect the wearer from specific airborne hazards and are different from surgical masks, which protect the wearer only from splashes and are primarily intended to protect others from infectious aerosols exhaled by the wearer. Respirator use requires employee participation in the Respiratory Protection Program, which involves medical clearance and annual fit testing and training. Contact EHS for questions regarding respirator usage.

Transportation and Storage [Provide additional information as it pertains to your research protocol]

- Keep the container in a cool (below 30°C; 86°F), well-ventilated area.



- Transport diethyl ether in secondary containment, preferably a polyethylene or other non-reactive acid/solvent bottle carrier.
- Diethyl ether should be stored with other flammables. Do not store ether near halogens or strong oxidizing agents.
- Diethyl 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 Facilities Service Center (FSC) at (734) 647- 2059 for evaluation and installation of appropriate devices.
- Avoid contamination with oxidizing agents, i.e. nitrates, oxidizing agents, chlorine bleaches, pool chlorine, etc., as ignition may result.
- Avoid storing diethyl ether on the floor.
- Consult EHS Hazardous Materials Management (EHS-HMM) at (734) 763-4568 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.

Waste Disposal [Provide additional information as it pertains to your research protocol]

- Contact EHS-HMM at (734) 763-4568 immediately to arrange for pick-up and disposal if:
 - The container is bulging;
 - Crystals are found around the lid of an ether container (do NOT open the container!); or
 - The container tests positive for peroxides.

Handle and store hazardous waste following the guidelines above for work practice controls, transportation and storage. Contact EHS-HMM for waste containers, labels, manifests, waste collection and for any questions regarding proper waste disposal. Also, refer to the EHS [Hazardous Waste](#) Web page for more information.

Training of Personnel

All personnel shall read and fully adhere to this SOP when handling Diethyl ether.

I have read and understand the above SOP. I have received approval from my Lab Director to perform this procedure. I agree to contact my Lab Director if I plan to modify this procedure.

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Revision History (Do not print as part of SOP)

05/11/2022	Partial Revision	Reviewed and updated links and removed emergency response section. (LGS)
03/04/2019	Annual Revision	
09/14/2018	Partial Revision	Reviewed and updated links and removed emergency response section. (LGS)