



West Texas A&M University™

ACADEMIC RESEARCH ENVIRONMENTAL HEALTH AND SAFETY

STANDARD OPERATING PROCEDURES

SOP No. 24.01.01.W1.44AR WTAMU General Use for Cryogenic Liquids

Approved: May 22, 2013

Revised: October 30, 2018

Next Scheduled Review: October 30, 2023

Environmental Health and Safety at WTAMU is composed of two distinct but integrated environmental safety departments that report to the Vice President of Research and Compliance. Academic and Research Environmental Health and Safety (AR-EHS) is responsible for research and academic related compliance, which includes laboratory and academic research and the associated compliance committees. Fire and Life Safety (FLS-EHS) is responsible for fire related compliance and conducts fire and life safety inspections of campus buildings and assists with the testing of all fire detection and suppression systems.

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1. Purpose

This standard operating procedure (SOP) is intended to provide general guidance on how to safely work with cryogenic liquids and dry ice. This general use SOP only addresses safety issues specific to cryogenic hazards of chemicals. If you have questions concerning the applicability of any item listed in this procedure contact the Principal Investigator/Laboratory Supervisor of your laboratory or Environmental Health and Safety (EHS) at 651-2270.

2. Scope

Cryogenic liquids are materials with extremely low boiling points (i.e. less than – 150°F). Common examples of cryogenic liquids are liquid nitrogen, helium, and argon. Dry ice is the common term for frozen carbon dioxide. One special property of both cryogenic liquids and dry ice is that they undergo substantial volume expansion when converted to a gas phase, which can potentially lead to an oxygen deficient atmosphere where ventilation is limited. Few cryogenic liquids can also pose additional hazards including toxicity and flammability (i.e. liquid carbon monoxide).

3. Control Hazards – General

- Only work with cryogenic liquids in well-ventilated areas to avoid localized oxygen depletion or buildup of flammable or toxic gas.
- Handle objects that are in contact with cryogenic liquids with tongs or proper gloves.
- Transfers or pouring of cryogenic liquids should be done carefully to avoid splashing.
- Containers and systems containing cryogenic liquids should have pressure relief mechanisms.
- Cryogenic liquid cylinders and other containers (such as Dewar flasks) should be filled no more than 80% of capacity to protect against thermal expansion.
- Cryogenic liquid/dry ice baths should be open to the atmosphere to avoid pressure build up.
- Keep liquid oxygen away from organic materials and ignition sources.
- Transfer of liquid hydrogen in an air atmosphere can condense oxygen in the liquid hydrogen, creating an explosion risk.
- Cryotube thawing - In addition to wearing proper safety equipment, when thawing cryotubes, place the cryotube in a heavy-walled container (e.g., a desiccator) or behind a safety shield to protect yourself in the event that the tube shatters.
- Shield or wrap fiber tape around glass Dewars to minimize flying glass and fragments should an explosion occur. **Note:** *Plastic mesh will not stop small glass fragments.*

3.1 Engineering/Ventilation Controls

If the process does not permit the handling of cryogenic liquids in well-ventilated areas, such as lab ventilation having a minimum of 6 air changes per hour, **contact EHS at 651-2270** to determine necessity of an oxygen-deficiency monitor.

3.2 Personal Protective Equipment (PPE)

At minimum, safety glasses, lab coat, long pants, and closed toed shoes are to be worn when entering laboratories having hazardous chemicals. Additionally when handling cryogenic liquids, heavy gloves (e.g., cryogenic gloves), safety goggles, face shield, and lab apron are appropriate.

3.3 Special Handling Procedures and Storage Requirements

- Cryogenic liquid Dewars are to be stored in well-ventilated areas. **Storage in unventilated closets, environmental rooms, and stairwells is prohibited.**
- Large Dewars must be tethered/anchored to a wall.
- Store flammable cryogenic liquids and liquid oxygen away from combustible materials and sources of ignition.
- Additionally, follow all substance-specific storage guidance provided in SDS documentation.

4. Spill and Accident Procedures

Do not attempt to clean up any spill of cryogenic liquid. If a large spill or Dewar leak occurs, immediately exit the area and call EHS at 651-2270 for emergency assistance.

Laboratory personnel who work with hazardous chemicals are to be provided the opportunity to receive medical attention/consultation when:

- A spill, leak, explosion, or other occurrence results in a hazardous exposure (potential overexposure).
- Symptoms or signs of exposure to a hazardous chemical develop.

5. Training

West Texas A&M University Environmental Health and Safety will follow the Texas A&M University System Policy [33.05.02 Required Employee Training](#). Staff and faculty whose required training is delinquent more than 90 days will have their internet access terminated until all trainings are completed. Only Blackboard and Single Sign-on will be accessible. Internet access will be restored once training has been completed. Student workers whose required training is delinquent more than 90 days will need to be terminated by their manager through Student Employment.

6. Record Retention

No official state records may be destroyed without permission from the Texas State Library as outlined in [Texas Government Code, Section 441.187](#) and [13 Texas Administrative Code, Title 13, Part 1, Chapter 6, Subchapter A, Rule 6.7](#). The Texas State Library certifies Agency retention schedules as a means of granting permission to destroy official state records.

West Texas A&M University Records Retention Schedule is certified by the Texas State Library and Archives Commission. West Texas A&M University Environmental Health and Safety will follow [Texas A&M University Records Retention Schedule](#) as stated in the Standard Operating Procedure [61.99.01.W0.01 Records Management](#). All official state records (paper, microform, electronic, or any other media) must be retained for the minimum period designated.

Contact Office

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