Laboratory Standard Operating Procedure for:

Formalin and Paraformaldehyde

Principal Investigator (PI) Approval is Required Prior to Performing this Procedure

Description

This standard operating procedure outlines the handling and use of formalin and paraformaldehyde. 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 formalin and paraformaldehyde.

Formalin and paraformaldehyde are primarily used as fixatives. These fixatives act to preserve and stabilize cells and tissues prior to examination processes. The aqueous solution of formalin is 37-40 percent formaldehyde in water or methanol. Paraformaldehyde is the crystallized polymer of formaldehyde (97%) that is weighed out and dissolved in solution for experimentation or for cell and tissue fixation. Typically 3-10% formalin or paraformaldehyde solutions are used to perfuse or fix tissues.

Useful Formalin and Paraformaldehyde Links:

http://www.cdc.gov/niosh/docs/81-111/
http://www.cdc.gov/niosh/topics/formaldehyde/
http://www.cdc.gov/niosh/npg/npgd0293.html

Potential Hazards

- Formalin and paraformaldehyde solutions can emit formaldehyde gas, a known human carcinogen, and can irritate the eyes and skin.
- Working with paraformaldehyde powder (and, to a lesser extent, flakes or granules), can expose employees to paraformaldehyde dust, which is a strong irritant/sensitizer.
- Contact with these solutions or paraformaldehyde solids may also cause drying of the skin and/or allergic dermatitis.
- The MIOSHA Permissible Exposure Limit for formaldehyde is 0.75 ppm for 8 hours or 2 ppm for 15 minutes. There is a substance-specific MIOSHA standard for formaldehyde, and an action limit of 0.5 ppm.
- Consult your Safety Data Sheet for more information on hazards.

Engineering Controls

- Work with concentrated (>4% formaldehyde/paraformaldehyde) solutions only in a chemical fume hood.
- Handle paraformaldehyde powder (and, preferably, granules or flakes) only in a chemical fume hood.
- Dilute solutions (<4% formaldehyde) may be used on the benchtop in small quantities.
- If there is any possibility that an employee's eyes may be splashed with solutions containing 0.1 percent or greater formaldehyde, an eyewash/drench hose must be available within the immediate work area for emergency use.

- If employees' skin may become splashed with solutions containing 1 percent or greater formaldehyde, for example, because of equipment failure or improper work practices, the MIOSHA formaldehyde standard requires a conveniently-located safety shower. If a shower is not available please notify your lab supervisor or lab director.

Work Practice Controls

- Designate an area for working with concentrated formalin, concentrated paraformaldehyde solutions, and paraformaldehyde solid, and label it as such.
- Keep containers closed as much as possible.
- Use in the smallest practical quantities for the experiment being performed.
- If you are weighing paraformaldehyde powder and the balance cannot be located in a fume hood or BSC, tare a container then add powder in the hood and cover before returning to the balance to weigh the powder.
- Labs handling moderate to large quantities of formaldehyde-containing solutions on a regular basis should contact EHS at (313) 593-0921 for assessment of exposure. Areas that handle only small (100 ml or less) pre-filled specimen containers, or that work with formaldehyde-containing solutions exclusively in a functioning chemical fume hood, would have low potential for overexposure, but should contact EHS if there are concerns.
- Once work with formalin/paraformaldehyde is complete, wipe down area with a soap and water solution.

Protective Equipment

Wear standard nitrile laboratory gloves, chemical splash goggles, face shield, and lab coat. If splash may occur, also wear an impervious apron. (MIOSHA requires that all contact of the eyes and skin with liquids containing 1 percent or more formaldehyde be prevented by the use of chemical protective clothing made of material impervious to formaldehyde and the use of other personal protective equipment, such as goggles and face shields, as appropriate to the operation.)

Transportation and Storage

- Transport formaldehyde solutions in secondary containment, preferably a polyethylene or other non-reactive acid/solvent bottle carrier.
- Keep container in cool, well-ventilated area.
- Keep container tightly closed and sealed until ready for use.
- Store in secondary containment with flammables, away from oxidizers, reducing agents, metals, and acids.
- Keep containers of paraformaldehyde (PFA) solid away from water.
- Avoid storing on the floor.
- Avoid ignition sources.

Waste Disposal

Formalin and paraformaldehyde solutions and powders must be disposed following the guidelines above while accumulating wastes and awaiting chemical waste pickup. Because most spent, unused and expired chemicals/materials are considered hazardous wastes, they must be properly disposed of. ***Do not dispose of chemical wastes by dumping them down a sink, flushing in a toilet or discarding in regular trash containers.*** Contact EHS at (313) 593-0921 for waste containers, labels, manifests, waste collection and for any questions regarding proper waste disposal. Also, refer to EHS's Hazardous Waste Webpage for more information.

Exposures/Unintended Contact

 ***If the employee is in need of emergency medical attention, call 911 immediately.*** 

For an actual chemical exposure/injury,

- Flush exposed eyes or skin with water for at least 15 minutes, then seek medical attention (see below).
- If there is respiratory irritation associated with exposure, remove all persons from the contaminated area.

Report all work related accidents, injuries, illnesses or exposures to WorkConnections within 24 hours by completing and submitting the Illness and Injury Report Form. Follow the directions on the WorkConnections website Forms Instructions to obtain proper medical treatment and follow-up.

Complete the EHS Laboratory Incident and Near-Miss Report form.

TREATMENT FACILITIES:

Midwest Medical Center -- *Campus Employees (including student employees)*
Mon-Fri 7:30 am - 4:30 pm
9301 Middlebelt Road
Romulus, MI 48174
Phone: 734-941-1000

After hours - go to:

Midwest Medical Center
Open 24/7
4700 Schaefer
Dearborn, MI 48126
Phone: 313-581-2600

Henry Ford Medical Center-Fairlane -- *University students (non-life threatening conditions)*
19401 Hubbard Drive
Dearborn, MI 48126
Phone: 313-928-8278

Click here for more information.

Spill Procedure

Employees in the area should be prepared to clean up minor spills, including most spills confined to the chemical fume hood. Wearing double nitrile gloves, splash goggles, face shield and lab coat (and impermeable apron, if available), use absorbent pads to absorb spilled material. For small spills of solid PFA, dampen the absorbent pad with methanol before placing over the spilled material and allow to sit for a few minutes before wiping up. After spill has been completely absorbed, wash down contaminated area with soap and water at least two times. Contaminated PPE and clean-up materials must be placed in a clear plastic bag or compatible container for proper disposal.

Additional Spill Links:

- Chemical Spill Control Information

Report all emergencies, suspicious activity, injuries, spills, and fires to Public Safety by calling at (313) 593-5333 or 911 from a campus phone. Register with the University of Michigan-Dearborn Emergency Alert System.

Training of personnel

All personnel are required to complete the ***Comprehensive Laboratory Safety*** session (**BLS009** *or equivalent*) via MyLINC. Furthermore, all personnel shall read and fully adhere to this SOP when handling formalin and paraformaldehyde.

Certification

I have read and understand the above SOP. I agree to contact my Supervisor or Lab manager if I plan to modify this procedure.

Name	Signature	UM ID #	Date

Principal Investigator _____ **Revision Date** _____