ENVIRONMENT, HEALTH, & SAFETY

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. Contact Environment, Health and Safety (EHS) at (810) 766-6763 to determine if a safety shower will be needed.

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 (810) 766-6763 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. Waste must be disposed of following EHS Hazardous Materials procedures. Contact Environment, Health and Safety (EHS) at (810) 766-6763 for waste containers, labels, manifests, waste collection and for any questions regarding proper waste disposal. Also refer to UM-Flint Hazardous Waste Management Program and EHS webpage http://www.umflint.edu/ehs/environment-health-and-safety 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.

Contact EHS for advice on symptoms of chemical exposure, or assistance in performing an exposure assessment.

Report all work related accidents, injuries, illnesses or exposures to UM-Flint DPS. Additionally, employees and supervisors must be sure to report the injury to EHS and complete and submit the Illness and Injury Report Form to WorkConnections within 24 hours. Follow the directions on the WorkConnections website Forms Instructions to obtain proper medical treatment and follow-up.

If you were involved in or observed an incident or near miss, please complete the EHS Laboratory Incident and Near-Miss Report Form. This will be valuable in improving laboratory safety on UM-Flint campus.

TREATMENT FACILITIES:

MAJOR INJURIES	MINOR INJURIES –During Business Hours	MINOR INJURIES –After Business Hours
Genesys Hospital One Genesys Parkway Grand Blanc, MI 48439 (810) 606-5710 **Hurley Medical Center** One Hurley Plaza Flint, MI 48503 (810) 262-9000 **McLaren Hospital Flint** 401 South Ballenger Hwy Flint, MI 48532 (810) 342-2000	**Genesys Occupational Health Network** 1460 Center Rd. Burton, MI 48509 (810) 715-4620 Mon. to Fri. 7:30 am to 10 pm Sat. & Sun. Noon to 8 pm **McLaren Flint-Burton OCC Center** 1459 S. Center Rd. Burton, MI 48509 (810) 496-0900 Mon. - Fri. 8 am to 8 pm Sat & Sun 10 am to 2 pm	**Downtown Flint** 420 S. Saginaw St. Flint, MI 48502 (810) 762-1550 **Genesys East** 1096 S. Belsay Rd, Suite F Burton, MI 48509 (810) 743-3351 **Genesys North** 4154 W. Vienna Rd Clio, MI 48420 (810) 686-7397 **Genesys South** 8447 N. Holly Rd Grand Blanc, MI 48439 (810) 603-0856 Mon. - Fri. 6 to 10pm / Sat. & Sun. 1-10pm

Click here for more information on the UM – Flint Emergency Preparedness and Response Plan.

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 pick-up by EHS.

Additional Spill Links:

- www.oseh.umich.edu/pdf/chemspil.pdf
- http://www.oseh.umich.edu/emer-chemical.shtml.

For large spills and most spills of formalin or paraformaldehyde solutions or paraformaldehyde powder that occurs outside of a chemical fume hood should be referred to EHS.

Report all emergencies, suspicious activity, injuries, spills, and fires to the UM-Flint Department of Public Safety (DPS) at 911 from any university telephone or (810) 762-3333 from cell phone or non-university telephone. Register with the University of Michigan-Flint Emergency Alert System via Wolverine Access. Also, preprogram the UM-Flint DPS telephone number (810) 762-3333 into your cell phone for quick, easy use.

Training of Personnel

All personnel are required to complete Laboratory Safety Training. Documentation of the training is required. This training can be accomplished by completing the ***Comprehensive Laboratory Safety*** session (**BLS009** *or equivalent*) via MyLINC, or UM-Flint EHS on-line training or other equivalent approved by EHS. 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** _____