

Standard Operating Procedure

for work with

Chemical name/class: Formaldehyde

CAS #: 30525-89-4

PI: Mark Walters

Date: March 1, 2021

Building: Fitzpatrick CIEMAS

Room #: Sample Prep Lab

Designated Work Area: Solvent Fume Hood

1. Circumstances of Use:

Formaldehyde is used in 37% concentration in SMIF. It is to be used in the solvent fume hood in the sample prep lab.

2. 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 OSHA Permissible Exposure Limit for formaldehyde is 0.75 ppm for 8 hours or 2 ppm for 15 minutes. There is a substance-specific OSHA standard for formaldehyde, and an action limit of 0.5 ppm.
- Consult your Safety Data Sheet (SDS) and the [Laboratory Chemical Safety Summary for Formaldehyde](#) for more information on hazards.

3. Engineering Controls:

- Work with concentrated (>4% formaldehyde/paraformaldehyde) solutions only in a solvent fume hood in the sample prep lab.
- Handle paraformaldehyde powder (and, preferably, granules or flakes) only in a solvent 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 OSHA formaldehyde standard requires a conveniently-located safety shower. Contact OESO at 919-684-8822 to determine if a safety shower will be needed.

4. Work Practice Controls:

- Use only in designated solvent fume hood in the sample prep lab.
- 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 OESO at 919-684-8822 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 OESO if there are concerns.
- Once work with formalin/paraformaldehyde is complete, wipe down area with a soap and water solution.

5. Personal protective equipment (PPE):

Wear standard nitrile laboratory gloves, chemical splash goggles, face shield, and lab coat. If splash may occur, also wear an impervious apron.
(OSHA 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.)

6. **Transportation and Storage:**

- Transport formaldehyde solutions in secondary containment, preferably a polyethylene or other non-reactive acid/solvent bottle carrier.
- Containers are kept in the designated refrigerator located in a chase.
- 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 PFA solid away from water.
- Avoid storing on the floor.
- Avoid ignition sources.

7. **Waste Disposal:**

Formaldehyde waste solutions should be poured down the solvent drain in the solvent fume hood in the sample prep lab.

8. **Exposures/Unintended contact:**

Contact Employee Occupational Health and Wellness (EOHW) at 919-684-3136 for medical advice on occupational chemical exposures. For an actual chemical exposure/injury

- Flush exposed eyes or skin with water for at least 15 minutes, then seek medical attention.
- If there is respiratory irritation associated with exposure, remove all persons from the contaminated area and contact the OESO spill team.
- Call 911 from a campus phone or 919-684-2444 from any phone to request assistance if needed. Contact Employee Occupational Health and Wellness at 919-684-8115 for exposure-related advice.

The work-related injury or illness report found at: <http://www.hr.duke.edu/benefits/medical/workcomp/report.php> should be completed within 24 hours. Follow-up medical attention should be sought through Duke Employee Occupational Health and Wellness (919-684-3136).

9. **Spill Procedure:**

Most spills of formalin or paraformaldehyde solutions, or paraformaldehyde powder that occur outside of a chemical fume hood should be referred to the OESO spill response team by calling 911 from a campus phone or 919-684-2444 from any phone.

In the event of a spill, follow SMIF spill procedures and immediately contact SMIF staff. Only SMIF staff and/or appropriate OESO personnel should clean up spills

Spills Contained Inside a Chemical Hood

- Avoid breathing vapors from the spill and leave the immediate area of the chemical hood
- Alert people in the immediate area of the spill
- Notify SMIF immediately by calling emergency numbers posted near the phone
- Wait for instructions from SMIF or for SMIF personnel to arrive to complete the clean-up of the affected area.

Spills Outside of a Chemical Hood

- Attend to injured or contaminated persons and remove them from exposure
- Press the closest manual alarm button (blue box) and evacuate the lab

Make yourself available to the SMIF staff and/or emergency responders and be prepared to tell the following: What chemical(s) are involved, how much was spilled, where the spill is located, nature of any injuries

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 OESO.

NOTE: If there is respiratory irritation associated with exposure, remove all persons from the contaminated area and contact the OESO spill team.

10. **Training of personnel:**



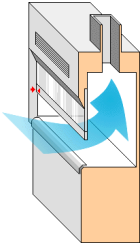

- All personnel are required to complete the SMIF General Lab Safety session and the SMIF Chemical Safety and Wet Hood training session.
- All personnel shall read and fully adhere to the ***Wet Hood Operating Procedure*** and the ***SMIF Lab Safety and Procedures Manual***
- All personnel shall read and fully adhere to this specific SOP for formalin, paraformaldehyde, and paraformaldehyde solutions



Duke OESO Guidelines for Safe Use of Formalin and Formaldehyde Solutions Paraformaldehyde



Complete **Lab-Specific Safety Information** on page 2.

Facts	<ul style="list-style-type: none"> • Formaldehyde (CAS 50-00-0) is H₂CO. This is the simplest aldehyde and is a gas at room temperature. • Formalin is a saturated formaldehyde solution (usually 37%), so 10% formalin is roughly 3.74% formaldehyde. • Some solutions have methanol added to stop polymerization; these solutions may be flammable or combustible. • Paraformaldehyde (PFA), CAS 30525-89-4) is polymerized formaldehyde. PFA is used to make very pure formaldehyde solutions or can be heated to create pure formaldehyde gas. 	
	Hazards	<p>Potential Hazards - Formaldehyde</p> <ul style="list-style-type: none"> • Acutely toxic via ingestion, inhalation, and skin contact. • Causes skin corrosion and serious eye damage. • Skin sensitizer; may cause an allergic skin reaction. • Suspected mutagen. • Carcinogen.
Hazard Controls	Selection & Purchase	<ul style="list-style-type: none"> • Use a safer alternative when possible. • Purchase the smallest containers at the lowest concentration practical. • If storing a large amount (>2L), purchase spill kit with formaldehyde neutralizer or solidifier.
	Storage & Transportation	<ul style="list-style-type: none"> • Store with flammables in tightly-closed shatter-resistant containers. • Store away from oxidizers, reducing agents, metals, and acids. • Use secondary container for transport. 
	Engineering Controls	<ul style="list-style-type: none"> • Eyewash required in immediate work area. • Eyewash-drench hose preferred. • Safety shower may be required for large quantities.  <ul style="list-style-type: none"> • Work with concentrated solutions (>4%) and all solids only in a chemical fume hood. • Dilute solutions (<4%) can be used on benchtop in small quantities if containers are opened only briefly. 
	Work Practice Controls	<ul style="list-style-type: none"> • Designate a work area for formaldehyde and label it. • Keep containers closed as much as possible. • Line work area with absorbent, leak-proof bench pads. • If weighing, place balance in hood OR use Tare Method → • Decontaminate with soap and water solution. • Labs handling >100 ml regularly on the benchtop must contact OESO Lab Safety for exposure assessment. <div style="border: 1px solid black; padding: 5px; display: inline-block; text-align: center;"> <p>Formaldehyde Work Area Danger! Toxic!</p> </div> <div style="border: 1px solid green; padding: 5px; display: inline-block; margin-top: 10px;"> <ul style="list-style-type: none"> ○ Tare (pre-weigh) empty container with lid. ○ Go to hood, add powder, close lid. ○ Go to balance to weigh. ○ Return to hood. </div>
	Personal Protective Equipment	<p>Minimum PPE:</p> <ul style="list-style-type: none"> • Nitrile (or latex) gloves (Change immediately if contaminated & every 2 hours. Wash hands at time of change.) • Splash goggles • Fully buttoned lab coat with sleeves extending to the wrists. <p>Risk of splash/large amounts: (in addition to the above, wear)</p> <ul style="list-style-type: none"> • Face shield. • Tyvek sleeves and/or gown/apron. 
Other	Emergencies	See Emergency Response webpage or flip chart and/or lab specific chemical hygiene plan. Contact OESO Spill team for spills outside fume hood if there is eye or respiratory irritation.
	Waste	See laboratory-specific chemical hygiene plan. ≤10% formalin (≤3.75% formaldehyde) can be disposed down the drain. PFA & solutions must be collected as chemical waste.
	Training	Sign signature page in Lab-Specific Chemical Hygiene Plan to indicate review.
	Questions	Contact OESO Laboratory Safety at 919-684-8822.



**Lab-Specific Safety Information for
Formalin and Formaldehyde Solutions
Paraformaldehyde**



*Supplements the Guidelines for Safe Use of Formalin,
Formaldehyde solutions, & solid PFA*

Lab	PI Name	Mark Walters			
	Location	Fitzpatrick CIEMAS 1562 (SMIF Sample Prep Lab)			
Lab-Specific Hazard Controls	Purchase Details	Select Type of Product	10% Formalin or 10% Neutral Buffered Formalin (NBF) <input type="checkbox"/>	37% Formaldehyde solution <input checked="" type="checkbox"/>	Paraformaldehyde Solid and/or PFA solution <input type="checkbox"/>
		Maximum container size	Enter maximum container size purchased	Enter maximum container size purchased	Enter maximum container size purchased
		Container type	Enter the container material	Enter the container material	Enter the container material
		Specific product information	Enter supplier name/product number or purity/grade to purchase	Enter supplier name/product number or purity/grade to purchase	Enter supplier name/product number or purity/grade to purchase
	Storage	Specific location	Enter specific storage location	Enter specific storage location	Enter specific storage location
	Use Information	Designated work area (specific room(s) and area(s))	Enter rooms and areas designated for use	Fitzpatrick CIEMAS 1562 (SMIF Sample Prep Lab) Solvent Hood	Enter rooms and areas designated for use
		Maximum quantity (and concentration if different than purchase concentration) to use at a time	Enter maximum quantity to be used at a time	Enter maximum quantity (and % formaldehyde if different than 37%) to be used at a time	Enter maximum quantity (and concentration % if solution) to be used at a time
		Location & type of spill clean-up supplies	Spill supply type and location.		
	Waste Disposal	Select Method of Disposal for Chemical Waste	<input type="checkbox"/> Drain Disposal <input type="checkbox"/> Waste Collection: Collection Location	<input type="checkbox"/> Drain Disposal ONLY if final USE concentration is <3.8% formaldehyde <input type="checkbox"/> Waste Collection: Collection Location	NO Drain Disposal <input type="checkbox"/> Waste Collection: Collection Location
	Details of Process	<ul style="list-style-type: none"> Use only in designated solvent fume hood in the sample prep lab. Keep containers closed as much as possible. Use in the smallest practical quantities for the experiment being performed. 			

	<ul style="list-style-type: none">• 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 OESO at 919-684-8822 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 OESO if there are concerns. <ol style="list-style-type: none">1. Once work with formalin/paraformaldehyde is complete, wipe down area with a soap and water solution.
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