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| **Chemical Name: Formalin, Paraformaldehyde and Formaldehyde****STANDARD OPERATING PROCEDURES****Type of SOP:** [x] **Hazardous Class** [x] **Hazardous Chemical** [ ] **Process**According to the Safety Data Sheets (SDS) for Formalin, Paraformaldehyde and Formaldehyde special precautions must be taken when working with these chemicals. This Standard Operating Procedure (SOP) briefly describes the use of equipment and supplies maintained in the lab/facility, procedures that must be followed, and the responsibilities of personnel when working in these labs/facilities. PI or the designee should **amend this SOP by entering text in the highlighted area in yellow to include specifics for your lab. Users shall** not conduct experiments, even pilot studies, which are not described in this approved SOP. It is essential that all personnel follow the appropriate procedures outlined in this SOP. **Please provide the SDS associated with this chemical to all lab personnel working with it.** |
| **PI Information** |
| Name: |  |
| Dept.: |  |
| PS ID: |  |
| Date: |  |
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| **1. PI Responsibilities (Please click the Check Box on every shaded section header.)**  |
|[ ]  The PI is responsible for training students/employees using Formalin, Paraformaldehyde or Formaldehyde. Training should include a discussion of the known & potential hazards and an explanation of the relevant policies, techniques & procedures to include the proper use of personal protective equipment and containment equipment. |
|[ ]  Students/employees should be trained initially and then annually thereafter. Their knowledge, competence and practices should be evaluated and documented.  |
|[ ]  Implement a safety program and include this information in the Formalin, Paraformaldehyde or Formaldehyde chemical hygiene plan. |
|[ ]  Limit access to authorized users. |
|[ ]  Minimize the possibility of direct skin or eye contact with the drug or inadvertent ingestion/inhalation. |
|[ ]  Transportation of Formalin, Paraformaldehyde or Formaldehyde within the facility should be performed using a sealed non-breakable container with secondary containment. |
|[ ]  Develop Standard Operating Procedures (SOP) for delivery and storage of Formalin, Paraformaldehyde or Formaldehyde. The SOP should have a contingency plan for broken or leaking bottles. |
|[ ]  Properly label containers and any secondary containers of Formalin, Paraformaldehyde or Formaldehyde. |
|[ ]  Provide SDS via email to ehs@uh.edu upon request. |

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| **2. Chemicals/Hazards** |
| * Chemical Name: Formalin
* CAS Number: 7732-18-5
* Form (physical state): Liquid
* Formalin is an aqueous solution of 37% -40% formaldehyde.
* Some solutions have methanol added to stop polymerization; these solutions may be flammable or combustible.
* It can emit formaldehyde gas, a known human carcinogen, and can irritate the eyes and skin.
* Contact with these solutions may also cause drying of the skin and/or allergic dermatitis.
* The solution can be stored for approximately 1 month, but a freshly prepared solution that is colorless often works best.
* The oral lethal dose for 50 percent of the test population (LD50) is 500 mg/kg.
* The inhaled lethal dose for 50 percent of the test population (LC50) is 0.578 mg/L.

Circumstances of Use in your lab: Click here to enter text. * Chemical Name: Paraformaldehyde
* CAS Number: 30525-89-4
* Form (physical state): Powder, Liquid solution
* Paraformaldehyde (PFA) is a solid polymerized form of formaldehyde.
* Flammable solid; May form combustible dust concentrations in air.
* It can be depolymerized to formaldehyde gas by dry heating and to formaldehyde solution by water in the presence of an acid or heat.
* The resulting formaldehyde gas from dry heating paraformaldehyde is flammable.
* The dust lethal dose for 50 percent of the test population (LD50) if taken orally is 592 mg/kg.
* The lethal dose for 50 percent of the test population (LC50) if inhaled is 1.07 mg/L.

Circumstances of Use in your lab: Click here to enter text.* Chemical Name: Formaldehyde
* CAS Number: 50-00-0
* Formaldehyde gas is a known human carcinogen and a suspected reproductive hazard causes burns and the vapor irritates the eyes and respiratory tract.
* 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, CFR 1910.1048.

Circumstances of Use in your lab: Click here to enter text. |

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|  **3. Engineering Controls** |
| * Work with Formalin, Paraformaldehyde or Formaldehyde in a certified ducted fume hood to avoid exposure to vapors.
* An eyewash/drench hose combination unit must be available in the immediate work area.

Please list the locations of the eye wash, safety shower and fume hood below.

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| Type | Location (Building and Room Numbers) |
| Fume Hood(s) |  |
| Glove boxes if applicable |  |
| Biosafety Cabinet if applicable |  |
| Safety Shower (s) |  |
| Eyewash Station(s) |  |
| Fire extinguisher(s) |  |

**More lab-specific information regarding storage and segregation to train users:** Click here to enter text. |

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| **4. Personal Protective Equipment (PPE)** |
| Personal protective equipment is especially important.* Handle with appropriate type of gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product.
* Nitrile gloves are recommended, breakthrough time>360 minutes. Rubber/latex breakthrough time is only 10-15 minutes.
* Wear splash goggles when handling Formalin Formaldehyde and Paraformaldehyde.
* Lab coats shall be worn. The laboratory coat must be appropriately sized for the individual and be buttoned to its full length. Laboratory coat sleeves must be of a sufficient length to prevent skin exposure while wearing gloves. Full length pants and close-toed shoes must be worn at all times by all individuals that are occupying the laboratory area. The area of skin between the shoe and ankle shall not be exposed.
* Store PPE away from sources of Formalin, Formaldehyde or Paraformaldehyde. Formaldehyde vapors can permeate the lab coat or glove material, reducing its barrier-properties.
* Respiratory protection may be needed if aerosol or vapor hazard is present and work is conducted outside of a fume hood. If any procedure may pose an external hazard it should be eliminated or strictly isolated. For information see EHS Respiratory Protection Program <https://www.uh.edu/ehls/about/manuals/> or email ehs@uh.edu.

All contact of the eyes and skin with liquids containing 1 percent or more formaldehyde shall be prevented by the use of chemical protective clothing made of material impervious (DuPont Tychem 4000 clothing or nitrile coated apron) to formaldehyde and the use of other personal protective equipment, such as goggles and face shields, as appropriate to the operation CFR 1910.1048(h)(1)(i). Air concentrations can be determined with an electronic personal air monitor or a passive detection badge coated with the chemical DNPH (2,4-dinitrophenylhydrazine).**More lab-specific information regarding PPE to train users:** Click here to enter text. |

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|  **5. Work Practice Controls (Preparation and Handling)** |
| * Consult with your Principal Investigator (PI) to receive approval before working with Formalin, Paraformaldehyde or Formaldehyde Particularly Hazardous Substances (PHSs). If possible, use safer chemical alternatives.
* Read the relevant Safety Data Sheets (SDS), technical bulletins, and guidance documents to understand how to mitigate the hazards.
* Perform a hazard analysis and identify the potential failures or weak points in your experimental design. Be prepared to handle accidents.
* **Designate a work area for formaldehyde and label it. Line work area with absorbent, leak-proof bench pads.**
* **Keep containers closed as much as possible.**
* **If weighing, place balance in hood OR use Tare Method**
1. **Tare (pre-weigh) empty container with lid.**
2. **Go to hood, add powder, close lid.**
3. **Go to balance to weigh.**
4. **Return to hood.**
* Lab-specific training must be completed and documented.
* Review the location of the emergency equipment (safety shower, eyewash, and fire extinguisher, etc.) listed in Section 3.
* The PI shall ensure that protective equipment and clothing that has become contaminated with Formalin, Paraformaldehyde or Formaldehyde is cleaned or laundered before its reuse.
* Users of Formalin, Paraformaldehyde or Formaldehyde a PHS, must be trained in proper lab technique stated in the Standard Operating Procedures (SOP) and be able to demonstrate proficiency.

**Designated Area:***(All Formalin, Paraformaldehyde or Formaldehyde* *must be stored and used in a designated work area. (You may designate your entire lab.) Indicate the designated area for Formalin, Paraformaldehyde or Formaldehyde use and how it will be posted).*Click here to enter text. |

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|  **6. Work Practice Controls (Storage and Transport)** |
| Keep container tightly closed and store in a secondary containment. Keep in a cool, well-ventilated area. Keep Formalin separated from brass, steel (all types and surface treatments), copper, acid anhydrides, strong oxidizing agents, and strong reducing agents. Solutions with over 25% formaldehyde are flammable and should be stored in a flammables cabinet. Concentrations below 25% are no longer flammable. 49 CFR 172.101 Department of Transportation.**More lab-specific information regarding storage and segregation to train users:** Click here to enter text. |

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| **7. Spill and Accident Procedures****[Specific cleaning and waste disposal procedures must be determined.]** |
| Formalin spills must be cleaned up as soon as possible by properly protected and trained personnel. All other persons should leave the area. Spill response procedures must be developed based on the chemical and potential spill or release conditions. Clean up spills using contents of the laboratory spill kit. Do not attempt to clean up any spill if not properly trained. If trained and equipped, only clean up small (less than \_\_\_\_\_\_\_\_\_ml) and dilute (less than\_\_\_\_\_\_\_%) spills that occur in a fume hood. If the spill is larger or more concentrated or people have been exposed, evacuate the area and call 911 on campus phone or 713-743-3333 for help. If a person is exposed follow EXPOSURE PROCEDURES in section 8 below.After spill has been completely absorbed, wash down contaminated area with soap and water at least two times.**SPILL CLEANUP PROCEDURES****Small spills:**1. Close hood sash, cordon off area.
2. If you need help, call EHS (during business hours (M-F/8-5) 713-743-5858, outside business hours call 911 on campus phone or 713-743-3333). Tell them that a Formalin, Paraformaldehyde or Formaldehyde spill has occurred and you need advice or assistance. Notify supervisor.
3. Personnel must wear a fully buttoned lab coat with sleeves which extend to the wrists, face shield and safety goggles, neoprene outer gloves and nitrile inner gloves, long pants (or other clothing covering the entire leg), rubber apron, and closed toed shoes. Never use latex gloves.
4. If spill is extensive within the containment, clean all interior surfaces after completion of the spill cleanup.
5. Bag all waste in plastic bags labeled as chemical spill debris and store in fume hood away from incompatible chemicals. Submit request to EHS for waste pickup.

**Large spills:**1. Evacuate all personnel from the laboratory and restrict access. Call 911 on campus phone or 713-743-3333 for help.
2. As soon as possible report the spill by notifying EHS (during business hours (M-F/8-5) 713-743-5858, outside business hours 911 on campus phone or 713-743-3333); tell them that a spill has occurred, and that you need help managing the spill. Notify supervisor.
3. Be prepared to provide the following information:
* Name and phone number of knowledgeable person that can be contacted
* Name of chemical spilled, concentration and amount spilled, liquid or solid type spill
* Number of injured, if any (refer below to EXPOSURE PROCEDURES)
* Location of spill

Any spill incident requires the involved person or supervisor to complete and submit the Injury Forms within 24 hours (8 hours if serious injury or hospitalization) of the incident to Risk Management.For questions on spill cleanup, contact EHS at 713-743-5858.**More lab-specific information regarding emergency to train users:** Click here to enter text. |

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|  **8. Exposure Procedures In Case of Emergency** |
| **Provide First Aid Immediately** * If inhaled, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.
* In case of skin contact, wash off with soap and plenty of water for 15 minutes. Take victim immediately to hospital. Consult a physician.
* In case of eye contact, rinse thoroughly with plenty of water for at least 15 minutes while lifting the upper and lower eyelids. Get medical aid immediately.
* If swallowed, never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

**Get Help** 1. After first aid measures, seek medical attention if needed at UH Health Center on UH Main Campus or the nearest Emergency Department, as appropriate.
2. Call 911 on campus phone or 713-743-3333 or go to nearest Emergency Department to seek medical attention. Give details of exposure:
	1. Chemical name and concentration
	2. Amount of exposure
	3. Route of exposure (skin, eyes, respiratory)
	4. Time since exposure
3. Bring the SDS and SOP of Formalin, Paraformaldehyde or Formaldehyde to the Emergency Department.
4. Notify your supervisor as soon as possible for assistance.
5. Secure area before leaving.

**Report Incident to Environmental Health and Safety**1. Notify EHS immediately after providing first aid and/or getting help.
	1. During business hours (M-F/8-5) call 713-743-5858.
	2. After hours call 911 on campus phone or 713-743-3333 to be routed to EHS staff on call.
2. For all incidents and near misses, the involved person or supervisor should report to EHS at 713-743-5858.

**More lab-specific information regarding first aid measures to train users:** Click here to enter text. |

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|  **9. Waste Disposal** |
|  **WASTE COLLECTION AND DISPOSAL**1. **Formalin, Paraformaldehyde or Formaldehyde Waste**
* Formalin, Paraformaldehyde or Formaldehyde waste must be treated as hazardous and collected by EHS.
* Attach an EHS “Unwanted Material Waste” label that states “Formalin, Paraformaldehyde or Formaldehyde waste” and the primary hazards (carcinogen, flammable), PI name. Unwanted Material Waste labels are available for on [EHS’s website](https://www.uh.edu/ehls/labs/labels/).
1. **Other PHS waste**

 Grossly contaminated gloves, absorbent pads, and all spill cleanup materials are hazardous waste.* Accumulate waste in a plastic bag.
* Label with EHS Unwanted Material Waste label as above.
1. **Disposal**

For chemical waste pickup: Complete Online [waste pickup request form](https://www.uh.edu/ehls/train/waste/index). 1. **Contacts**

 For questions regarding chemical and hazardous chemical collection* visit the EHS [Chemical Waste](https://www.uh.edu/ehls/waste/) website or,
* email ehs@uh.edu or,
* call 713-743-5858
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|  **10. Lab-specific Protocol/Procedure**  |
|  This SOP must be customized for each lab using Formalin, Paraformaldehyde or Formaldehyde. Use this section to describe or attach what is being done with this chemical, including specific laboratory procedures and quantities used.  |

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| Particularly HazardousSubstance involved? | X YES: | Blocks #11 to #13 are Mandatory |
|  NO: | Blocks #11 to #13 are Optional. |
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| **11. Approval Required** |
| All staff working with Formalin, Paraformaldehyde or Formaldehyde must be trained on this SOP prior to starting work. They must also be trained on the Formalin, Paraformaldehyde or Formaldehyde SDS, and it must be readily available in the laboratory. All training must be documented and maintained by the PI or their designee. |
| **12. Decontamination** |
| All surfaces and non-disposable equipment will be decontaminated with copious amounts of soap and water. |
| **13. Designated Area** |
| * All work with Formalin must be done in a designated laboratory, work space and fume hood. This work will be conducted in *[room #]*.
 |
| PI’s Name: | PISD: |
| Department:  | Date: |
| Signature: |  |

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| **[Laboratory Name]****Documentation of Training\*****Standard Operating Procedure for Formalin, Paraformaldehyde or Formaldehyde**  |
|  *“I have read and understand this SOP. By signing below, I agree to fully adhere to its requirements.”* |
| Last | First | PSID | Email | Signature | Date |
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\* This document, including the signature page with signatures by all involved personnel shall be maintained by the Principal Investigator or Designee, and be submitted to EHS either electronically via the ehs@uh.edu or hard copy upon request.

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|  **Template Revision History** |
| Version | Date Approved | Author | Revision Notes: |
| 1.0 | 02/03/2020 | EHLS Chemical Safety  | New Template. |
| 1.1 | 06/10/2020 | EHS Chemical Safety | Name & logo change, and review. |
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