# University of Arizona

## Formaldehyde, Formalin, and Paraformaldehyde (PFA)

## Standard Operating Procedure

*[This is a template. Fill in all necessary blanks and delete all highlighted areas when complete. Add any sections necessary for your laboratory. This will be appended to your Laboratory Chemical Hygiene Plan.]*

**Title:**  **Click here to enter the title of your SOP.**

**Approval Holder (AH):** Click here to enter text **Approval #:** Click here to enter text

**Approval Holder Phone Number(s):** Click here to enter text

**Approval Safety Coordinator (ASC):** Click here to enter text

**Approval Safety Coordinator Phone Number(s):** Click here to enter text

**Department:** Click here to enter text

1. **Purpose**

This standard operating procedure (SOP) is intended to provide guidance on how to safely Describe the procedure or process this SOP will address in Enter AH’s name’s laboratory. Laboratory personnel should review this SOP, as well as the appropriate Safety Data Sheet(s) (SDSs), before Describe the procedure or process this SOP will address. If you have questions concerning the requirements within this SOP, contact your Approval Holder (AH) or Approval Safety Coordinator (ASC).

1. **Scope**

*[Describe when this SOP applies and to whom this SOP applies.]*

1. **Hazard Description**

*[Describe the hazards presented by the procedure or process this SOP addresses. What makes it hazardous? Provide an example, if applicable.]*



* **Formaldehyde** is a toxic, corrosive, flammable liquid that acts as a potent carcinogen; it is also a dermal and respiratory sensitizer that produces eye irritation at concentrations ≥0.3 ppm.
* **Formalin** is a solution of formaldehyde and methanol in water which is commonly used as a preservative for biological samples.
* **Paraformaldehyde** is a white, crystalline solid resulting from the polymerization of formaldehyde. It can decompose to formaldehyde gas by dry heating and can also be made into a solution by dissolving it in water in the presence of acid or heat.

The common signs and symptoms of exposure include:

* Breathing difficulties.
* Causes burns by all exposure routes.
* May cause allergic skin reaction (rash, itching, swelling, trouble breathing, tingling of the hands and feet, dizziness, lightheadedness, chest pain, muscle pain or flushing)
* Headache, dizziness, tiredness, nausea and vomiting.
* Ingestion causes severe swelling, severe damage to the delicate tissue and danger of perforation.

OSHA permissible exposure limit, the level at which most workers will not experience ill-health effects, is set at 0.75 ppm over an 8-hour work day or 2 ppm for 15-minutes.

1. **Process & Hazard Controls**

*[Describe the steps needed to set up and complete the procedure or process in safe manner following the* [*hierarchy of controls*](https://www.cdc.gov/niosh/topics/hierarchy/default.html)*. Use as much detail as is necessary to ensure all laboratory workers can complete the procedure or experiment safely.]*

* 1. **Elimination/Substitution**

*[Describe any eliminations of hazardous chemicals or processes; alternatively, any substitutions with less hazardous alternatives that could be used to accomplish the task. Delete this section if you are unable to eliminate or substitute.]*

* If feasible, other fixatives (such as alcohol) may be used in lieu of formaldehyde. Alternatives like glutaraldehyde are less hazardous and may also be an acceptable substitute.
  1. **Engineering Controls**

*[Describe any engineering controls (e.g. fume hoods, gas cabinets, local exhausts, blast shields, etc.) that are used to safely accomplish the task.]*

* Formaldehyde-based compounds must be used within a fume hood or other RLSS-approved ventilated device, such as a Type II B2 biosafety cabinet.
  1. **Work Practices**

*[Describe any work practices (e.g. staggering schedules, additional cleaning measures for particulates, etc.) that are used to safely accomplish the task.]*

* Pre-plan work, including pre-filling containers or vials, if formaldehyde needs to be used outside of a fume hood.
* Ensure all use and storage areas have a “Designated Area” label to alert others in the vicinity of the hazard.
* Hazard Communication:
  + In work areas where the concentration of airborne formaldehyde exceeds either the OSHA requirements, OSHA 1910.1048 (formaldehyde standard) requires signs on all entrances with the following legend:

**DANGER**

**FORMALDEHYDE**

**MAY CAUSE CANCER**

**CAUSES SKIN, EYE, AND RESPIRATORY IRRITATION**

**AUTHORIZED PERSONNEL ONLY**

* + Access to these workplaces has to be limited to authorized personnel that have received training on the hazards of formaldehyde and safe handling procedures.
  + Please contact RLSS for signage.
  1. **Personal Protective Equipment**

*[Describe the personal protective equipment needed to adequately protect laboratory workers when performing the process or procedure addressed by this SOP. Ensure to specify any personal protective equipment beyond the minimum (i.e. safety glasses, lab coat, gloves, long pants and closed-toed shoes).]*

* **Hand and Arm Protection**: Nitrile gloves; thicker gloves may be required, dependent upon the intensity, frequency, and duration of use.
* **Face and Eye Protection**: Safety goggles are a minimum protection; the use of a face shield with eye protection is strongly recommended to protect both the eyes and face from splashes.
* **Body Protection**: A 100% cotton lab coat should be used.
* **Respiratory Protection**: Respirators may be required to protect from formaldehyde vapors. Do NOT wear a respirator without being assessed, medically cleared, and fit tested by RLSS to ensure the respirator is appropriate and will protect workers.
  1. **Transportation and Storage**

*[Describe how to safely transport and/or store (e.g. ventilated cabinet, flammable cabinet, under inert blanket, etc.) the hazardous chemical(s) or processes.]*

* **Storage**
  + Store in secondary containment, in a well-ventilated area, away from heat, flame and from other materials that are not particularly hazardous or which may be chemically incompatible. Each container’s label must include appropriate pictograms and identify the material as carcinogenic, sensitizing, toxic, and an irritant. Containers of pure formaldehyde or paraformaldehyde, or flammable mixtures of formaldehyde, must also be labeled as flammable.
  + Containers of these materials must be stored in leak-proof secondary containment within a Designated Area.
  + If not plainly visible (e.g. through a cabinet window), labelling must be applied to storage locations where these are stored to avoid an inadvertent encounter.

1. **Spills, Cleanup & Disposal**

*[Describe how to safely end the procedure or process, clean up the process or spills, and/or dispose of any waste generated.]*

Spill response should always follow the [University Chemical Hygiene Plan](https://rgw.arizona.edu/sites/default/files/cs-univeristy_chemical_hygiene_plan.pdf) Section 8.2.

**Exposure Response**

|  |  |  |  |
| --- | --- | --- | --- |
| **Inhalation** | **Ingestion** | **Skin Contact** | **Eye Contact** |
| If breathing is difficult, give oxygen. Do not use mouth-to-mouth method if victim ingested or  inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with  a one-way valve or other proper respiratory medical device. Move to fresh air. Immediate  medical attention is required. | Do not induce vomiting. Call a physician or Poison Control Center | Wash off immediately with plenty of water for at least 15 minutes. Immediate medical  attention is required. | Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. In  the case of contact with eyes, rinse immediately with plenty of water and seek medical  advice |

1. **Enter Additional Section Title**

*[Add as many sections as necessary to adequately describe how to safely perform the procedure or process addressed by this SOP.]*

1. **References**

* **UCLA Formaldehyde SOP:** <https://ucla.box.com/s/0qoxd0b8rhojfeqrqt6t2blwmvf4lj1z>