

Standard Operating Procedure

Formaldehyde

This is an SOP template and is not complete until: 1) lab specific information is entered into the box below 2) lab specific protocol/procedure is added to the protocol/procedure section and 3) SOP has been signed and dated by the PI and relevant lab personnel.

Print a copy and insert into your
Laboratory Safety Manual and Chemical Hygiene Plan.
Refer to instructions for assistance.

Department:	Click here to enter text.
Date SOP was written:	Click here to enter a date.
Date SOP was approved by PI/lab supervisor:	Click here to enter a date.
Principal Investigator:	Click here to enter text.
Internal Lab Safety Coordinator/Lab Manager:	Click here to enter text.
Lab Phone:	Click here to enter text.
Office Phone:	Click here to enter text.
Emergency Contact:	Click here to enter text. <i>(Name and Phone Number)</i>
Location(s) covered by this SOP:	Click here to enter text. <i>(Building/Room Number)</i>

Type of SOP: Process Hazardous Chemical Hazardous Class

Purpose

Formaldehyde and Formalin, commonly used as fixatives and as nucleic acid denaturants, is a regulated carcinogen. The OSHA Permissible Exposure Limit is 0.75 ppm in an eight hour time weighted average. Approximately 1.5 grams of vaporized Formaldehyde will achieve this concentration in a typical laboratory (not accounting for air flow). The odor threshold of formaldehyde is reported to be as low as 0.1 ppm. While formaldehyde is a gas, it is mainly used in laboratories and sold as a solution in water or methanol.

Physical & Chemical Properties/Definition of Chemical Group

CAS#: 50-00-0

Class: Cal/OSHA Regulated Carcinogen (IARC Group 1), Flammable Liquid and Vapor

Molecular Formula: CH₂O

Form (physical state): Gas, Liquid (as 37% or 16%)

Color: Clear

Boiling point: -19 °C (Gas), 91-101 °C (Liquid Mixture)

Potential Hazards/Toxicity

LD50

Oral: 100 mg/kg [Rat]

Dermal: 270 uL/kg [Rabbit]

Permissible Exposure Limits (PEL): 0.75 ppm

Acute Effects

Hazardous in case of eye contact (irritant), of ingestion. Slightly hazardous in case of skin contact (irritant, sensitizer, permeator). Non-corrosive for skin. Non-corrosive to the eyes. Non-corrosive for lungs. Severe over-exposure can result in death.

Chronic Effects

Slightly hazardous in case of skin contact (sensitizer)

Mutagenic Effects

Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. Classified possible teratogen for humans.

Developmental Toxicity

Classified reproductive system toxin. The substance may be toxic to kidneys, liver, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage. Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Personal Protective Equipment (PPE)

Respirator Protection

Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N99 (US) or type P2 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Respirators should be used only under any of the following circumstances:

- As a last line of defense (i.e., after engineering and administrative controls have been exhausted).
- When Permissible Exposure Limit (PEL) has exceeded or when there is a possibility that PEL will be exceeded.
- Regulations require the use of a respirator.
- An employer requires the use of a respirator.
- There is potential for harmful exposure due to an atmospheric contaminant (in the absence of PEL)
- As PPE in the event of a chemical spill clean-up process

Lab personnel intending to use/wear a respirator mask must be trained and fit-tested by EH&S. This is a regulatory requirement. (<http://map.ais.ucla.edu/go/1004655>)

Hand Protection

Handle with nitrile or chloroprene 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. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

NOTE: Consult with your preferred glove manufacturer to ensure that the gloves you plan on using are compatible with formaldehyde.

Refer to glove selection chart from the links below:

http://www.ansellpro.com/download/Ansell_8thEditionChemicalResistanceGuide.pdf

OR

<http://www.allsafetyproducts.biz/page/74172>

OR

<http://www.showabestglove.com/site/default.aspx>

OR

<http://www.mapaglove.com/>

Eye Protection

ANSI approved safety glasses or goggles.

Skin and Body Protection

Flame resistant lab coats should be worn. These laboratory coats must be appropriately sized for the individual and be buttoned to their 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 should not be exposed.

Hygiene Measures

Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

Engineering Controls

Work with this chemical in a certified ducted fume hood or ducted Biosafety cabinet. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower.

First Aid Procedures

If inhaled

Move person into fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Consult a physician.

In case of skin contact

Flush with plenty of water for at least 15 minutes while removing contaminated clothing. Take victim immediately to hospital.

In case of eye contact

Flush eyes with plenty of water for at least 15 minutes lifting upper and lower eyelids and removing contact lenses. Consult a physician. Continue rinsing eyes during transport to the hospital.

If swallowed

Never give anything by mouth to an unconscious person. Get medical aid immediately. Do NOT induce vomiting. If conscious and alert, give milk, activated charcoal, or water.

Special Handling and Storage Requirements

Handling: Wear personal protective equipment. Ensure adequate ventilation. Do not get in eyes, on skin, or on clothing. Do not ingest. Keep away from clothing and other combustible materials. **Storage:** Store in secondary containment with Carcinogen label on the primary container, secondary containment and the storage location. Keep container tightly closed in a cool, dry, and well-ventilated. Store away from heat sources and in a flame proof area.

Spill and Accident Procedure

Chemical Spill Dial 911 and x59797

Spill – Assess the extent of danger. Help contaminated or injured persons. Evacuate the spill area. Avoid breathing vapors. If possible, confine the spill to a small area using a spill kit or absorbent material. Keep others from entering contaminated area (e.g., use caution tape, barriers, etc.).

Small (<1 L) – If you have training, you may assist in the clean-up effort. Use appropriate personal protective equipment and clean-up material for chemical spilled. Double bag spill waste in clear plastic bags, label and take to the next chemical waste pick-up.

Large (>1 L) – Dial **911** (or 310-825-1491 from cell phone) and EH&S at x59797 for assistance.

Chemical Spill on Body or Clothes – Remove clothing and rinse body thoroughly in emergency shower for at least 15 minutes. Seek medical attention. *Notify supervisor and EH&S at x59797 immediately.*

Chemical Splash Into Eyes – Immediately rinse eyeball and inner surface of eyelid with water from the emergency eyewash station for 15 minutes by forcibly holding the eye open. Seek medical attention. *Notify supervisor and EH&S at x59797 immediately.*

Medical Emergency Dial 911 or x52111

Life Threatening Emergency, After Hours, Weekends And Holidays – Dial **911** (or 310-825-1491 from cell phone) or contact the Ronald Reagan UCLA Medical Center (emergency room) directly at **x52111** (located at 757 Westwood Plaza, enter from Gayley Avenue). *Note: All serious injuries must be reported to EH&S at x59797 within 8 hours.*

Non-Life Threatening Emergency – Go to the Occupational Health Facility (OHF), **x56771**, CHS room 67-120 (This is on the 6th floor, 7th corridor, room 120. Enter through the School of Dentistry on Tiverton Drive and proceed to the “O” elevator to the 6th floor.) Hours: M - F, 7:30 a.m. to 4:30 p.m. At all other times report to Ronald Regan UCLA Medical Center (emergency room) at **x52111**. *Note: All serious injuries must be reported to EH&S at x59797 within 8 hours.*

Needle stick/puncture exposure (as applicable to chemical handling procedure) – Wash the affected area with antiseptic soap and warm water for 15 minutes. For mucous membrane exposure, flush the affected area for 15 minutes using an eyewash station. Page the needle stick nurse by dialing **231** from a campus phone, enter **93333** when prompted and then enter your extension. Hours: M – F, 8:00 a.m. to 4:00 p.m. At all other times report to Ronald Regan UCLA Medical Center (emergency room) at **x52111**. *Note: All needle stick/puncture exposures must be reported to EH&S at x59797 within 8 hours.*

Decontamination/Waste Disposal Procedure

Wearing proper PPE, decontaminate equipment and bench tops using soap and water. Dispose of the used formaldehyde and disposables contaminated with formaldehyde as hazardous waste.

General hazardous waste disposal guidelines:

Label Waste

- Affix an on-line hazardous waste tag on all waste containers using the Online Tag Program <http://otp.ucop.edu/> as soon as the first drop of waste is added to the container

Store Waste

- Store hazardous waste in closed containers, in secondary containment and in a designated location
- Double-bag dry waste using transparent bags <http://map.ais.ucla.edu/go/1002774>
- Waste must be under the control of the person generating & disposing of it

Dispose of Waste

- Dispose of regularly generated chemical waste within 90 days
- Call EH&S at x61887 for questions
- Empty Containers
 - Dispose as hazardous waste if it once held extremely hazardous waste (irrespective of the container size) <http://ehs.ucla.edu/Pub/ExtremelyHazardousWaste.pdf>
 - Consult waste pick-up schedule <http://ehs.ucla.edu/pub/HazWaste%20Pickup%20Schedule.pdf>

Prepare for transport to pick-up location

- Check on-line waste tag
- Write date of pick-up on the waste tag
- Use secondary containment

Safety Data Sheet (SDS) Location

Online SDS can be accessed at <http://msds.ehs.ucla.edu>.

Protocol/Procedure (Add lab specific Protocol/Procedure here)

Prepare the following solutions in ventilated chemical fume hood:

- Standard Fixative: FA-PBS (Reagent formaldehyde, 37% in PBS [137 mM NaCl, 2.7 mM KCl, and 11.9 mM $\text{KH}_2\text{PO}_4/\text{Na}_2\text{HPO}_4$, pH = 7.4])

37% Formaldehyde	100 μl
PBS (see SOP for PBS)	900 μl
Total	1000 μl

- FA-PBN (Reagent formaldehyde, 37% in 100 mM PBN [10 mM Phosphate Buffer, 150 mM NaCl, pH = 7.4])

37% Formaldehyde	100 μl
PBN (see SOP for PBN)	900 μl
Total	1000 μl

- FA-PEMS
(Reagent formaldehyde, 37% in PEMS [100 mM PIPES, 2 mM MgSO_4 , 2 mM EGTA, pH = 7.0])

37% Formaldehyde	100 µl
PEMS (see SOP for PEMS)	900 µl
Total	1000 µl

4. FA-PBT (EM-grade formaldehyde, MeOH-free, 16% in PBT [137 mM NaCl, 2.7 mM KCl, and 11.9 mM $\text{KH}_2\text{PO}_4/\text{Na}_2\text{HPO}_4$, 0.1% Triton X-100, pH = 7.4])

16% EM-grade formaldehyde	250 µl
PBT (see SOP for PBT)	750 µl
Total	1000 µl

5. FA-BFB (EM-grade formaldehyde, MeOH-free 16% in BFB [150 mM PIPES, 3 mM MgSO_4 , 1.5 mM EGTA, 1.5% v/v Nonidet P-40 (NP-40)])

37% Formaldehyde	100 µl
PEMS (see SOP for BFB)	900 µl
Total	1000 µl

6. PLP Fix (2% Paraformaldehyde, 0.4 M Sorrenson Buffer, 75 mM Lysine, 10 mM NaIO_4)

16% Paraformaldehyde (see SOP for Paraformaldehyde)	1.25 ml
NaIO_4	0.0214 g
0.4 M Sorrenson Buffer (see SOP for Phosphate Buffer)	8.75 ml
Total	10 ml

7. Bouin's Fixative (4% Paraformaldehyde, 0.5% Picric Acid, 0.1 M $\text{NaH}_2\text{PO}_4/\text{Na}_2\text{HPO}_4$, pH = 7.2)

16% Paraformaldehyde (see SOP for Paraformaldehyde)	125 µl
1.2% Saturated Picric Acid (see SOP for Picric Acid)	250 µl
0.5X Sorrenson Buffer (see SOP for Phosphate Buffer)	125 µl
Total	500 µl

8. Modified Zamboni's Fixative (4% Paraformaldehyde, 1.6% Glutaraldehyde, 0.2% Picric Acid, 0.1 M $\text{NaH}_2\text{PO}_4/\text{Na}_2\text{HPO}_4$, pH = 7.4)

16% Paraformaldehyde (see SOP for Paraformaldehyde)	125 µl
50% Glutaraldehyde (see SOP for Glutaraldehyde)	16 µl
1.2% Saturated Picric Acid (see SOP for Picric Acid)	83 µl
0.1 M $\text{NaH}_2\text{PO}_4/\text{Na}_2\text{HPO}_4$ (pH = 7.4) (see SOP for Phosphate Buffer)	125 µl
Total	500 µl

NOTE

Any deviation from this SOP requires approval from PI.

Documentation of Training *(signature of all users is required)*

- Prior to conducting any work with formaldehyde, designated personnel must provide training to his/her laboratory personnel specific to the hazards involved in working with this substance, work area decontamination, and emergency procedures.
- The Principal Investigator must provide his/her laboratory personnel with a copy of this SOP and a copy of the SDS provided by the manufacturer.
- The Principal Investigator must ensure that his/her laboratory personnel have attended appropriate laboratory safety training or refresher training within the last one year.

Principal Investigator SOP Approval

Print name _____

Signature _____

Approval Date: _____

I have read and understand the content of this SOP:

Name	Signature	Date
Click here to enter text.		Click here to enter a date.
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