THE
UNIVERSITY
OF RHODE ISLAND

Formaldehyde Health & Safety Program

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University of Rhode Island Formaldehyde Health & Safety Program

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Formaldehyde Health & Safety Program

1. Introduction

This document establishes the University of Rhode Island's written compliance program for formaldehyde, as required by the Occupational Safety and Health Administration (OSHA) under Title 29 Code of Federal Regulations Part 1910.1048. This program is designed to identify work activities and personnel with potential exposure to formaldehyde (0.1%) and ensure that this chemical is handled safely.

2. Responsibilities

Various departments and employees have responsibilities under this program, including:

Office of Environmental Health and Safety (EHS)

- Preparing, reviewing, and periodically revising this Program.
- Providing supervisor and employee training and information.
- Monitoring and evaluating formaldehyde exposures for URI students and employees
- Evaluating engineering controls.
- Evaluating personal protective equipment, providing required PPE training and fitting, as needed.
- With departmental supervisors, identifying and posting regulated work areas.
- Maintaining records of exposure measurements.

Student Health Services or Employee's PCP/Hospital

- Performing and evaluating medical surveillance as required.
- Maintaining medical records.

Facilities

- Maintaining local exhaust ventilation systems in good working order.
- Notifying EHS and laboratory departments when these systems must be temporarily shut down for maintenance or repair.

Lab Managers/Supervisors and Principal Investigators

- Providing all employees with training information about formaldehyde, safe chemical handling, personal protective equipment requirements, and this Program.
- Notifying EHS about workplace conditions and potentially affected employees.
- Supplying required personal protective equipment to affected employees free-of-charge.
- Ensuring that affected employees/students receive required medical evaluations if exposed to levels of formaldehyde above the PELs or STELs.

Affected Employees/Students

- Observing the procedures and requirements outlined in this Program.
- Fulfilling their EHS training requirements, including Laboratory Safety Training.
- Completing annual Formaldehyde Safety Training if required per Section 3 of this document.

- Obtaining medical surveillance if required.
- Reporting exposures or potential exposures to EHS and URI Health Services.
- Wearing all required personal protective equipment if engineering controls are not available (i.e. fume hood).
- Notifying supervisor and/or EHS of any workplace changes.

3. Exposure Limits

The following table lists the various exposure limits and compliance requirements for airborne levels of formaldehyde:

Formaldehyde Level (Air)	Type of Limit	Exposure Time Duration	Compliance Requirements[1]
0.1 ppm	OSHA Exposure threshold	Any period of time	Annual formaldehyde-specific information/training
0.1 ppm	ACGIH Threshold Limit Value	8-hour time-weighted average	Non-regulatory limit, compliance requirement same as above
0.3 ppm	ACGIH ceiling limit (TLV)	Any period of time	Non-regulatory limit, compliance requirements are the same as above
0.5 ppm	OSHA Action limit (AL)	8-hour time-weighted average	Above plus: medical surveillance; periodic exposure monitoring
0.75 ppm	OSHA Permissible exposure limit (PEL)	8-hour time-weighted average	Above plus: establish and post regulated areas; respiratory protection; establish engineering and work practice controls to lower exposures below PEL, as feasible.
2 ppm	OSHA Short-term exposure limit (STEL)	15-minute time-weighted average	As above for PEL

[1] In addition to Laboratory Safety training

4. Exposure Monitoring

It is the responsibility of the University to monitor employees for formaldehyde exposure when exposure above the action level is suspected. Initial monitoring must be initiated when any of these conditions are met:

- the formaldehyde in use is a gas,
- mixtures or solutions are composed of greater than 0.1 percent formaldehyde, and/or
- materials being used are capable of releasing formaldehyde into the air, under reasonably foreseeable conditions of use, at concentrations reaching or exceeding 0.1 ppm.

Monitoring will also be performed if an employee reports any signs or symptoms of

respiratory or dermal conditions associated with formaldehyde exposure. If there is a concern regarding exposure to formaldehyde or formaldehyde solutions, please contact URI EHS so that a risk assessment can be conducted to determine if exposure monitoring is necessary. Additionally, if there is a change in the process, equipment, personnel, or control measures that may result in new or additional exposure to formaldehyde, exposure monitoring will be conducted.

EHS will measure exposure levels every 6 months for anyone shown to be at or above the Action Level (AL) or above the Short-Term Exposure Limit (STEL). Notification of monitoring results will be given within 15 days of receipt of results, and if necessary, corrective action taken to decrease exposure. Additional monitoring may be required if an employee experiences symptoms associated with formaldehyde exposure.

If EHS can document that the presence of formaldehyde or formaldehyde-releasing products in the workplace does not result in airborne concentrations of formaldehyde that would cause an employee to be exposed at or above the AL or STEL under foreseeable conditions of use, then monitoring may not be required.

All exposure sampling strategies are selected to identify areas and employees likely to be exposed to formaldehyde at or above the action level or recommended TLV. Depending upon the work location and frequency of operations, exposure monitoring will be conducted with area measurements, personal dosimetry, or a combination of techniques.

5. Employees and Activities Covered by Program

Formaldehyde is widely used in research and clinical support laboratories at URI. However, since it is primarily used in very small quantities and generally handled under local exhaust ventilation in most laboratories (i.e., fume hoods), the potential for employee exposures above the 0.1 ppm threshold is very low in the majority of cases. Based on this information, laboratory researchers handling formaldehyde exclusively in small, laboratory-scale quantities and operations, within a fume hood, are conditionally exempt from this program provided that they have completed the University's Laboratory Safety training.

Some work activities and employee classifications carry the potential to exceed the 0.1 ppm threshold limit and are therefore included in this program. Unlike most research activities involving formaldehyde, these operations typically involve routine work with larger volumes of formaldehyde in service/support functions such as clinical-related autopsy services, surgical specimen preservation, cadaver embalming for anatomical dissection laboratories, and specimen preservation. These kinds of operations have been identified through historical surveys, workplace hazard assessments, and exposure monitoring.

6. Labels and Safety Data Sheets

All containers containing formaldehyde and formaldehyde solutions outside of research laboratories need to be labeled with the identity of the contents and physical and health hazard warnings as required by the OSHA hazard communication standard.

Safety Data Sheets (SDSs) are available on the URI Microsoft Portal. Use your URI Single Sign On

username and password to log in and use the search bar to find “safety data sheets”. Once in the SDS Hub, type in “formaldehyde”, “formalin”, “paraformaldehyde” or the specific chemical you are looking for. You can search/filter for the specific formaldehyde mixture and manufacturer that you are using. Once you found the correct chemical name, mixture and vendor, click on “view SDS” for a copy of the SDS. Appendix B also provides safety information on formaldehyde. You can also obtain a SDS by contacting the distributor or manufacturer (or web search) of the chemical you are using. Generic SDSs (formaldehyde solution and embalming fluid) are appended to this program as Appendix E and Appendix F, respectively.

7. Regulated Areas

Work areas where formaldehyde is anticipated to exceed the STEL or 8-hour TWA PEL must be identified as regulated areas and entry restricted to trained employees. Regulated areas are posted with signs or labels as shown in Appendix A.

8. Medical Surveillance

Medical evaluation and surveillance as described in 29 CFR Part 1910.1048(l) is available through the URI Health Services for all *students* exposed to formaldehyde at or above the STEL or AL. *Employees* that may have been exposed to formaldehyde at or above the STEL or AL may receive primary assessment and treatment at URI Health Services before proceeding to their PCP or hospital. URI employees should also contact URI Human Resources to complete and submit and injury/illness report. Medical services are also available to employees and students involved in a spill, splash, or other emergency condition that causes a potential over-exposure. For serious, acute formaldehyde exposure, all employees and students should call 911.

9. Work Practices

As outlined in both the University’s Hazard Communication and Chemical Hygiene Programs, work practices and administrative procedures are important for ensuring the safe handling of toxic chemicals such as formaldehyde.

- Know the location of the nearest eyewash and safety shower, and the locations of spill supplies, personal protective equipment, and other safety equipment before you begin using formaldehyde in the lab.
- Familiarize yourself and others in the lab with the information contained in the specific safety data sheet for the chemical you are using. Contact EHS with any questions.
- If you are pregnant, may be pregnant, or breastfeeding, contact URI Health Services or your PCP prior to using formaldehyde, formalin, or paraformaldehyde to understand risks associated with the use of this chemical.
- Never eat, drink, smoke, or apply cosmetics in a laboratory or near chemicals.
- Wear safety goggles, a lab coat, long sleeves and pants, closed toe shoes and chemical resistant gloves prior to handling chemicals.
- Upon arrival, check shipments of formaldehyde for leakage before accepting the package and report any damages to the supervisor or your PI.
- Never deface the labels on chemical containers and replace them if worn or illegible.
- Handle formaldehyde in a manner that minimizes the potential for skin exposure and

releases into the air.

- Manipulate and transfer only the smallest volume of formaldehyde needed for your work and use standard equipment to ensure safe transfer and always handle under local exhaust ventilation (i.e. fume hood).
- Keep spill absorbents available and situate the receiving container on a spill pad or other absorbent material.
- Keep containers closed except when actively transferring or using them.
- Store formaldehyde containers in a secure location as close to ground level as possible.
- Perform transfers and mixing in a laboratory hood or at another source of local exhaust, such as a snorkel. Never handle formaldehyde solutions at the open bench. Ensure that the fume hood is in proper working condition and has been certified within the past year.

10. Engineering Controls

Local ventilation is the most efficient applied engineering control for limiting employee exposures to formaldehyde. Laboratory fume hoods and BSCs are very efficient at control exposures and should be used whenever handling volatile or toxic chemicals, including formaldehyde, in the laboratory. Never use a laminar flow hood when using formaldehyde. Other local devices, such as snorkels, downdraft tables, and back slot ventilation should be used when fume hoods are not feasible. Fume hoods are evaluated and certified on at least an annual basis. Contact EHS if the fume hood/BSC in your lab has an expired certification.

Laboratories and other work areas where formaldehyde is handled must be equipped with an eyewash station and deluge shower in the immediate area capable of providing emergency rinsing and flushing for 15 minutes with fresh water. Contact EHS if you need training on how to properly use an eyewash or safety shower or refer to Appendix D for instructions.

11. Personal Protective Equipment

Personal protective equipment (PPE) is required whenever handling formaldehyde. For most operations, basic PPE consists of a laboratory coat, apron or gown, safety glasses or goggles and/or face shield, and gloves. Additionally, long pants and closed toe shoes are required. In the unlikely event that exposures are anticipated to exceed the STEL or PEL, respiratory protection is also required. Respirators will be selected and used according to criteria from Table 1, 29CFR Part 1910.1048 and the University's Respiratory Protection Program. Contact EHS for additional information on required medical evaluation, respirator training and fit testing.

The style and grade of gloves should be selected according to the concentration and quantity of formaldehyde used, and the potential for hand contact. For small quantity procedures with mechanical transfer devices, disposable nitrile gloves should be sufficient, provided that gloves are removed and replaced if splashed. For larger volume operations or those where contact with liquid formaldehyde is more likely, heavier utility-grade nitrile, or butyl rubber gloves must be worn over the exam-style nitrile gloves.

12. Emergency Procedures

Spill absorbing supplies must be kept on-hand and available for emergency use in areas where large volumes of formaldehyde could be released in an accident or from equipment failure. URI EHS can provide assistance in selecting appropriate supplies.

Very small incidental spills that occur during the course of ordinary work can be cleaned up by lab users. Work from the perimeter inwards and absorb spilled liquid with paper towels or absorbent. Routine workplace personal protective equipment is generally sufficient for these kinds of spills. Collect absorbed material into heavy plastic bags, and seal and label them for collection as hazardous chemical waste. **It is not considered to be a small spill if respiratory protection is necessary to clean it up. Contact URI Dispatch at 874-4910 to reach the EHS staff on-call for assistance.**

Large spills and any incident that may cause a potential over-exposure should immediately be communicated to emergency responders. Safely leave the area and summon emergency assistance by dialing 911. Give the dispatcher as much information about the nature and location of the spill, and whether or not any one has been contaminated or injured.

More detailed emergency procedures are described in the Substance Safety Guidelines (Appendix B), provided to all departments covered by this Program.

13. Training and Information

All employees working with chemicals must receive training appropriate to their workplace, including Laboratory Safety training. Employees working with formaldehyde where exposures could exceed 0.1 ppm also receive additional formaldehyde-specific training information on an annual basis. This information is provided by supervisors and by URI EHS (Appendix B). Annual training is provided by either direct training sessions, web-based training, or through training and informational fact sheets that are distributed to all affected workers (Appendix C). Additional copies of this program, OSHA's Formaldehyde Standard, and other related materials are available from URI EHS.

14. Record Keeping

Exposure measurements and training records will be maintained for at least thirty (30) years by URI EHS. Records of worker's compensation claims will be kept by Human Resources for the duration of the affected employee's employment plus thirty (30) years. URI Health Services maintains student exposure medical records.

15. Waste Disposal

Formaldehyde-containing materials must be disposed as hazardous chemical waste. Once waste is generated and prepared for pick-up, notify URI EHS to arrange for pick-up by completing the online pickup form.

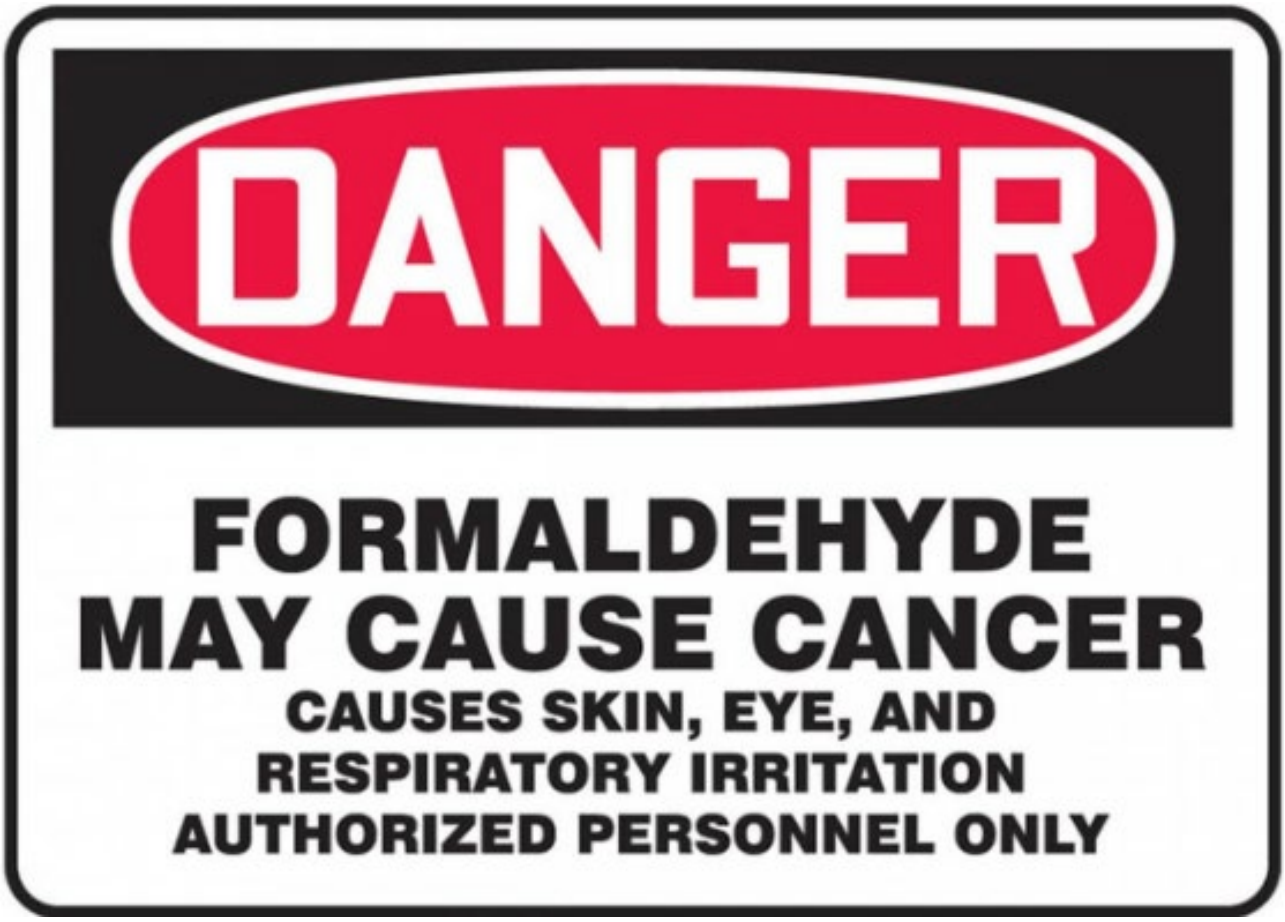
Liquid wastes must be collected in impervious, closable containers and identified as hazardous waste with tags and labels available from URI EHS.

Biological specimens preserved in formaldehyde may be disposed in several ways. Where specimens constitute a very small fraction (i.e., < 5-10%) of the overall volume, collect as liquid waste, above. Where the tissue or specimens constitute a larger, bulkier fraction of the overall waste volume, the liquid fraction should be decanted and the wastes separated into solid and liquid streams. Use caution whenever decanting or straining formaldehyde to avoid free liquids remaining with the solids and work only in a fume hood or other local exhaust extractor to prevent over-exposure to formaldehyde vapors. If the specimens were derived from humans, primates, or other mammals, the solid samples must be disposed of as potentially infectious biomedical waste using red biomedical waste disposal bags and placed in a biowaste box. Affix "pathological waste" or "incinerate only" labels on the box and place in the biowaste room on the morning of the waste pickup. For more information, please refer to the EHS Biosafety page for the biowaste calendar or to fill out the biowaste pickup form.

Appendices:

A. **Regulated Area Postings**
B. **Formaldehyde Information**
C. **Formaldehyde Training Fact Sheet**
D. **Eyewash Procedures**
E. **Thermo Fisher Scientific Formaldehyde Solution 37% Safety Data Sheet**
F. **Sample Embalming Safety Data Sheet (Hydrol Chemical Company)**
G. **Formaldehyde Safety Poster for the Laboratory**

Appendix A: Regulated Area Postings


DANGER
FORMALDEHYDE
MAY CAUSE CANCER
CAUSES SKIN, EYE, AND
RESPIRATORY IRRITATION
AUTHORIZED PERSONNEL ONLY

Appendix B: Formaldehyde Information

SUBSTANCE SAFETY GUIDELINES FOR FORMALDEHYDE

This Guideline provides information about formaldehyde and is designed to inform laboratory employees working with this chemical of their rights and duties under URI's formaldehyde safety program, as required by OSHA (20 CFR Part 1910.1048). Although the precise hazards associated with exposure to formaldehyde depend upon both its form (solid, liquid, or gas) and concentration, this document will discuss concentrated formaldehyde (37% in water, no stabilizers or inhibitors). Since most laboratories routinely work with more dilute solutions of formaldehyde, the information contained herein should be considered "worst-case" for the majority of formaldehyde users.

SUBSTANCE IDENTIFICATION

Chemical Name: Formaldehyde Solution Chemical Family: Aldehyde
Chemical Formula: HCHO Molecular Weight: 30.03
CAS Number: 50-00-0

Synonyms: Formalin; Formic Aldehyde; Paraform; Formol; Formalin (Methanol-free); Formalith; Methanal; Methyl Aldehyde; Methylene Glycol; Methylene Oxide; Tetraoxymethalene; Oxomethane; Oxymethylene

Components & Contaminants: 37% Formaldehyde, 63% Water (Inhibited solutions may contain up to 10% methanol by volume). Other Contaminants: Formic acid (alcohol free)

EXPOSURE LIMITS

OSHA: 0.75 ppm (eight-hour time weighted average) 2 ppm (fifteen minute time weighted average)

PHYSICAL DATA

Description: Colorless liquid, pungent odor
Boiling point: 214 deg. F (101 deg. C)
Specific Gravity: 1.08 (H20=1 @20 deg. C)
pH: 2.8-4.0
Solubility in Water: Miscible
Solvent Solubility: Soluble in alcohol
Formaldehyde Vapor Density: 1.04 (Air= 1 @ 20 deg. C)
Odor Threshold: 0.8-1 ppm

FIRE AND EXPLOSION HAZARD

Moderate fire and explosion hazard when exposed to heat or flame, depending on formulation of the solution and whether it contains methanol. The flash point of 37% formaldehyde solutions is above normal room temperature, but the explosion range is very wide, from 7 to 73% by volume in air. Reaction of formaldehyde with nitrogen dioxide, nitromethane, perchioric acid and aniline, or peroxyformic acid yields explosive compounds.

Flash Point: 185 deg. F (85 deg. C) closed cup Lower Explosion Limit: 7%

Upper Explosion Limit: 73%
Autoignition Temperature: 806 deg. F (430 deg. C) Flammability Class (OSHA): III A

Extinguishing Media: Use dry chemical, "alcohol foam", carbon dioxide, or water in flooding amounts as fog. Solid streams may not be effective. Cool fire-exposed containers with water from side until well after fire is out. Use of water spray to flush spills can also dilute the spill to produce nonflammable mixtures. Water runoff, however, should be contained for treatment.

NATIONAL FIRE PROTECTION ASSOCIATION DESIGNATION

Health: 2-Materials hazardous to health, but areas may be entered with full-faced mask self-contained breathing apparatus which provides eye protection.

Flammability: 2-Materials which must be moderately heated before ignition will occur. Water spray may be used to extinguish the fire because the material can be cooled below its flash point.

Reactivity: D-Materials which (in themselves) are normally stable even under fire exposure conditions and which are not reactive with water. Normal firefighting procedures may be used.

REACTIVITY

Stability: Formaldehyde solutions may self-polymerize to form paraformaldehyde which precipitates.

Incompatibilities (i.e., materials to avoid): Strong oxidizing agents, caustics, strong alkalies, isocyanates, anhydrides, oxides, and inorganic acids. Formaldehyde reacts with hydrochloric acid to form the potent carcinogen, bis-chloromethyl ether. Formaldehyde reacts with nitrogen dioxide, nitromethane, perchloric acid and aniline, or peroxyformic acid to yield explosive compounds. A violent reaction occurs when formaldehyde is mixed with strong oxidizers.

Hazardous Combustion or Decomposition Products: Oxygen from the air can oxidize formaldehyde to formic acid, especially when heated. Formic acid is corrosive.

HEALTH HAZARD DATA ACUTE EFFECTS OF EXPOSURE

Ingestion (Swallowing): Liquids containing 10-40% formaldehyde cause severe irritation and inflammation of the mouth, throat, and stomach. Severe stomach pains will follow ingestion with possible loss of consciousness and death. Ingestion of dilute formaldehyde solutions (0.03- 0.04%) may cause discomfort in the stomach and pharynx.

Inhalation (Breathing): Formaldehyde is highly irritating to the upper respiratory tract and eyes. Concentrations of *0.5* to 2.0 ppm may irritate the eyes, nose, and throat of some individuals. Concentrations of 3 to *5* ppm may also cause tearing of the eyes and are intolerable to some persons. Concentrations of 10 to 20 ppm cause difficulty in breathing, burning of the nose and throat, cough, and heavy tearing of the eyes, and 25 to 30 ppm causes severe respiratory tract injury leading to pulmonary edema and pneumonitis. A concentration of 100 ppm is immediately dangerous to life and health. Deaths from accidental exposure to high concentrations of formaldehyde have been reported.

Skin (Dermal): Formalin is a severe skin irritant and a sensitizer. Contact with formalin causes white discoloration, smarting, drying, cracking, and scaling. Prolonged and repeated contact can cause numbness and a hardening or tanning of the skin. Previously exposed persons may react to future exposure with an allergic eczematous dermatitis or hives.

Eye Contact: Formaldehyde solutions splashed in the eye can cause injuries ranging from transient discomfort to severe, permanent corneal clouding and loss of vision. The severity of the effect depends on the concentration of formaldehyde in the solution and whether or not the eyes are flushed with water immediately after the accident.

Acute Animal Toxicity:

Oral, rats: LD5O=800 mg/kg
mouse: LD5O=42 mg/kg

Inhalation, rats: LCLo=250 mg/kg Oral,
Inhalation, mouse: LCLo=900 mg/kg
Inhalation, rats: LC5O=590 mg/kg

Note - The perception of formaldehyde by odor and eye irritation becomes less sensitive with time as one adapts to formaldehyde. This can lead to overexposure if a worker is relying on formaldehyde's warning properties to alert the potential for exposure.

CHRONIC EFFECTS OF EXPOSURE

Carcinogenicity: Formaldehyde has the potential to cause cancer in humans. Repeated and prolonged exposure increases the risk. Various animal experiments have conclusively shown formaldehyde to be a carcinogen in rats. In humans, formaldehyde exposure has been associated with cancers of the lung, nasopharynx and oropharynx, and nasal passages.

Mutagenicity: Formaldehyde is genotoxic in several *in vitro* test systems showing properties of both an initiator and a promoter.

Toxicity: Prolonged or repeated exposure to formaldehyde may result in respiratory impairment. Rats exposed to formaldehyde at **2** ppm developed benign nasal tumors

and changes of the cell structure in the nose as well as inflamed mucous membranes of the nose. Structural changes in the epithelial cells in the human nose have also been observed. Some persons have developed asthma or bronchitis following exposure to formaldehyde, most often as the result of an accidental spill involving a single exposure to a high concentration of formaldehyde.

EMERGENCY AND FIRST AID PROCEDURES

Ingestion (Swallowing): If the victim is conscious, dilute, inactivate, or absorb the ingested formaldehyde by giving milk, activated charcoal, or water. Any organic material will inactivate formaldehyde. Keep affected person warm and at rest. Get medical attention immediately. If vomiting occurs, keep head lower than hips.

Inhalation (Breathing): Remove the victim from the exposure area to fresh air immediately. Where the formaldehyde concentration may be very high, each rescuer must put on a self-contained breathing apparatus before attempting to remove the victim, and medical personnel should be informed of the formaldehyde exposure immediately. If breathing has stopped, give artificial respiration. Keep the affected person warm and at rest. Qualified first-aid or medical personnel should administer oxygen, if available, and maintain the patient's airways and blood pressure until the victim can be transported to a medical facility. If exposure results in a highly irritated upper respiratory tract and coughing continues for more than 10 minutes, the worker should be hospitalized for observation and treatment.

Skin Contact: Remove contaminated clothing (including shoes) immediately. Wash the affected area of your body with soap or mild detergent and large amounts of water until no evidence of the chemical remains (at least 15 to 20 minutes). If there are chemical burns, get first aid to cover the area with sterile, dry dressing, and bandages. Get medical attention if you experience appreciable eye or respiratory irritation.

Eye Contact: Wash the eyes immediately with large amounts of water occasionally lifting tower and upper lids, until no evidence of chemical remains (at least 15 to 20 minutes). In case of burns, apply sterile bandages loosely without medication. Get medical attention immediately. If you have experienced appreciable eye irritation from a splash or excessive exposure, you should be referred promptly to an ophthalmologist for evaluation.

EMERGENCY PROCEDURES

General Information - **Emergencies:** If you work in an area where a large amount of formaldehyde could be released in an accident or from equipment failure, make sure that spill absorbing supplies are on- hand and available for use in a spill. The Office of Environmental Health & Safety can assist you in selecting appropriate supplies. In the event of a large spill or release, leave the area immediately and summon emergency assistance by dialing 911. You can also call the URI Dispatch to contact the EHS staff on

call. Give the dispatcher as much information about the nature and location of the spill, and whether or not any one has been contaminated or injured.

Personal Contamination: If you are splashed with formaldehyde, immediately flush the affected area with water from the eyewash or emergency showers in your laboratory or in the hallway to prevent serious injury. Flush with water for at least 15 minutes and notify others to summon medical assistance.

Spills and Leaks: Place leaking container into a secondary container (such as a tray) and move to a well-ventilated area such as a chemical fume hood. Collect small spills with absorbent material and place the waste into properly labeled containers for disposal as hazardous chemical waste. Always wear gloves, eye protection, and a laboratory coat when cleaning up a small spill. If you feel that respiratory protection is necessary, are uncertain as to how to proceed or for larger spills (such as a spill of one liter or more), immediately call URI Dispatch at 874-4910 to reach the EHS on-call staff. Trained EHS staff or URI's hazardous waste vendor will respond to control and clean up the spill. In the event of a large spill, do not touch spilled material but do shut off any nearby ignition sources and do whatever is possible to increase the ventilation of the area (turn on chemical fume hood, open window) if this can be done without placing you at risk. You should then cordon off the spill area and deny entry except for emergency responders.

Spill Reporting and Waste Disposal: URI must comply with EPA rules regarding the clean-up of toxic waste and notify state and local authorities, if required. Please notify the Office of Environmental Health & Safety of any formaldehyde spills, and they will notify the appropriate agencies if required. URI must dispose of waste containing formaldehyde in accordance with applicable local, state, and Federal law and in a manner that minimizes exposure of employees at the site and of the clean-up crew. Liquid wastes should be collected in glass or heavy plastic jugs or bottles (provided by EHS), and solid and semi-solid (e.g., contaminated paper towels used in cleaning up a small spill) placed and sealed in double plastic bags. Label all waste containers with the hazardous waste labels provided by EHS, place the waste in your lab's SAA tray and fill out the hazardous waste pickup form. Labels and waste containers can also be requested using this form.

MONITORING AND MEASUREMENT PROCEDURES

Monitoring Requirements: If your work with formaldehyde is anticipated to exceed either the 0.5 ppm action level or the 2 ppm STEL, an evaluation will be performed to properly characterize your exposure. Exposure is highly unlikely to occur if formaldehyde is used within a fume hood. If formaldehyde sampling is necessary in your immediate work area, EHS will conduct sampling using monitoring data obtained from "representative employees" performing similar work with formaldehyde. If monitoring is required, you may be asked to wear a sampling device to collect formaldehyde. This device could be a passive badge, a sorbent tube attached to a pump, or an impinger

containing liquid. You should perform your work as usual but inform the person who is conducting the monitoring of any difficulties you are having wearing the device and any changes or deviations from your usual work routine.

Monitoring Techniques: OSHA's only requirement for selecting a method for sampling and analysis is that the method(s) accurately evaluate the concentration of formaldehyde in employees' breathing zones. At URI, we use a variety of approved sampling methods, including NIOSH 2016, NIOSH 3500, and passive dosimeters. The appropriate monitoring method and technique will be determined by the Industrial Hygienist performing the monitoring.

Notification of Results: If monitoring is performed, you will be notified of the results in writing within 15 to 21 days.

PROTECTIVE EQUIPMENT AND CLOTHING

Personal protective equipment (PPE) and clothing must be worn on all skin surfaces which could come into contact with formalin. This equipment or clothing must be fabricated from materials impervious to formaldehyde if you handle formaldehyde solutions of 1% or more. Types of equipment or clothing that may be required include: gloves, aprons, disposable coveralls, and eye protection. If you are required to change into whole-body chemical protective clothing (such as a disposable coverall), your supervisor must provide a change room for your privacy and for storage of your normal clothing. It is the employer's responsibility to supply necessary protective equipment and clothing to employees at no cost.

Protective Gloves: Gloves fabricated from butyl or neoprene rubber, nitrile or polyvinylchloride are impervious to formalin. A variety of styles are available in different thicknesses to accommodate any task. If you require help identifying a glove that does not interfere with your work, contact EHS.

Eye Protection: If you might be splashed in the eyes with formalin, it is essential that you wear goggles, safety glasses with side shields, or a faceshield to protect the eyes.

Respiratory Protection: Given the typically dilute concentrations and low volumes of formaldehyde handled on campus, coupled with local exhaust devices such as fume hoods, the potential for over- exposure to most formaldehyde users is very small. Nevertheless, there are operations and circumstances where a respirator may be needed to prevent over-exposure. In the event you need to wear a respirator, you must be enrolled in the University's respiratory protection program. This program ensures that the proper respirator has been selected, that it fits correctly, and that you are physically capable of wearing it.

ENTRY INTO ATMOSPHERES IMMEDIATELY DANGEROUS TO LIFE AND HEALTH (IDLH)

Enter areas where the formaldehyde concentration might be 100 ppm or more only with complete body protection including self-contained breathing apparatus with a full face piece operated in a positive pressure demand mode. This equipment is essential to protect your life and health under such extreme conditions. It is highly unlikely that this type situation would develop in the laboratory setting, and is mentioned here primarily for emergency responders.

ENGINEERING CONTROLS

Ventilation, especially a laboratory fume hood, is the most widely applied engineering control method for limiting laboratory employee's exposure to formaldehyde. There are two distinct types of ventilation - local exhaust and general (mechanical) exhaust.

Local Exhaust: Local exhaust ventilation (e.g., laboratory fume hood) is designed to capture airborne contaminants as near to their point of generation as possible. To protect you, the direction of contaminant flow must always be toward the local exhaust system inlet and away from you. Laboratory hoods should have a face velocity of 100 fpm ± 20%. These hoods are tested annually by a vendor procured by Facilities Services. If your fume hood is malfunctioning, please submit a work order to Facilities Services.

General (Room or Dilution) Exhaust: General exhaust ventilation works by diluting the concentration of workplace contaminants by introducing fresh outside air into the work area. The effectiveness of this kind of ventilation depends on the number of room or laboratory air changes per hour, and the locations and generation rates of formaldehyde vapors. It is recommended that formaldehyde is used only within a fume hood since it reduces the likelihood of exposure to the greatest degree.

Work Practices: Work practices and administrative procedures are an important part of a control system. Always work with formaldehyde in a manner that minimizes the potential for skin exposure and releases into the air. If you are asked to perform a task in a certain manner to limit your exposure to formaldehyde, it is extremely important that you follow these procedures. Where possible, always handle formaldehyde solutions in a laboratory hood or other source of local exhaust. Never mouth pipette, and do not heat or stir formaldehyde solutions at the open bench. Keep containers closed except when manipulating them and perform transfers and dilutions of stock solutions in a laboratory hood.

MEDICAL SURVEILLANCE

Medical surveillance helps to protect employees' health by identifying potential reversible health problems early. If your exposure has been identified as potentially

exceeding the action limit or STEL, you will be required to participate in the formaldehyde medical surveillance program. This program, which is available at no expense to you and at a reasonable time and place, will be offered at the time of your initial assignment and once a year afterward as long as your exposure remains above these limits. However, even if your exposure is below these levels, you should inform your employer if you have or develop any signs and medical symptoms that you suspect are related to your formaldehyde exposure.

The formaldehyde medical surveillance program includes:
(a) A medical disease questionnaire.
(b) A physical examination if the physician determines this is necessary.

The physician must collect all information needed to determine if you are at increased risk from your exposure to formaldehyde. At the physician's discretion, the medical examination may include other tests, such as a chest x-ray, to make this determination. At URI, all medical surveillance is performed by the URI Health Services (for students) or the employee's PCP or local hospital. Note that URI employees should contact Human Resources and complete and submit and Accident/Illness Form, found on their website. After a medical examination the examining physician will provide URI with a written opinion which includes any special protective measures recommended and any restrictions on your exposure. The physician must inform you of any medical conditions you have which would be aggravated by exposure to formaldehyde. An employee can find out more about the medical surveillance program by contacting URI Health Services at 874-2246. All records from your medical examinations, including disease surveys, must be retained by URI and one is made available to you by making a request in writing to URI Health Services.

Medical Surveillance - **Emergencies:** If you are exposed to formaldehyde in an emergency (such as a spill) and develop signs or symptoms associated with acute toxicity from formaldehyde exposure, URI must provide you with a medical examination as soon as possible. In this instance, employees and students should call 911 or contact URI Health Services (874-2246). This medical examination will include all steps necessary to stabilize your health. You may be kept in the hospital for observation if your symptoms are severe to ensure that any delayed effects are recognized and treated.

Appendix C: Formaldehyde Training Fact Sheet

FORMALDEHYDE TRAINING FACT SHEET

Previous monitoring and evaluations of your work area have identified the potential for low level exposures to formaldehyde. The URI Formaldehyde Safety Program provides a detailed description of the safety, training, and medical surveillance requirements for staff exposed to different levels of this chemical. This bulletin provides you with on-going information about the hazards associated with formaldehyde, means for protecting yourself and procedures to follow during various emergencies. Should you have any further questions, please contact URI Environmental Health & Safety at 874-7993 or srm@etal.uri.edu.

Formaldehyde is used in research and clinical support laboratories throughout URI. Any solution containing greater than 0.1% formaldehyde is considered a formaldehyde solution and is classified as a carcinogen. Anyone working with formaldehyde where potential exposures may exceed 0.1ppm must be trained annually in accordance with OSHA's formaldehyde standard (29CFR1910.1048). This standard is available from the EHS office and at OSHA's web site at www.osha.gov.

OSHA has assigned the following exposure limits for formaldehyde: 8-hr permissible exposure limit (PEL): 0.75ppm
8-hr action limit (AL): 0.5ppm
15-minute short-term exposure limit (STEL): 2ppm

Initial exposure monitoring has been conducted in your area to determine whether these limits are exceeded. To date, no areas regularly exceed these levels, and therefore full program compliance has not been required. However, periodic monitoring is performed to ensure that exposure levels remain below all applicable limits. If at any point exposures in your work area were in excess of any of these limits, a full formaldehyde compliance program, including medical surveillance, continued exposure monitoring, establishment of regulated areas, and a respiratory protection program would be required to be in place for your area.

Health Effects

Formaldehyde has been shown to be a nasal and lung carcinogen, and is highly irritating to the skin, eyes, and respiratory system. Direct skin contact can cause white discoloration, and drying, cracking, or scaling. Prolonged and repeated contact can cause numbness and hardening of the skin.

Formaldehyde vapors can cause tearing of the eyes and burning of the nose and throat. It is also a skin sensitizer and may cause allergic dermatitis or hives on previously exposed persons. Any of these symptoms should be immediately reported to your supervisor and/or URI Health Services.

Engineering Controls
Local exhaust ventilation is the most effective means for controlling exposure where the potential for inhalation of formaldehyde vapors exists. The exhaust must draw the vapors away from the breathing zone and be exhausted to the outside. Since the odor threshold for formaldehyde ranges from 0.2-0.8 ppm, no formaldehyde odor should be present with the use of effective ventilation.

Personal Protective Equipment
Personal protective equipment (PPE) must be worn to prevent any contact of unprotected skin with formaldehyde. Nitrile exam-style gloves are recommended for most laboratory-scale work with formaldehyde. Utility-grade nitrile or butyl rubber gloves over exam-style gloves are required for larger scale work with formaldehyde when direct contact with formaldehyde is more likely to occur. Safety glasses must always be worn when working with hazardous materials, and tight-fitting chemical goggles should be worn to protect the eyes from splashes and from formaldehyde vapors. A face shield should be worn as necessary for splash protection. A laboratory coat, apron, or gown is also required to protect the clothes and body from contact with formaldehyde. All laboratory staff and students are required to wear long pants and closed toe shoes when in the laboratory.

Respiratory protection for formaldehyde is required if the exposures are anticipated to exceed OSHA's exposure limits. Anyone who wears a respirator must first be medically cleared and properly trained and fit-tested by EHS in accordance with the University's Respiratory Protection Program.

Spills and Emergencies
Small Incidental Spills that occur during the course of ordinary work can be cleaned up by area staff, providing that respiratory protection is not required for the cleanup. Work from the perimeter inwards, and absorb spilled liquid with paper towels or absorbent. Collect absorbed material into heavy plastic bags, and seal and label them for collection as hazardous chemical waste. If you feel at all uncomfortable, follow the procedure for large spills. It is not considered to be a small spill if respiratory protection is needed.

Large spills and any incident that causes a potential over-exposure should immediately be communicated to emergency responders. Leave the area and summon emergency assistance by dialing 911 from any telephone.

Appendix D: Eyewash Procedures

EMERGENCY EYE WASH
DIRECTIONS

This eyewash procedure must be reviewed by all lab users before using hazardous materials, including flammables, corrosives, and cell cultures.

- **TO PREVENT AN EYE EXPOSURE, ALWAYS WEAR SAFETY GLASSES OR SPLASH GOGGLES WHEN WORKING WITH HAZARDOUS MATERIALS.**
- **When something goes wrong, you must be able to respond immediately.**
- **You never know when something will go wrong. You only get one pair of eyes. Protect them.**

If you fail to wear safety glasses or splash goggles and something does go wrong:

- **<u>Go Immediately to the Eyewash Station – Don't Waste A Second!</u>**

  If a chemical or biological splashes into your eyes, time is of the essence. Go immediately to the eyewash station which is on the south wall of the lab. In most labs, it will be under the safety shower, between the corridor where the freezers are located and the cell culture room.

- **<u>Push the Lever to Activate the Unit</u>** with one single motion.

  The dust covers will pop off and the flushing fluid will begin to flow out from the faucet heads. The unit will be hands-free so once activated, it will stay on.

- **<u>Begin to Flush</u>**

  Get your eyes directly in the stream of the flushing fluid - Immediately!

- **<u>Hold Your Eyes Open with Your Fingers</u>**

  Keep your eyes open by holding your eyelids apart with your fingers.

- **<u>Roll Your Eyes</u>**

  Gently roll your eyes from left to right and up and down to be sure that the fluid is flushing all areas of your eye.

- **<u>Flush for a Full Fifteen Minutes</u>**

  Continue flushing for a full 15 minutes. The temperature will be between 60 and 100^0F so you can comfortably continue flushing for the entire time. This is important because you need to fully dilute the material and wash it out of your eyes. Any time less than 15 minutes is NOT enough time to accomplish this.

- **<u>Take Out Your Contacts</u>**

  If you are wearing contacts, gently remove them while continuing to flush. Don't delay the flushing to take out your lenses but make sure to take them out because they could trap the chemical in your eyes and cause more damage.

- **<u>Seek Medical Help</u>**

  After you have flushed, go to Health Services to determine if anything more needs to be done to preserve your vision.

Appendix E: Thermo Fisher Scientific Formaldehyde Solution

37% Safety Data Sheet

Request the specific SDS that applies to your research from your instructor. This SDS is just an example of a typical formaldehyde solution SDS

SAFETY DATA SHEET

Creation Date 08-Feb-2010 **Revision Date** 24-Dec-2021 **Revision Number** 6

1. Identification

Product Name **Formaldehyde solution 37%**

Cat No. : **F75F-1GAL; F75P-1GAL; F75P-4; F75P-20**

Synonyms Formalin; Methanal; Methylene oxide; Oxymethane; Formic aldehyde; Methyl aldehyde

Recommended Use Laboratory chemicals.
Uses advised against Food, drug, pesticide or biocidal product use.

Details of the supplier of the safety data sheet

Company
Fisher Scientific Company
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Emergency Telephone Number CHEMTREC®, Inside the USA: 800-424-9300
CHEMTREC®, Outside the USA: 001-703-527-3887

2. Hazard(s) identification

Classification
This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Flammable liquids	Category 3
Acute oral toxicity	Category 3
Acute dermal toxicity	Category 3
Acute Inhalation Toxicity - Vapors	Category 3
Skin Corrosion/Irritation	Category 1 B
Serious Eye Damage/Eye Irritation	Category 1
Skin Sensitization	Category 1
Germ Cell Mutagenicity	Category 2
Carcinogenicity	Category 1A
Specific target organ toxicity (single exposure)	Category 1
Target Organs - Respiratory system, Central nervous system (CNS), Optic nerve.	
Specific target organ toxicity - (repeated exposure)	Category 1
Target Organs - Kidney, Liver, Heart, spleen, Blood.	

Label Elements

Signal Word

Danger

Hazard Statements
Flammable liquid and vapor
Causes severe skin burns and eye damage
May cause an allergic skin reaction
May cause respiratory irritation
May cause drowsiness or dizziness
Suspected of causing genetic defects
May cause cancer
Causes damage to organs
Causes damage to organs through prolonged or repeated exposure
Toxic if swallowed, in contact with skin or if inhaled

Precautionary Statements
Prevention
Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Use personal protective equipment as required
Wash face, hands and any exposed skin thoroughly after handling
Do not eat, drink or smoke when using this product
Use only outdoors or in a well-ventilated area
Do not breathe dust/fume/gas/mist/vapors/spray
Contaminated work clothing should not be allowed out of the workplace
Wear protective gloves
Keep away from heat/sparks/open flames/hot surfaces. - No smoking
Keep container tightly closed
Ground/bond container and receiving equipment
Use explosion-proof electrical/ventilating/lighting equipment
Use only non-sparking tools
Take precautionary measures against static discharge
Keep cool
Response
Immediately call a POISON CENTER or doctor/physician
Inhalation
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Skin
Wash contaminated clothing before reuse
IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower
If skin irritation or rash occurs: Get medical advice/attention
Eyes
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
Ingestion
Rinse mouth
Do NOT induce vomiting
Fire
In case of fire: Use CO2, dry chemical, or foam for extinction
Storage
Store locked up
Store in a well-ventilated place. Keep container tightly closed
Disposal
Dispose of contents/container to an approved waste disposal plant

Hazards not otherwise classified (HNOC)
None identified
Other hazards
Poison, may be fatal or cause blindness if swallowed. Vapor harmful. CANNOT BE MADE NON-POISONOUS. WARNING. Reproductive Harm - https://www.p65warnings.ca.gov/.

3. Composition/Information on Ingredients

Component	CAS No	Weight %
Water	7732-18-5	45 - 48
Formaldehyde	50-00-0	37 - 40
Methyl alcohol	67-56-1	15

4. First-aid measures

General Advice Immediate medical attention is required. Show this safety data sheet to the doctor in attendance.

Eye Contact 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.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes. Immediate medical attention is required.

Inhalation 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. Remove to fresh air. Immediate medical attention is required.

Ingestion Do NOT induce vomiting. Call a physician or poison control center immediately.

Most important symptoms and effects Difficulty in breathing. Causes burns by all exposure routes. May cause allergic skin reaction. . Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting: Product is a corrosive material. Use of gastric lavage or emesis is contraindicated. Possible perforation of stomach or esophagus should be investigated: Ingestion causes severe swelling, severe damage to the delicate tissue and danger of perforation: Symptoms of allergic reaction may include rash, itching, swelling, trouble breathing, tingling of the hands and feet, dizziness, lightheadedness, chest pain, muscle pain or flushing

Notes to Physician Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media Water mist may be used to cool closed containers.

Unsuitable Extinguishing Media No information available

Flash Point 50 °C / 122 °F

Method - No information available

Autoignition Temperature No information available

Explosion Limits
Upper No data available
Lower No data available
Sensitivity to Mechanical Impact No information available

Sensitivity to Static Discharge No information available

Specific Hazards Arising from the Chemical
Flammable. Containers may explode when heated. Vapors may form explosive mixtures with air. Vapors may travel to source of ignition and flash back. The product causes burns of eyes, skin and mucous membranes. Thermal decomposition can lead to release of irritating gases and vapors.

Hazardous Combustion Products
Hydrogen. Formaldehyde.
Protective Equipment and Precautions for Firefighters
Thermal decomposition can lead to release of irritating gases and vapors. As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPA

Health	Flammability	Instability	Physical hazards
3	2	0	N/A

6. Accidental release measures

Personal Precautions Use personal protective equipment as required. Evacuate personnel to safe areas. Keep people away from and upwind of spill/leak. Ensure adequate ventilation. Remove all sources of ignition. Take precautionary measures against static discharges.

Environmental Precautions Should not be released into the environment. Do not flush into surface water or sanitary sewer system. See Section 12 for additional Ecological Information.

Methods for Containment and Clean Up Soak up with inert absorbent material. Keep in suitable, closed containers for disposal. Remove all sources of ignition. Use spark-proof tools and explosion-proof equipment.

7. Handling and storage

Handling Use only under a chemical fume hood. Do not breathe mist/vapors/spray. Do not get in eyes, on skin, or on clothing. Wear personal protective equipment/face protection. Do not ingest. If swallowed then seek immediate medical assistance. Keep away from open flames, hot surfaces and sources of ignition. Use only non-sparking tools. Take precautionary measures against static discharges.

Storage. Keep containers tightly closed in a dry, cool and well-ventilated place. Corrosives area. Keep away from heat, sparks and flame. Incompatible Materials. Strong oxidizing agents. Strong bases. nitriles. Acids. Isocyanates. Acid anhydrides. Metals. Acid chlorides.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH	Mexico OEL (TWA)
Formaldehyde	TWA: 0.1 ppm STEL: 0.3 ppm	(Vacated) TWA: 3 ppm (Vacated) STEL: 10 ppm (Vacated) Ceiling: 5 ppm TWA: 0.75 ppm STEL: 2 ppm	IDLH: 20 ppm TWA: 0.016 ppm Ceiling: 0.1 ppm	Ceiling: 0.3 ppm
Methyl alcohol	TWA: 200 ppm STEL: 250 ppm Skin	(Vacated) TWA: 200 ppm (Vacated) TWA: 260 mg/m^3 (Vacated) STEL: 250 ppm (Vacated) STEL: 325 mg/m^3 Skin TWA: 200 ppm TWA: 260 mg/m^3	IDLH: 6000 ppm TWA: 200 ppm TWA: 260 mg/m^3 STEL: 250 ppm STEL: 325 mg/m^3	TWA: 200 ppm STEL: 250 ppm

Legend

ACGIH - American Conference of Governmental Industrial Hygienists
OSHA - Occupational Safety and Health Administration
NIOSH IDLH: NIOSH - National Institute for Occupational Safety and Health

Engineering Measures Use only under a chemical fume hood. Ensure that eyewash stations and safety showers are close to the workstation location. Use explosion-proof electrical/ventilating/lighting equipment. Ensure adequate ventilation, especially in confined areas.

Personal Protective Equipment

Eye/face Protection Tight sealing safety goggles. Face protection shield.

Skin and body protection Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Liquid
Appearance	Colorless
Odor	pungent
Odor Threshold	No information available
pH	No information available
Melting Point/Range	0 °C / 32 °F
Boiling Point/Range	101 °C / 213.8 °F
Flash Point	50 °C / 122 °F
Evaporation Rate	No information available
Flammability (solid,gas)	Not applicable
Flammability or explosive limits	
Upper	No data available
Lower	No data available
Vapor Pressure	No information available
Vapor Density	> 1.0
Specific Gravity	No information available
Solubility	miscible
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	No information available
Decomposition Temperature	No information available
Viscosity	No information available

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability Stable under normal conditions.

Conditions to Avoid Incompatible products. Excess heat. Keep away from open flames, hot surfaces and sources of ignition.

Incompatible Materials Strong oxidizing agents, Strong bases, nitriles, Acids, Isocyanates, Acid anhydrides, Metals, Acid chlorides

Hazardous Decomposition Products Hydrogen, Formaldehyde

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information

Oral LD50 Category 3. ATE = 50 - 300 mg/kg.

Dermal LD50 Category 3. ATE = 200 - 1000 mg/kg.

Vapor LC50 Category 3. ATE = 2 - 10 mg/l.

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Water	-	-	-
Formaldehyde	500 mg/kg (Rat)	LD50 = 270 mg/kg (Rabbit)	0.578 mg/L (Rat) 4 h
Methyl alcohol	LD50 = 1187 – 2769 mg/kg (Rat)	LD50 = 17100 mg/kg (Rabbit)	LC50 = 128.2 mg/L (Rat) 4 h

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation Causes burns by all exposure routes

Sensitization May cause sensitization by skin contact

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS No	IARC	NTP	ACGIH	OSHA	Mexico
Water	7732-18-5	Not listed	Not listed	Not listed	Not listed	Not listed
Formaldehyde	50-00-0	Group 1	Known	A1	X	A2
Methyl alcohol	67-56-1	Not listed	Not listed	Not listed	Not listed	Not listed

IARC (International Agency for Research on Cancer)

IARC (International Agency for Research on Cancer)
Group 1 - Carcinogenic to Humans
Group 2A - Probably Carcinogenic to Humans
Group 2B - Possibly Carcinogenic to Humans

NTP: (National Toxicity Program)

NTP: (National Toxicity Program)
Known - Known Carcinogen
Reasonably Anticipated - Reasonably Anticipated to be a Human Carcinogen

ACGIH: (American Conference of Governmental Industrial Hygienists)

A1 - Known Human Carcinogen
A2 - Suspected Human Carcinogen
A3 - Animal Carcinogen
ACGIH: (American Conference of Governmental Industrial Hygienists)

Mexico - Occupational Exposure Limits - Carcinogens

Mexico - Occupational Exposure Limits - Carcinogens
A1 - Confirmed Human Carcinogen
A2 - Suspected Human Carcinogen
A3 - Confirmed Animal Carcinogen
A4 - Not Classifiable as a Human Carcinogen
A5 - Not Suspected as a Human Carcinogen

Mutagenic Effects Mutagenic effects have occurred in humans.

Reproductive Effects Experiments have shown reproductive toxicity effects on laboratory animals.

Developmental Effects Developmental effects have occurred in experimental animals. Component substance is listed on California Proposition 65 as a developmental hazard.

Teratogenicity Teratogenic effects have occurred in experimental animals.

STOT - single exposure Respiratory system Central nervous system (CNS) Optic nerve

STOT - repeated exposure Kidney Liver Heart spleen Blood

Aspiration hazard No information available

Symptoms / effects,both acute and delayed Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting: Product is a corrosive material. Use of gastric lavage or emesis is contraindicated. Possible perforation of stomach or esophagus should be investigated: Ingestion causes severe swelling, severe damage to the delicate tissue and danger of perforation: Symptoms

of allergic reaction may include rash, itching, swelling, trouble breathing, tingling of the hands and feet, dizziness, lightheadedness, chest pain, muscle pain or flushing

Endocrine Disruptor Information No information available

Other Adverse Effects The toxicological properties have not been fully investigated.

12. Ecological information

Ecotoxicity

Do not empty into drains. The product contains following substances which are hazardous for the environment.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Formaldehyde	Not listed	Leuciscus idus: LC50 = 15 mg/L 96h	Not listed	EC50 = 20 mg/L 96h EC50 = 2 mg/L 48h
Methyl alcohol	Not listed	Pimephales promelas: LC50 > 10000 mg/L 96h	EC50 = 39000 mg/L 25 min EC50 = 40000 mg/L 15 min EC50 = 43000 mg/L 5 min	EC50 > 10000 mg/L 24h

Persistence and Degradability Miscible with water Persistence is unlikely based on information available.

Bioaccumulation/ Accumulation No information available.

Mobility . Will likely be mobile in the environment due to its water solubility.

Component	log Pow
Formaldehyde	-0.35
Methyl alcohol	-0.74

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

Component	RCRA - U Series Wastes	RCRA - P Series Wastes
Formaldehyde - 50-00-0	U122	-
Methyl alcohol - 67-56-1	U154	-

14. Transport information

DOT

- **UN-No** UN1198
- **Proper Shipping Name** FORMALDEHYDE SOLUTIONS, FLAMMABLE
- **Hazard Class** 3
- **Subsidiary Hazard Class** 8
- **Packing Group** III

TDG

- **UN-No** UN1198
- **Proper Shipping Name** FORMALDEHYDE SOLUTION, FLAMMABLE
- **Hazard Class** 3
- **Subsidiary Hazard Class** 8
- **Packing Group** III

IATA

- **UN-No** UN1198
- **Proper Shipping Name** FORMALDEHYDE SOLUTION, FLAMMABLE
- **Hazard Class** 3
- **Subsidiary Hazard Class** 8
- **Packing Group** III

IMDG/IMO

- **UN-No** UN1198
- **Proper Shipping Name** FORMALDEHYDE SOLUTION, FLAMMABLE
- **Hazard Class** 3

Subsidiary Hazard Class 8
Packing Group III

15. Regulatory information

United States of America Inventory

Component	CAS No	TSCA	TSCA Inventory notification - Active-Inactive	TSCA - EPA Regulatory Flags
Water	7732-18-5	X	ACTIVE	-
Formaldehyde	50-00-0	X	ACTIVE	-
Methyl alcohol	67-56-1	X	ACTIVE	-

Legend:
TSCA US EPA (TSCA) - Toxic Substances Control Act, (40 CFR Part 710)
X - Listed
'-' - Not Listed

TSCA 12(b) - Notices of Export Not applicable

International Inventories
Canada (DSL/NDSL), Europe (EINECS/ELINCS/NLP), Philippines (PICCS), Japan (ENCS), Japan (ISHL), Australia (AICS), China (IECSC), Korea (KECL).

Component	CAS No	DSL	NDSL	EINECS	PICCS	ENCS	ISHL	AICS	IECSC	KECL
Water	7732-18-5	X	-	231-791-2	X	X		X	X	KE-35400
Formaldehyde	50-00-0	X	-	200-001-8	X	X	X	X	X	KE-17074
Methyl alcohol	67-56-1	X	-	200-659-6	X	X	X	X	X	KE-23193

KECL - NIER number or KE number (http://ncis.nier.go.kr/en/main.do)

U.S. Federal Regulations

SARA 313

Component	CAS No	Weight %	SARA 313 - Threshold Values %
Formaldehyde	50-00-0	37 - 40	0.1
Methyl alcohol	67-56-1	15	1.0

SARA 311/312 Hazard Categories See section 2 for more information

CWA (Clean Water Act)

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
Formaldehyde	X	100 lb	-	-

Clean Air Act

Component	HAPS Data	Class 1 Ozone Depletors	Class 2 Ozone Depletors
Formaldehyde	X		-
Methyl alcohol	X		-

OSHA - Occupational Safety and Health Administration

Component	Specifically Regulated Chemicals	Highly Hazardous Chemicals
Formaldehyde	2 ppm STEL 0.5 ppm Action Level 0.75 ppm TWA	TQ: 1000 lb

CERCLA This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability

Act (CERCLA) (40 CFR 302)

Component	Hazardous Substances RQs	CERCLA EHS RQs
Formaldehyde	100 lb	100 lb
Methyl alcohol	5000 lb	-

California Proposition 65 This product contains the following Proposition 65 chemicals.

Component	CAS No	California Prop. 65	Prop 65 NSRL	Category
Formaldehyde	50-00-0	Carc. (Gaseous only)	40 µg/day	Carcinogen
Methyl alcohol	67-56-1	Developmental	-	Developmental

U.S. State Right-to-Know Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Water	-	-	X	-	-
Formaldehyde	X	X	X	X	X
Methyl alcohol	X	X	X	X	X

U.S. Department of Transportation

Reportable Quantity (RQ): Y
DOT Marine Pollutant N
DOT Severe Marine Pollutant N

U.S. Department of Homeland Security This product contains the following DHS chemicals:
Legend - STQs = Screening Threshold Quantities, APA = A placarded amount

Component	DHS Chemical Facility Anti-Terrorism Standard
Formaldehyde	Release STQs - 15000lb (solution)

Other International Regulations

Mexico - Grade Moderate risk, Grade 2

Authorisation/Restrictions according to EU REACH

Component	REACH (1907/2006) - Annex XIV - Substances Subject to Authorization	REACH (1907/2006) - Annex XVII - Restrictions on Certain Dangerous Substances	REACH Regulation (EC 1907/2006) article 59 - Candidate List of Substances of Very High Concern (SVHC)
Formaldehyde	-	Use restricted. See item 72. (see link for restriction details) Use restricted. See item 28. (see link for restriction details) Use restricted. See item 75. (see link for restriction details)	-
Methyl alcohol	-	Use restricted. See item 69. (see link for restriction details)	-

https://echa.europa.eu/substances-restricted-under-reach

Safety, health and environmental regulations/legislation specific for the substance or mixture

Component	CAS No	OECD HPV	Persistent Organic Pollutant	Ozone Depletion Potential	Restriction of Hazardous Substances (RoHS)
Water	7732-18-5	Listed	Not applicable	Not applicable	Not applicable
Formaldehyde	50-00-0	Listed	Not applicable	Not applicable	Not applicable
Methyl alcohol	67-56-1	Listed	Not applicable	Not applicable	Not applicable

Component	CAS No	Seveso III Directive (2012/18/EC) - Qualifying Quantities	Seveso III Directive (2012/18/EC) - Qualifying Quantities	Rotterdam Convention (PIC)	Basel Convention (Hazardous Waste)

		for Major Accident Notification	for Safety Report Requirements		
Water	7732-18-5	Not applicable	Not applicable	Not applicable	Not applicable
Formaldehyde	50-00-0	5 tonne	50 tonne	Not applicable	Not applicable
Methyl alcohol	67-56-1	500 tonne	5000 tonne	Not applicable	Not applicable

16. Other information

Prepared By
Regulatory Affairs
Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

Creation Date 08-Feb-2010
Revision Date 24-Dec-2021
Print Date 24-Dec-2021
Revision Summary This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

Disclaimer
The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text

End of SDS

Appendix F: Typical Embalming Safety Data Sheet (Hydrol Chemical Company)

Request the specific SDS that applies to your research from your instructor. This SDS is just an example of a typical embalming chemical SDS.

SAFETY DATA SHEET

MARYLAND STATE ANATOMICAL SOLUTION CONCENTRATE

SDS Revision Date: **05/26/2015**

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product Identifiers

Product Identity	Maryland State Anatomical Solution Concentrate
Alternate Names	Embalming Chemical, Mixture

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified Uses	Embalming Chemical, Tissue Preservative
Application Method	See Technical Data Sheet

1.3 Details of the supplier of the safety data sheet

Company Name	Hydrol Chemical Company, Inc. 520 Commerce Drive Yeadon, PA 19050

1.4 Emergency telephone number

CHEMTREC (USA)	(800) 424-9300
Customer Service **Hydrol Chemical Company, Inc.**	(800) 345-8200 (610) 622-3603

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Flammable liquids 3; H226	Flammable liquid and vapor.
Acute toxicity 4; H302	Harmful if swallowed.
Acute toxicity 3; H311	Toxic in contact with skin.
Acute toxicity 2; H330	Fatal if inhaled.
Skin corrosion 1B; H314	Causes severe skin burns and eye damage.
Eye damage 1; H318	Causes serious eye damage.
Skin sensitivity 1; H317	May cause an allergic skin reaction.
Mutagenicity 2; H341	Suspected of causing genetic defects.
Carcinogenicity 1B; H350	May cause cancer.
STOT – single exposure 1; H370	Causes damage to organs.
Acute aquatic toxicity 3; H402	Harmful to aquatic life.

2.2 GHS Label elements, including precautionary statements

Pictogram:

Signal word: **Danger**

Hazard statements:

H226 Flammable liquid and vapor.
H302 Harmful if swallowed.
H311 Toxic in contact with skin.
H330 Fatal if inhaled.
H314 Causes severe skin burns and eye damage.
H318 Causes serious eye damage.
H317 May cause an allergic skin reaction.
H341 Suspected of causing genetic defects.
H350 May cause cancer.
H370 Causes damage to organs.
H373 May cause damage to organs through prolonged or repeated exposure.
H411 Toxic to aquatic life with long lasting effects.

Precautionary statements:

P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and understood.
P210 Keep away from heat / sparks / open flames / hot surfaces – No smoking.
P241 Use explosion-proof electrical / ventilating / light / equipment.
P260 Do not breathe dust / fume / gas / mist / vapors / spray.
P264 Wash thoroughly after handling.
P270 Do not eat, drink, or smoke when using this product.
P271 Use only outdoors, or in a well-ventilated area.
P272 Contaminated work clothing should not be allowed out of the workplace.
P273 Avoid release to the environment.
P280 Wear protective gloves / eye protection / face protection.
P284 Wear respiratory protection.

Response statements:

P301+330+331 IF SWALLOWED: Rinse mouth. Do Not induce vomiting.
P302+352 IF ON SKIN: Wash with plenty of soap and water.
P303+361+353 IF ON SKIN (or hair): Remove / Take all contaminated clothing immediately. Rinse skin with water / shower.
P304+312 IF INHALED: Call a POISON CENTER or doctor / physician if you feel unwell.
P305+351+338 IF IN EYES: Rinse continuously with water for several minutes. Remove contact lenses if present and easy to do – continue rinsing.
P307+311 IF exposed, call a POISON CENTER or doctor / physician.
P308+313 If exposed or concerned: Get medical advice / attention.
P310 Immediately call a POISON CENTER or doctor / physician.
P320 Specific treatment is urgent (see information on this label).
P333+313 IF skin irritation or a rash occurs: Get medical advice or attention.
P340 Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P363 Wash contaminated clothing before reuse.
P370+378 In case of fire: Use alcohol resistant foam, CO_2, powder, water spray for extinction. Do not use water jet.
P391 Collect spillage.

Storage statements:

P403+233 Store in a well ventilated space. Keep container tightly closed.
P405 Store locked up.

Disposal statements:

P501 Dispose of contents / container in accordance with local / national regulations.

3. COMPOSITION / INFORMATION ON INGREDIENTS

This product contains the following substances that present a hazard within the meaning of the relevant State and Federal Hazardous Substances Regulations.

Ingredient / Chemical Designations	Weight %	GHS Classification	Notes
Formaldehyde **CAS Number: 0000050-00-0**	**2.0 – 3.0**	**Acute Toxicity 3; H331** **Acute Toxicity 3; H311** **Acute Toxicity 3; H301** **Carcinogenicity 1B; H350** **Mutagenicity 2; H341** **Skin Corrosivity 1B; H314** **Skin Sensitivity 1; H317**	**(1)(2)**
Methanol **CAS Number: 0000067-56-1**	**24 – 28**	**Flammable Liquid 2; H225** **Acute Toxicity 3; H331** **Acute Toxicity 3; H311** **Acute Toxicity 3; H301** **STOT SE 1; H370**	**(1)(2)**
Phenol **CAS Number: 0000108-95-2**	**22 – 26**	**Mutagen 2; H341** **Acute Toxicity 3; H331** **Acute Toxicity 3; H311** **Acute Toxicity 3; H301** **STOT RE 2; H373** **Skin Corrosivity 1B; H314**	**(1)(2)**
Glycerine **CAS Number: 0000056-81-5**	**38 – 42**		**(1)**

(1) Substance classified with a health or environmental hazard.
(2) Substance with a workplace exposure limit.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General: Move victim to fresh air.
Call 911 or emergency medical service.
Give artificial respiration if victim is not breathing.
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.
Administer oxygen if breathing is difficult.
Remove and isolate contaminated clothing and shoes.
In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
In case of burns, immediately cool affected skin for as long as possible with cold water. Do not remove clothing if adhering to skin.
Keep victim warm and quiet.
Effects of exposure (inhalation, ingestion, or skin contact) to substance may be delayed.
Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

Inhalation: Move victim to fresh air. Call emergency medical care. Apply artificial respiration if victim is not breathing. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Administer oxygen if breathing is difficult.

Eyes: Irrigate copiously with clean, fresh water for at least 15 minutes, holding eyelids apart, and seek medical attention.

Skin: Remove and isolate contaminated clothing and shoes. In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes. Shower and wash with soap and water. Keep victim warm and quiet.

Ingestion: **If substance is swallowed, Call Physician Or Poison Control Center For Most Current Information. Ingestion is life threatening.**
Never induce vomiting or give diluents (milk or water) to someone who is unconscious, having convulsions, or who cannot swallow.
Victims of chemical exposure must be taken for medical attention. Rescuers should be taken for medical attention, if necessary. Take copy of label and SDS with victim to a health professional.

4.2 Most important symptoms and effects, both acute and delayed

Overview Acute: Severe irritation of the tissue that had contact with the substance (skin, eyes, mucous membranes). Drowsiness, fatigue, confusion may be experienced after inhalation or ingestion of the substance.

Chronic: Methanol is eliminated slowly from the body; Therefore, repeated exposures may build up to toxic levels in body tissues. Animal studies show long term exposures to methanol damages the CNS, kidneys or liver, skin disorders, and birth defects.

Symptoms of overexposure by route of exposure: Methanol may be harmful if swallowed, inhaled, or injected into skin. Methanol may cause skin and eye irritation or damage. Methanol can be very irritating to mucous membranes and the respiratory tract.

Inhalation: Inhalation of Methanol vapors may lead to irritation of the nose and throat. Symptoms of overexposure mat include dizziness, coughing, headache, dyspnea, lachrymation, nausea, and vomiting. Exposure to high concentrations of this material vapor may cause unconsciousness or death.

Primary routes of entry: Inhalation, skin contact, eyes, ingestion.

Target organs: CNS, eyes, circulatory and respiratory systems.

Contact with skin or eyes: Methanol is an eye and skin irritant. Splashes in the eye may cause eye irritation, redness, tearing, and temporary corneal damage or blindness.

Skin absorption: Methanol is absorbed through the skin and may result in effects similar to inhalation exposure.

Ingestion: Ingestion of one to four ounces of Methanol can cause irreversible damage to the nervous system, blindness, or death. It cannot be made non-poisonous. Aspiration of the material into the lungs can cause chemical pneumonitis.

Injection: Injection of Methanol can lead to redness and irritation of the surrounding tissue. Possible cancer hazard. Contains an ingredient which may cause cancer based on animal data (see Section 3 and Section 15 for each ingredient). Risk of cancer depends on duration and level of exposure. Exposure to solvent vapor concentrations from the component solvents in excess of the stated occupational exposure limits may result in adverse health effects such as mucous membranes and respiratory system irritation and adverse affects on the kidneys, liver, and CNS. Symptoms include headache, nausea, dizziness, fatigue, muscular weakness, drowsiness, and in extreme cases, loss of consciousness.

Repeated or prolonged contact with the substance may cause removal of natural fat from the skin resulting in dryness, irritation, and possible non-allergic contact dermatitis. Solvents may also be absorbed through the skin. Splashes of the liquid in the eyes may cause irritation and soreness with possible reversible damage. See Section 2 for further details.

Inhalation: Fatal if inhaled. Causes damage to organs.

Eyes: Causes serious eye damage.

Skin: Toxic in contact with skin. May cause an allergic skin reaction. Causes severe skin burns and eye damage.

Ingestion: Harmful if swallowed.

5. FIRE-FIGHTING MEASURES

5.1 Extinguishing media

Dry chemical, foam, carbon dioxide, and water fog.

5.2 Special hazards arising from the substance or mixture

May form formaldehyde gas, carbon oxides, hydrogen, formic acid, and various hydrocarbons. Incomplete combustion may also produce irritating smoke and toxic or irritating gases or fumes.
Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Keep away from heat / sparks / open flames / hot surfaces – No smoking.
Use explosion-proof electrical / ventilation / lighting / equipment.
Do not breathe mist / vapors / spray.

5.3 Advice for fire-fighters

Wear positive pressure self-contained breathing apparatus (SCBA).
Wear chemical protective clothing that is specifically recommended by the manufacturer. It may provide little or no thermal protection in fire situations ONLY; It is not effective in spill situations where direct contact with the substance is possible.
Flammable / combustible material.
May be ignited by heat, sparks, or flames.
Vapors may form explosive mixtures with air.
Vapors may travel to source of ignition and flash back.
Most vapors are heavier than air. They will spread along the ground and collect in low, or confined areas (sewers, basements, tanks, etc.)
Vapor explosion hazard indoors, outdoors, or in sewers.
Those substances designated with a (P) may polymerize explosively when heated or involved in a fire.
Runoff to sewer may create fire or explosion hazard.
Containers may explode when heated.
Many liquids are lighter than water.
May cause toxic effects if inhaled or ingested / swallowed.
Contact with substance may cause severe burns to skin and eyes.
Fire will produce irritating, corrosive, and/or toxic gases.
Vapors may cause dizziness or suffocation.
Runoff from fire control or dilution water may cause pollution.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment, and emergency procedures

Water spray may reduce vapor, but may not prevent ignition in closed spaces.

6.2 Environmental precautions

Do not allow spills to enter drains or watercourses.
Use good personal hygiene practices. Wash hands before eating, drinking, smoking, or use of the toilet. Promptly remove soiled clothing and wash thoroughly before reuse.

6.3 Methods and material for containment and cleanup

Vapor is heavier than air and may flow along surface to distant ignition source and flash back.
CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper is not available or no answer to call, refer to appropriate telephone number listed on the inside back cover of ERG.
As an immediate precautionary measure, isolate spill or leak area for at least 50 meters (150 feet) in all directions.
Keep unauthorized personnel away.
Stay upwind.
Keep out of low areas.
Ventilate closed spaces before entering.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

See Section 2 for further details.

7.2 Conditions for safe storage, including any incompatibilities

Handle containers carefully to prevent damage and spillage.
Incompatible materials: Avoid contact with strong oxidizers / alkalis / mineral acids / phenol / urea.
See Section 2 for further details.

7.3 Specific end use(s)

No data available.

8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

8.1 Control parameters

Exposure

Ingredient / Chemical Designations	Source	Value
Formaldehyde	OSHA	TWA 0.75 ppm, STEL 2 ppm
CAS Number: 0000050-00-0	ACGIH	TWA 0.3 ppm Ceiling: 1 ppm S, A2, 1
	NIOSH	Ca TWA 0.016 ppm C 0.1 ppm (15 min)
	Supplier	No established limit
Methanol	OSHA	TWA 200 ppm (260 mg/m^3)
CAS Number: 0000067-56-1	ACGIH	TWA 200 ppm, STEL 250 ppm Skin
	NIOSH	TWA 200 ppm (260 mg/m^3), STEL 250 ppm (325 mg/m^3) Skin
	Supplier	No established limit
Phenol	OSHA	TWA 5 ppm (19 mg/m^3) Skin
CAS Number: 0000108-95-2	ACGIH	TWA 5 ppm Skin
	NIOSH	TWA 5 ppm (19 mg/m^3) C 15.6 ppm (60 mg/m^3) [15 min.] Skin
	Supplier	No established limit
Glycerine	OSHA	TWA 5 mg/m^3, STEL 15 mg/m^3
CAS Number: 0000056-81-5	ACGIH	TWA 10 mg/m^3
	NIOSH	No data available
	Supplier	No established limit

Carcinogen Data

Ingredient / Chemical Designations	Source	Value
Formaldehyde	OSHA	Select Carcinogen: Yes
CAS Number: 0000050-00-0	NTP	Known: Yes; Suspected: Yes
	IARC	Group 1: Yes; Group 2a, 2b, 3, 4: No
Methanol	OSHA	Select Carcinogen: No
CAS Number: 0000067-56-1	NTP	Known: No; Suspected: No
	IARC	Group 1, 2a, 2b, 3, 4: No
Phenol	OSHA	Select Carcinogen: No
CAS Number: 0000108-95-2	NTP	Known: No; Suspected: No
	IARC	Group 1, 2a, 2b, 4: No Group 3: Yes
Glycerine	OSHA	Select Carcinogen: No
CAS Number: 0000056-81-5	NTP	Known: No; Suspected: No
	IARC	Group 1, 2a, 2b, 3, 4: No

8.2 Exposure controls

Respiratory	Not necessary where area is properly ventilated.
Eyes	Wear safety eyewear; safety glasses, goggles, or visors to protect against splashing liquid.
Skin	Wear overalls which cover the body, arms, and legs. Skin should not be exposed. All parts of the body should be washed after contact. Wear PVC, vinyl, nitrile, or latex gloves.
Engineering Controls	Provide adequate ventilation. If the use of local exhaust ventilation is insufficient to maintain vapor levels below occupational exposure limits, suitable respiratory protection must be worn.
Other Work Practices	Use good personal hygiene. Wash hands before eating, drinking, smoking, or toileting. Promptly remove soiled clothing; wash thoroughly before reuse.

See Section 2 Precautionary Statements for further details.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	Clear, water-white liquid
Odor	Pungent
Odor threshold	No data available
pH	5.0 – 7.0
Melting pt. / freezing pt.	No data available
Initial boiling pt. and boiling range	90-92C (194-198^{o}F)
Flash point (TCC)	52-54C (126-129^{o}F)
Evaporation rate (Bu Acetate = 1)	Less than 1
Flammability (solid, gas)	Not applicable
Upper/Lower flammability or explosion limits	Lower explosive limit: 7% Upper explosive limit: 73%
Vapor pressure (Pa)	No data available
Vapor density	Greater than 1
Specific gravity	1.030-1.040
Solubility in water	Complete
Partition coefficient n-octanol/water (log Pow)	No data available
Auto-ignition temperature (C)	No data available
Decomposition temperature (C)	No data available
Viscosity (cps)	No data available

9.2 Other information

No other relevant information.

10. STABILITY AND REACTIVITY

10.1 Reactivity

Hazardous polymerization will not occur.

10.2 Chemical stability

Stable under recommended storage/handling conditions. May form formic acid and methanol at elevated temperatures.

10.3 Possibility of hazardous reactions

No data available.

10.4 Conditions to avoid

Avoid heat and open flame. Exposure to cold may form methylene oxide as a precipitant.

10.5 Incompatible materials

Avoid contact with strong oxidizers, strong alkalis, strong mineral acids, and urea.

10.6 Hazardous decomposition products

May form formaldehyde gas, carbon oxides, hydrogen, and formic acid. Incomplete combustion may also produce irritating smoke, and/or toxic vapors or gases.

11. TOXICOLOGICAL INFORMATION

Acute toxicity

Exposure to solvent vapor concentrations from the component solvents greater than the occupational exposure limits may result in adverse health effects such as mucous membrane and respiratory system irritation and adverse effects on kidneys, liver, and CNS. Symptoms include headache, nausea, dizziness, fatigue, muscular weakness, drowsiness, and in extreme cases, loss of consciousness.

Repeated or prolonged contact with the substance may cause removal of natural fat from the skin resulting in dryness, irritation, and possible non-allergic dermatitis. Solvents may also be absorbed through the skin. Splashes of liquid in the eyes may cause irritation and soreness with possible reversible damage.

Ingredient / Chemical Designations	Oral LD50 (mg/kg)	Skin LD50 (mg/kg)	Inhalation Vapor LD50 (mg/L/4hr)	Inhalation Dust/Mist LD50 (mg/L/4hr)	Inhalation Gas LD50 (ppm)
Formaldehyde CAS Number: 0000050-00-0	800.00, Rat - Category: 4	270.00, Rabbit - Category: 3	0.578, Rat - Category: 2	No data available	168.00, Rat - Category: N/A
Methanol CAS Number: 0000067-56-1	143.00, Human - Category: 3	15,800.00, Rabbit - Category: N/A	128.00, Rat - Category: N/A	No data available	64,000.00, Rat - Category: N/A
Phenol CAS Number: 0000108-95-2	317.00, Rat - Category: 4	630.00, Rabbit - Category: 3	No data available	No data available	No data available
Glycerine CAS Number: 0000056-81-5	12,600.00, Rat - Category: N/A	>10,000.00, Rabbit - Category: N/A	No data available	No data available	No data available

Item	Category	Hazard
Acute Toxicity (mouth)	4	Harmful if swallowed
Acute Toxicity (skin)	3	Toxic in contact with skin
Acute Toxicity (inhalation)	2	Fatal if inhaled
Skin Corrosion / Irritation	1B	Causes severe skin burns and eye damage
Eye Damage / Irritation	1	Causes serious eye damage
Sensitization (respiratory)	-	N/A
Sensitization (skin)	1	May cause an allergic reaction
Germ Toxicity	2	Suspected of causing genetic defects
Carcinogenicity	1B	May cause cancer
Reproductive Toxicity	-	N/A
Specific Target Organ Systemic Toxicity (single exposure)	1	Causes damage to organs
Specific Target Organ Systemic Toxicity (repeated exposure)	2	May cause damage to organs through repeated exposure
Aspiration Hazard	-	N/A

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxic to aquatic life with long lasting effects.

Aquatic Ecotoxicity

Ingredient / Chemical Designations	96 hr LC50 Fish (mg/l)	48 hr EC50 Crustacean (mg/l)	ErC50 Algae (mg/l)
Formaldehyde CAS Number: 0000050-00-0	1.41, Oncorhynchus mykiss	5.80, Daphnia pulex	0.788 (96 hr), Ulva pertusa
Methanol CAS Number: 0000067-56-1	100.00, Pimephales promelas	10,000.00, Daphnia magna	16.912 (96 hr), Ulva pertusa
Phenol CAS Number: 0000108-95-2	3.73, Oncorhynchus gorbuscha	3.29, Ceriodaphnia dubia	46.42 (96 hr), Pseudokirchneriella subcapitata
Glycerine CAS Number: 0000056-81-5	No data available	No data available	No data available

12.2 Persistence and degradability

No data available

12.3 Bioaccumulative potential

No data available

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

This product contains no PBT/vPvB chemicals

12.6 Other adverse effects

No data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Do not allow into drains or water courses. Wastes and emptied containers should be disposed of in accordance with regulations enacted under the Control of Pollution Act and the Environmental Protection Act.

Using information supplied within this SDS, advice should be obtained from the Waste Regulation Authority whether any special local municipal waste regulations apply.

14. TRANSPORTATION INFORMATION

14.1 Transport Classes

DOT (Domestic Surface Transportation)

DOT Proper Shipping Name: Flammable Liquid, Toxic, N.O.S. (Methanol)(Phenol)
UN Number: 1992
DOT Shipping Class: 3, 6.1
Packing Group: II

IMO / IMDG (Ocean Transportation)

IMDG Proper Shipping Name: Flammable Liquid, Toxic, N.O.S. (Methanol)(Phenol)
UN Number: 1992
IMDG Hazard Class: 3, 6.1
Packing Group: II

14.2 Environmental hazards

DOT: N/A

IMDG: Marine pollutant: Formaldehyde
Phenol

15. REGULATORY INFORMATION

Overview The data provided in this section includes select regulations, and is not inclusive of all regulations that may be applicable to this product. All ingredients of this product are listed on the TSCA Inventory, or are not required to be listed.

WHMIS Classification D2A E

US EPA Tier II Hazards

Fire:	Yes
Sudden Pressure Release:	No
Reactivity:	No
Immediate Health:	Yes
Delayed Health:	Yes

EPCRA 311/312 Chemicals and RQ (>0.1%)

Formaldehyde (100 lbs)
Methanol (5,000 lbs)
Phenol (1,000 lbs)

EPCRA 302 Extremely Hazardous (>0.1%)

Formaldehyde
Phenol

EPCRA 313 Toxic Chemicals (>0.1%)

Formaldehyde
Methanol
Phenol

Proposition 65 - Carcinogens (>0.1%)

Formaldehyde

Proposition 65 - Developmental Toxins (>0.0%)

None listed

Proposition 65 - Female Reproductive Toxins (>0.0%)

None listed

Proposition 65 - Male Reproductive Toxins (>0.0%)

None listed

NJ RTK Substances (>1.0%)

Formaldehyde
Methanol
Phenol
Glycerine

PA RTK Substances (>1.0%)

Formaldehyde
Methanol
Phenol
Glycerine

16. OTHER INFORMATION

All information contained herein is based upon data believed to be correct. However, no guarantee, expressed or implied, is made with respect to the information contained within. We accept no responsibility and disclaim all liability for any harmful effects which may be caused by exposure to this product. Users of this product must comply with all health and safety laws and regulations applicable.

The full text of the phrases appearing in section 3 is as follows:

H225 Highly flammable liquid and vapor
H301 Toxic if swallowed
H311 Toxic in contact with skin
H314 Causes severe skin burns
H317 May cause an allergic skin reaction
H331 Toxic if inhaled
H341 Suspected of causing genetic defects
H350 May cause cancer
H370 Causes damage to organs
H373 May cause damage to organs through prolonged or repeated exposure

This Safety Data Sheet was prepared using information provided by / obtained by Hydrol Chemical Company, Inc. The information is offered for your consideration and guidance when exposed to the product. Hydrol Chemical Company, Inc. expressly disclaims all expressed or implied warranty and assumes no responsibility for the accuracy or completeness of the data contained herein. The data in this SDS does not apply to use with any other product or in any other process as to the accuracy of and/or sufficiency of such information. This SDS may not be changed or altered in any way without the expressed knowledge and permission of Hydrol Chemical Company, Inc.

End of Document

Appendix G: Formaldehyde Safety Poster for the Laboratory

Provided to print and post in your lab

FORMALDEHYDE (CH_2O)

OTHER NAMES AND SOURCES

- formalin (formaldehyde in water)
- paraform (polymer of formaldehyde)
- methylene glycol (hydrated formaldehyde)
- methyl aldehyde

USES

On campus: fixation of animal or plant tissue, RNA analyses, and as a fumigant in biological cabinets and animal rooms

General uses: resins, plastics, textiles, disinfectant embalming agents, drug testing, photography, automotive industry

HAZARDS

Highly toxic to humans and wildlife if swallowed, inhaled, or comes in contact with skin.

Carcinogenic: May cause cancer and genetic defects.

Corrosive and irritant: Can cause severe skin burns and eye damage. Repeated exposures to low levels can cause sensitization, an allergic reaction due to prior contact.

REDUCE RISKS

May require medical monitoring. Contact URI Health Services prior to use if pregnant or other health concerns.

Never work alone. Read SDS before use.

Use only in a fume hood, well-ventilated area, or with a respirator. Contact URI EH&S for Respiratory Program information.

Wear goggles, gloves, lab coat, long pants and fully enclosed shoes.

Keep away from heat/sparks/open flame/hot surfaces - this is a combustible liquid.

Choose gloves appropriate to the hazard using...C_3D_2

Chemicals
Concentration
Contact Type
Duration
Dexterity

IN CASE OF EXPOSURE

Signs and Symptoms: watery eyes, burning sensation in eyes, nose, and throat; skin rashes, nausea, coughing, chest tightness, and allergic reaction.

Ensure there is a eyewash and safety shower within 10 seconds of the work area. Know locations before using CH2O.

If swallowed: Do not induce vomiting; rinse mouth with water and seek immediate medical assistance.

Skin exposure: Remove contaminated clothing, wash with soap and water. Seek immediate medical assistance.

If inhaled: Move the person to fresh air and seek medical attention by calling 911

Environmental Health and Safety | srm@etal.uri.edu | 401.874.7993