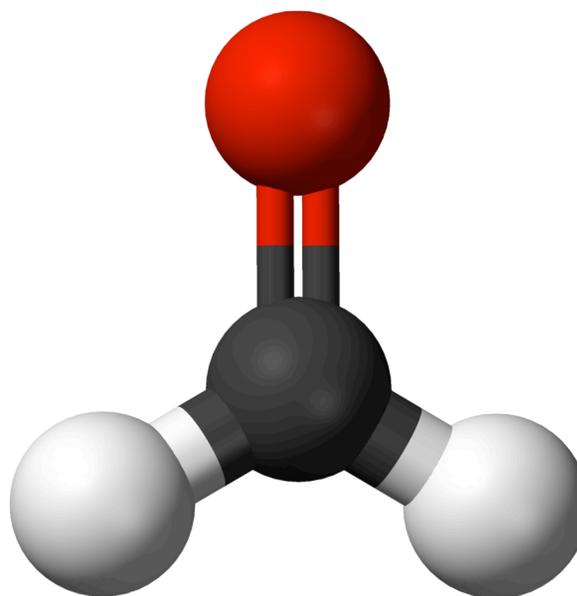


Formaldehyde Safety Training (C_003)

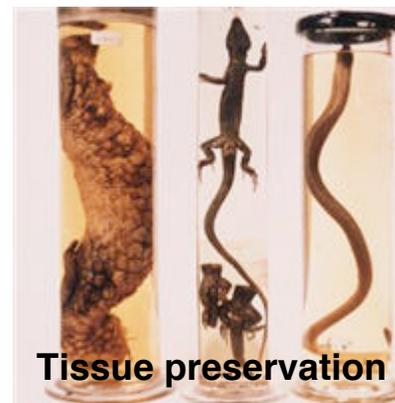


Kenneth L. Marshall
LLE Chemical Hygiene Officer

Exposure to formaldehyde can result in serious acute and chronic health effects

- **OSHA's Formaldehyde Standard (29 CFR 1910.1048) mandates procedures and protocols for working with formaldehyde beyond those outlined in the Chemical Hygiene Plan (CHP):**
 - **Special container labeling**
 - **Limits on amounts of formaldehyde stored, depending on concentration**
 - **Written spill control countermeasure plan in areas where formaldehyde is used**
 - **Protocols for decontamination of clothing**
 - **Medical surveillance for individuals exposed to airborne formaldehyde concentrations of 0.75 ppm (8 hr TWA) or 2-ppm (15 min STEL)**

Formaldehyde use is prevalent in industrial, commercial, academic, medical and residential environments



If formaldehyde is everywhere, why the concern?

Formaldehyde exposures above OSHA limits can result in serious health effects



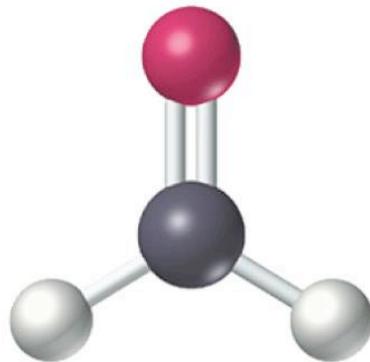
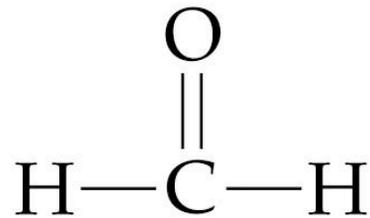
FEMA trailer: over 400 times the OSHA allowable limit for airborne formaldehyde concentration

- OSHA 8 hr TWA: 0.75 ppm
- OSHA STEL: 2-ppm (15 min interval)

Odor threshold: 1 ppm

- *Acute exposures (single event, high concentrations)*
 - eye and respiratory irritation
- *Chronic exposure (multiple exposures, low concentration)*
 - allergic sensitivity and cancer

Formaldehyde is a flammable gas that is most frequently used and supplied as a water-based solution



- Boiling pt: **-21 °C (gas)**
96 °C (37% in water)
- Flash pt: **140 °F**
- Explosion limits : **7-73% in air**
- Solubility in water: **37% by mass**



Synonyms: formalin, paraform, formic aldehyde, formal, and methanal

Inhalation effects for formaldehyde depend on its ambient concentration

Air concentration (ppm)	Health effects
0.5 - 2.0	Irritation of eyes, nose and throat
3.0 - 5.0	Tearing of eyes
10 – 20	Difficult breathing, coughing, burning sensation
25 – 30	Chest constriction, bronchitis, headache excessive thirst, weakness, palpitations, nausea, vomiting, severe respiratory tract injury (pneumonitis)
50 – 100	Pulmonary edema/inflammation - severe lower airway effects
> 100	Death

Chronic exposure can lead to headache, rhinitis, nausea, drowsiness, kidney inflammation, and memory loss

Serious skin and eye problems can result from formaldehyde exposure

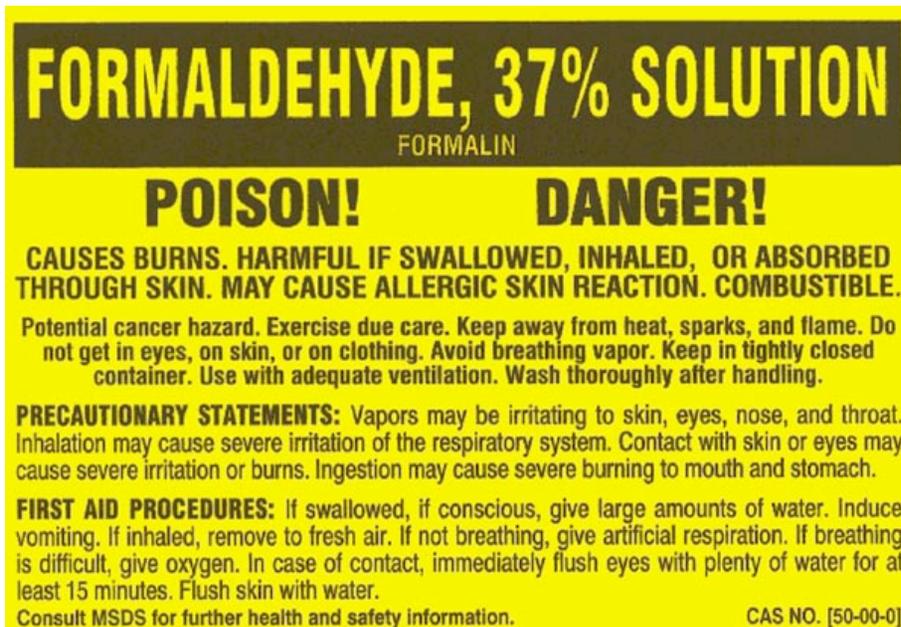


OSHA requires employees experiencing adverse health effects be removed from work areas where formaldehyde is present

- **Eye contact**
 - Airborne concentrations from 4-20 ppm may cause profuse tearing and damage to the eye
 - Contact with aqueous solutions may cause transient, minor injury and discomfort to severe permanent corneal clouding and loss of vision
- **Skin contact (solution)**
 - *Acute exposure:* irritation, white discoloration, roughness, and first degree burns
 - *Chronic exposure:* second degree burns, numbness, rash, fingernail damage, skin hardening or tanning, and sensitization

Special labeling is required for formaldehyde containers

- **Container labels must include:**



FORMALDEHYDE, 37% SOLUTION
FORMALIN

POISON! DANGER!

CAUSES BURNS. HARMFUL IF SWALLOWED, INHALED, OR ABSORBED THROUGH SKIN. MAY CAUSE ALLERGIC SKIN REACTION. COMBUSTIBLE.

Potential cancer hazard. Exercise due care. Keep away from heat, sparks, and flame. Do not get in eyes, on skin, or on clothing. Avoid breathing vapor. Keep in tightly closed container. Use with adequate ventilation. Wash thoroughly after handling.

PRECAUTIONARY STATEMENTS: Vapors may be irritating to skin, eyes, nose, and throat. Inhalation may cause severe irritation of the respiratory system. Contact with skin or eyes may cause severe irritation or burns. Ingestion may cause severe burning to mouth and stomach.

FIRST AID PROCEDURES: If swallowed, if conscious, give large amounts of water. Induce vomiting. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Flush skin with water.

Consult MSDS for further health and safety information. CAS NO. [50-00-0]

- For formaldehyde solutions in water the name “formaldehyde” and the solution concentration
- For mixtures of other materials with formaldehyde, the phrase “Contains formaldehyde”
- The warning term “carcinogen” or “cancer hazard”
- All other health hazards associated with formaldehyde exposures

The OSHA Formaldehyde Standard limits formaldehyde container size to minimize the severity of a spill

Formaldehyde concentration	Container size limit
10%	5 gallons
37%	1 gallon

- **Secondary containment is required for all formaldehyde storage**

Containers must have tight-fitting lids to prevent the release of formaldehyde to the work area

Engineering controls

Effective engineering controls must be used to keep formaldehyde concentrations below OSHA exposure limits



- **Medical surveillance required for individuals exposed to airborne formaldehyde concentrations of:**
 - **0.75 ppm (8 hr TWA¹) or**
 - **2 ppm (15 min STEL²)**

¹ *Time-weighted average*

² *Short-term exposure limit*

All operations at LLE involving formaldehyde MUST be conducted in a laboratory fume hood to avoid exceeding exposure limits and eliminate the need for medical surveillance

PPE

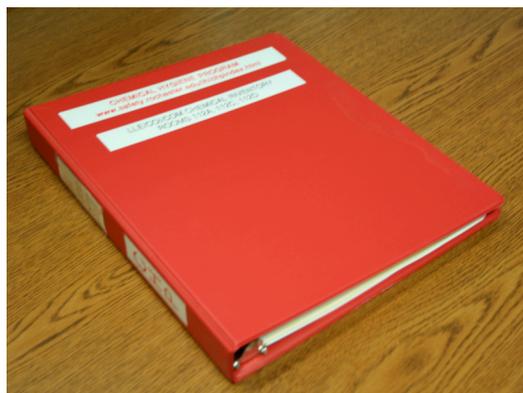
The level of PPE required for working with formaldehyde depends on both the amount of material and the process it is used in



- Laboratory operations (< 1000 ml):
 - Safety goggles
 - Butyl or nitrile gloves (**NOT LATEX**)
 - Lab coat with sleeves
- Larger quantities (or if significant splash hazard exists):
 - Full face shield
 - Rubber apron, protective sleeves
 - Rubber boots

Consult the MSDS sheet or the LLE Chemical Hygiene Officer for additional specific guidance on PPE requirements

All laboratories and facilities where formaldehyde is used must have a documented spill control plan



- **LLE CHP binder**
 - **UR Hazard Communication Program for Formaldehyde Exposures in the Workplace**
 - **UR Formaldehyde Spill Control Plan**
 - **Plan for dealing with formaldehyde-contaminated clothing**
- **Information also available in electronic format at:**

www.safety.rochester.edu/ih/FormaldResearch.html

A copy of the spill control plan must be available in areas where formaldehyde is used

Formaldehyde-contaminated clothing must be decontaminated or disposed of as hazardous waste



- OSHA requires each facility to have a plan for processing or disposal of formaldehyde contaminated clothing.
- UR EHS has developed the following procedure for formaldehyde-contaminated clothing:
 1. Remove contaminated clothing and place in a sealable plastic bag
 2. Wash the affected body part off
 3. Call EH&S at x5-3241
- EH&S will either dispose of the clothing, or wash it and return it to you

DO NOT attempt to launder or clean the clothing yourself !

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