

Formaldehyde: Hazards and Precautions

Audience: University of Connecticut Laboratory Personal
Campus Covered: All
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Formaldehyde (also called formic aldehyde or methyl aldehyde) is used as a tissue preservative or organic chemical reagent. Formaldehyde itself is a colorless gas, but it is more commonly purchased and used in aqueous solution (called formalin solution), with a maximum concentration of 40%. Formalin solutions often contain some amount of methanol as well. Both formaldehyde gas and solutions have a characteristic pungent, unpleasant odor.

Health Hazards

When present in the air at a concentration above 0.1 parts per million, formaldehyde can cause watery eyes, nausea, coughing, chest tightness, wheezing, skin rashes, allergic reactions, and burning sensations in the eyes, nose, and throat. Formaldehyde has been shown to cause cancer in laboratory animals and may cause cancer in humans. It is also a possible mutagen and teratogen. It is highly toxic if swallowed, inhaled, or absorbed through skin or mucous membranes.

Formaldehyde reacts vigorously with oxidizers and, at its highest concentrations, is a combustible liquid. In addition, formaldehyde reacts with hydrochloric acid (HCl) to produce bis (chloromethyl) ether vapor, a very potent carcinogen.

Eye and Skin Exposure

Formaldehyde is corrosive, and the eyes are especially vulnerable. An air concentration of two parts per million (2 ppm) is quickly irritating to the eyes, and 20 ppm can cause permanent clouding of the cornea after only one exposure. Formaldehyde is also a sensitizing agent. Subsequent exposures can produce symptoms more quickly and at lower concentrations. Symptoms of exposure may include coughing, eye or skin irritation, allergic reactions, vomiting, and diarrhea.

Safety Precautions for Formaldehyde Use

Employees who handle formaldehyde must be familiar with the hazards of formaldehyde and what to do in case of an exposure or spill. A Material Safety Data Sheet (MSDS) for formaldehyde should always be kept in the work area where formaldehyde is being used. The MSDS and this Fact Sheet are excellent tools for training employees on the hazards of formaldehyde. MSDSs are available from the web site www.ehs.uconn.edu.

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Exposure Monitoring

Exposure monitoring may be required to ensure that employees are not over-exposed. Contact EH&S (486 - 3613) for assistance in determining exposure monitoring needs in your laboratory if you work with formaldehyde.

Ventilation

Formaldehyde should always be used with adequate ventilation, preferably in a fume hood, to minimize inhalation of vapor.

Eye Protection

Always use chemical goggles or a face shield when handling formaldehyde to minimize the risk of even a small splash or vapor exposure to the corneas.

Body Protection

Wear a laboratory coat and never wear shorts or open-toed shoes when handling formaldehyde.

Gloves

Medium or heavyweight nitrile, neoprene, natural rubber, or PVC gloves should be worn when handling concentrated formaldehyde. Disposable (exam) nitrile gloves may be used when handling dilute concentrations (10% or less). If you have questions about selecting gloves, contact an industrial hygienist at EH&S (486 - 3613). Gloves that have not been contaminated with formaldehyde may be discarded in the regular trash. Disposable gloves contaminated with formaldehyde must be thoroughly rinsed before being discarded in the regular trash. Heavily contaminated gloves must be disposed of as chemical waste.

Safe Work Practices

Be sure that formaldehyde solutions are clearly labeled with the chemical's name and hazards. As with any laboratory chemical, do not mouth pipette formaldehyde solutions. Do not eat, drink, or smoke where formaldehyde is handled, processed, or stored, since the chemical

can be swallowed. Always wash hands thoroughly after using formaldehyde, even if gloves are worn.

Storage

Store formaldehyde in labeled, chemically compatible containers, away from heat and flame. Always place large-volume containers on a low, protected shelf or in another location where they will

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not be accidentally spilled or knocked over. Containers larger than 4L (1 gallon) should be stored inside a deep pan or other secondary containment. Do not store formaldehyde bottles in any area where a leak would flow to a drain.

Waste Disposal

Place formaldehyde waste in a chemically compatible container with a sealed lid and label clearly. Complete a Hazardous waste tag and call EH&S (486 – 3613). All biological materials preserved in formaldehyde must also be disposed of in this manner, not in medical waste containers. Drain disposal of dilute aqueous solutions containing formaldehyde is permitted to the limit of 100 grams of solute per laboratory per day (for example, 1 liter of 10% formalin, or 10 liters of 1% formalin). This limit applies only as long as no other hazardous chemical is present in the solution. Call EH&S (486 - 3613) if you need tags or have questions about the disposal of formaldehyde waste.

Formaldehyde Spills

If formaldehyde is spilled outside a chemical fume hood, evacuate the area, close the laboratory doors, and post the area to prevent others from entering. If the incident occurs during regular work hours (Monday to Friday, 8 a.m. to 5 p.m.), call 911 for assistance in cleaning up the spill. After hours, call 911. Provide information or other assistance to emergency responders as requested.

Splash of Formaldehyde to Eyes or Skin

For eye or skin exposure, immediately flush with plenty of water for at least 15 minutes. Remove contaminated clothing and contact 911. In case of ingestion, call 911 for immediate medical attention. As with all accidents, report any exposure as soon as possible to your supervisor.

EH&S Can Help

EH&S staff are available to train your employees on the hazards and precautions of working with formaldehyde. We can also perform exposure monitoring in your workplace. Material Safety Data Sheets about formaldehyde-containing products are available on the EH&S web site.

