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Published on UC Davis Safety Services (http://safetyservices.ucdavis.edu)

Guidelines for Handling Formaldehyde

SafetyNet #: 139

What is Formaldehyde?

Formaldehyde is a colorless, flammable gas at room temperature with a characteristic pungent odor. It has been used by both clinical diagnostic and research laboratories as a preservative or tissue fixative for over a century and as a chemical reagent. It is most commonly dissolved in water or water/methanol at 37-40% solution. Paraformaldehyde, a solid, is a precursor to formaldehyde. Both are capable of releasing formaldehyde gas. The terms formaldehyde and formalin are often used interchangeably, but there are important differences in their concentrations. A fixative labeled 10% buffered formalin is actually a 4% solution of formaldehyde (i.e., a 10% solution made from a 37-40% solution of formaldehyde).

Symptoms of Exposure

Because formaldehyde is very water soluble it affects the mucous membranes. The effects of formaldehyde exposure can vary from person to person. Eye irritation, skin irritation and respiratory irritation are typical acute exposure effects. Long-term, chronic exposure effects may include cancers of the lung, nasopharyngeal and oropharynx, and nasal passages. Formaldehyde is listed as a reproductive toxin by the US Department of Energy, Office of Science [1].

Because of formaldehyde's hazards, including human carcinogenicity, Cal/OSHA has enacted specific regulations (Title 8, California Code of Regulations, Section 5217) regarding its safe handling. The following elements must be included in a formaldehyde safety program:

- A laboratory-specific Standard Operating Procedure (template attached) for the use of formalin / formaldehyde must be developed.
- Employees who handle formaldehyde must receive documented training on the hazards of formaldehyde and what to do in case of an exposure or spill.
- Exposure monitoring may be required to ensure that employees are not over-exposed.
- Formaldehyde should always be used with adequate ventilation, preferably in a fume hood, to minimize inhalation of formaldehyde vapor.

Employee Information and Training

Employees who handle formaldehyde must receive documented training on the hazards of formaldehyde and what to do in case of an exposure or spill. A Safety Data Sheet (SDS) for formaldehyde should be kept in the work area where formaldehyde is being used. The SDS and this SafetyNet are excellent tools for training

employees on the hazards of formaldehyde. SDSs are available from EH&S website. A formaldehyde Standard Operating Procedure template and training record sheet are provided to help you comply with the documentation and training requirements.

- **Standard Operating Procedure Template** [2]

Exposure Monitoring

Contact EH&S for assistance in determining exposure monitoring needs in your laboratory if you work with formaldehyde.

Ventilation

Formaldehyde should always be used in a chemical fume hood, with spot (snorkel) ventilation or in an enclosure exhausted to the outside of the building. Re-circulating clean benches or bio-safety cabinets are not appropriate for the use of formaldehyde.

Eye Protection

Always use chemical splash goggles 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 appropriate footwear that covers the entire foot.

Gloves

Medium or heavyweight nitrile, neoprene, natural rubber, or PVC gloves should be worn when handling concentrated formaldehyde. Disposable nitrile gloves may be used when handling dilute concentrations (10% or less). If you have questions about selecting gloves, contact EH&S. Heavily contaminated gloves must be disposed as chemical hazardous waste.

Respiratory Protection

It may be determined that respiratory protection is required (or even if not required, it may be desired) to conduct work with formaldehyde. Work with your Supervisor and EH&S (752-3734) to determine if a respirator is warranted for this work.

Safe Work Practices

Be sure that formaldehyde solutions are clearly labeled with the chemical name and hazards. As with any laboratory chemical, do not mouth-pipette formaldehyde solutions. Do not eat, drink, or apply cosmetics where formaldehyde is handled, processed, or stored, since the chemical can be ingested or 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 not be accidentally

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

Waste Management

Please see Safety Nets #8 [3], #34 [4] and #43 [5] for guidance on disposal of formaldehyde.

Contact

Hazardous Materials & Waste Management

hazwaste@ucdavis.edu 530-754-5058
FAX: 530-752-4527

More information

/health-safety-hazardous-materials-waste-staff-listing [6]

Related content

1. Identification and Segregation of Chemical Waste
2. Managing Chemical Waste Streams To Reduce Disposal Cost
3. Guidelines for Disposal of Chemical Waste

Source URL (modified on 01/07/16 02:07am): http://safetyservices.ucdavis.edu/safetynet/guidelines-handling-formaldehyde

Links

[1] http://www.aps.anl.gov/Safety_and_Training/User_Safety/acutetoxic.html
[2] http://safetyservices.ucdavis.edu/snfn/safetynets/snml/sn139/SOP%20-%20formaldehyde.doc
[3] http://safetyservices.ucdavis.edu/safetynet/guidelines-disposal-chemical-waste
[4] http://safetyservices.ucdavis.edu/safetynet/managing-chemical-waste-streams-reduce-disposal-cost
[5] http://safetyservices.ucdavis.edu/safetynet/identification-and-segregation-chemical-waste
[6] http://safetyservices.ucdavis.edu/health-safety-hazardous-materials-waste-staff-listing