



December 2011 Safety Topic of the Month

Formaldehyde

Formaldehyde is well known as a preservative in research laboratories, as an embalming fluid, and as a sterilizer. Urea-formaldehyde (UF) and phenol formaldehyde (PF) resins are also used in foam insulations, as adhesives in the production of particle board and plywood, and in the treating of textiles.

Although the term formaldehyde describes various mixtures of formaldehyde, water, and alcohol, the term "formalin" is used to describe a saturated solution of formaldehyde dissolved in water with another agent, most commonly methanol which is added to stabilize the solution. Formalin is typically 37% formaldehyde by weight (40% by volume) and 6-13% methanol by volume in water. A typical laboratory formulation is called 10% buffered formalin solution. It contains about 3.7% formaldehyde, 1.5% methanol, 2 % buffers, and about 93% water. The formaldehyde component provides the disinfectant and preservative effects of formalin.

The *National Toxicological Program's (NTP) 12th Report on Carcinogens* classifies formaldehyde as "known to be a human carcinogen". It has been reported to cause nasal tumors. Formaldehyde is a sensitizing agent that can cause an immune system response upon initial exposure. Acute exposure is highly irritating to the eyes, nose, and throat and can make anyone exposed cough and wheeze. Subsequent exposure may cause severe allergic reactions of the skin, eyes and respiratory tract and can lead to olfactory fatigue, defined as the inability to discern the odor of formaldehyde. Ingestion of formaldehyde can be fatal, and long-term exposure to low levels in the air or on the skin can cause asthma-like respiratory problems and skin irritation such as dermatitis and itching. The National Institute for Occupational Safety and Health (NIOSH) considers 20 ppm of formaldehyde to be immediately dangerous to life and health (IDLH).

Safe Handling Procedures

All laboratories that work with formaldehyde must have a written Standard Operating Procedure (SOP).

All work with formaldehyde should be conducted in a well ventilate space such as a fume hood or under a properly designed and installed exhaust system to prevent exposure by inhalation

Splash goggles and impermeable gloves (nitrile, PVC, butyl rubber, Viton) should be worn to prevent eye and skin contact.

Formaldehyde should be used only in areas free of ignition sources.

Containers of formaldehyde should be stored in secondary containers in areas separate from oxidizers and bases.

An eyewash and safety shower should be available if splashing of formaldehyde is likely.

All procedures using formaldehyde are to be performed in designated areas. There is a space on the laboratory hazard communication door sign to designate the formaldehyde. All designated areas should be posted with a sign that contains the following information:

WARNING
DESIGNATED AREA FOR HANDLING THE FOLLOWING
SUBSTANCES WITH HIGH ACUTE OR CHRONIC TOXICITY:
Formaldehyde – Carcinogen
AUTHORIZED PERSONNEL ONLY

Discussion Topics

- 1) Review and document formaldehyde handling and transfer procedures. Look for ways to minimize risk of exposure.
- 2) Review less toxic alternatives to formaldehyde use such as using ethanol for preservation.
- 3) Are all areas where formaldehyde is used posted as designated areas?
- 4) The EHS office has colorimetric badges available for evaluating formaldehyde exposure. Contact the EHS office for procedures involving formaldehyde that are conducted outside of a fume hood where exposure monitoring may be necessary.

References

Prudent Practices - http://www.nap.edu/catalog.php?record_id=12654

OSHA Safety and Health Topics - <http://www.osha.gov/SLTC/formaldehyde/>

Iowa State University Formaldehyde Training Booklet -
<http://www.ehs.iastate.edu/publications/manuals/formaldehyde.pdf>