OSHA® FactSheet

Formaldehyde

Formaldehyde is a colorless, strong-smelling gas often found in aqueous (water-based) solutions. Commonly used as a preservative in medical laboratories and mortuaries, formaldehyde is also found in many products such as chemicals, particle board, household products, glues, permanent press fabrics, paper product coatings, fiberboard, and plywood. It is also widely used as an industrial fungicide, germicide and disinfectant.

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, typically with another agent, most commonly methanol, added to stabilize the solution. Formalin is typically 37% formaldehyde by weight (40% by volume) and 6-13% methanol by volume in water. The formaldehyde component provides the disinfectant effects of formalin.

What Employers Should Know

The OSHA Formaldehyde standard (29 CFR 1910.1048) and equivalent regulations in states with OSHA-approved state plans protects workers exposed to formaldehyde and apply to all occupational exposures to formaldehyde from formaldehyde gas, its solutions, and materials that release formaldehyde.

- The permissible exposure limit (PEL) for formaldehyde in the workplace is 0.75 parts formaldehyde per million parts of air (0.75 ppm) measured as an 8-hour time-weighted average (TWA).
- The standard includes a second PEL in the form of a short-term exposure limit (STEL) of 2 ppm which is the maximum exposure allowed during a 15-minute period.
- The action level – which is the standard's trigger for increased industrial hygiene monitoring and initiation of worker medical surveillance – is 0.5 ppm when calculated as an 8-hour TWA.

Harmful Effects on Workers

Formaldehyde is a sensitizing agent that can cause an immune system response upon initial exposure. It is also a cancer hazard. 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. 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. Concentrations of 100 ppm are immediately dangerous to life and health (IDLH).

Note: The National Institute for Occupational Safety and Health (NIOSH) considers 20 ppm of formaldehyde to be IDLH.

Routes of Exposure

Workers can inhale formaldehyde as a gas or vapor or absorb it through the skin as a liquid. They can be exposed during the treatment of textiles and the production of resins. In addition to healthcare professionals and medical lab technicians, groups at potentially high risk include mortuary workers as well as teachers and students who handle biological specimens preserved with formaldehyde or formalin.

How Employers Can Protect Workers

Airborne concentrations of formaldehyde above 0.1 ppm can cause irritation of the respiratory tract. The severity of irritation intensifies as concentrations increase.

Provisions of the OSHA standard require employers to do the following:

- Identify all workers who may be exposed to formaldehyde at or above the action level or STEL through initial monitoring and determine their exposure.

- Reassign workers who suffer significant adverse effects from formaldehyde exposure to jobs with significantly less or no exposure until their condition improves. Reassignment may continue for up to 6 months until the worker is determined to be able to return to the original job or to be unable to return to work – whichever comes first.
- Implement feasible engineering and work practice controls to reduce and maintain worker exposure to formaldehyde at or below the 8-hour TWA and the STEL. If these controls cannot reduce exposure to or below the PELs, employers must provide workers with respirators.
- Label all mixtures or solutions composed of greater than 0.1 percent formaldehyde and materials capable of releasing formaldehyde into the air at concentrations reaching or exceeding 0.1 ppm. For all materials capable of releasing formaldehyde at levels above 0.5 ppm during normal use, the label must contain the words "potential cancer hazard."
- Train all workers exposed to formaldehyde concentrations of 0.1 ppm or greater at the time of initial job assignment and whenever a new exposure to formaldehyde is introduced into the work area. Repeat training annually.
- Select, provide and maintain appropriate personal protective equipment (PPE). Ensure that workers use PPE such as impervious clothing, gloves, aprons, and chemical splash goggles to prevent skin and eye contact with formaldehyde.
- Provide showers and eyewash stations if splashing is likely.
- Provide medical surveillance for all workers exposed to formaldehyde at concentrations at or above the action level or exceeding the STEL, for those who develop signs and symptoms of overexposure, and for all workers exposed to formaldehyde in emergencies.

Recordkeeping Requirements

Employers are required to do the following regarding worker exposure records:

- Retain exposure records for 30 years.
- Retain medical records for 30 years after employment ends.
- Allow access to medical and exposure records to current and former workers or their designated representatives upon request.

Additional Information

For more information on this, and other health-related issues affecting workers, visit OSHA's web site at www.osha.gov.

This is one in a series of informational fact sheets highlighting OSHA programs, policies or standards. It does not impose any new compliance requirements. For a comprehensive list of compliance requirements of OSHA standards or regulations, refer to Title 29 of the Code of Federal Regulations. This information will be made available to sensory-impaired individuals upon request. The voice phone is (202) 693-1999; the teletypewriter (TTY) number is (877) 889-5627.

For assistance, contact us. We can help. It's confidential.

OSHA® Occupational Safety and Health Administration
www.osha.gov 1-800-321-6742

DSG 4/2011