CAUT Health and Safety Fact Sheet

Formaldehyde

ISSUE 26

Formaldehyde is a colourless, strong-smelling gas used as a preservative, industrial fungicide, germicide and disinfectant. Used in a liquid form, it is known as formalin. In a solid form, it is known as para-formaldehyde.

The Canadian Centre for Occupational Health and Safety (CCOHS) notes that "Formaldehyde is VERY TOXIC….. is a CANCER HAZARD – it can cause cancer, and it is a POSSIBLE MUTAGEN…"[1].

In its 2002 Fact Sheet – *Formaldehyde, how formaldehyde can harm workers*, the Occupational Safety and Health Administration (OSHA) of the US Department of Labour alerts employers that formaldehyde is "…a sensitizing agent that can cause an immune system response on initial exposure…a suspected human carcinogen that is linked to nasal cancer and lung cancer."

IARC, the International Agency for Research on Cancer classifies formaldehyde as carcinogenic to humans (Group 1).

In universities and colleges, academic staff and other campus workers are exposed through a wide range of direct and non-direct means, from handling it in research laboratories to being exposed through books treated for fungus in the libraries. Archeologists and their students are exposed[2] when excavating historical cemeteries containing bodies embalmed with formaldehyde. Formaldehyde is also known to contaminate ground water near cemeteries where bodies have been treated with it.

If your work may expose you to formaldehyde, it will be important to know its hazards and how to protect yourself. Consult with your workplace Joint Health & Safety Committee (JHSC) to see if there are safer substitutes, or if you must come into contact with it, how to handle it safely.

Exposure can occur through a wide range of direct and non-direct means, from laboratories to books treated for fungus in libraries

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Also Known As

Formaldehyde solutions are also known as formalin, formic aldehyde, methaldehyde, methanal, methyl aldehyde, methylene oxide, oxomethane, and oxymethylene.

Uses

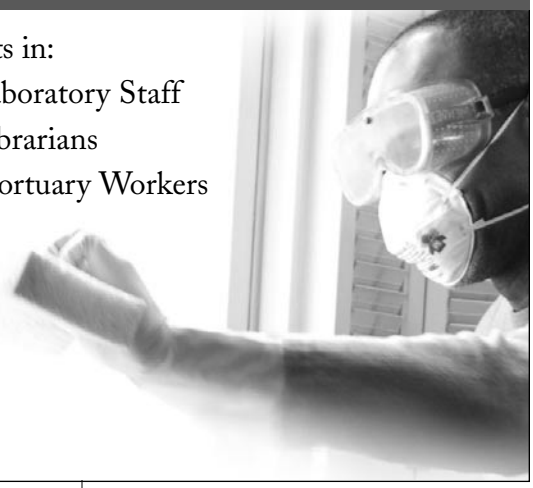
- in histopathology to preserve tissue specimens and embalming fluids
- in photographic industry as a film hardener
- metal industry as a corrosion inhibitor
- textiles finishing agents
- paper preservative
- dyes and tanning agents
- fire-retardant fabrics
- surface-active agents
- processing aids
- dispersion and plastics precursors
- extraction agents
- perfumes
- vitamins and drugs
- as an anti-bacteriostatic for cheese, sugar and flavourings
- used in agriculture for seed treatment, soil disinfection, insecticide and fumigant, and antimicrobial for slow-release fertilizers and animal feeds

Who's at risk?*

Academic staff and students in:

- Agriculture
- Archeology
- Cleaning and maintenance staff
- Fine Arts (photography, textiles)
- Healthcare
- Instructors
- Laboratory Staff
- Librarians
- Mortuary Workers

* not an exhaustive list



Exposure

Formaldehyde is a normal intermediate metabolite that is found in all cells. It does not accumulate in tissue and has a half-life of 90 seconds in blood. It is very reactive, bonds easily to proteins and nucleic acids, and metabolizes rapidly to formic acid (excreted in the urine), converts to carbon dioxide (exhaled), and synthesizes proteins and nucleic acids.

Exposure can occur through the following:

- inhaled as a gas or vapour (bronchitis, pulmonary edema, pneumonitis, pneumonia, death)
- absorbed through the skin or eye as a liquid (dermatitis, eye burns, permanent corneal opacification, loss of vision)
- sensitizing agent on initial contact
- subsequent exposures may cause severe allergic reactions
- long-term exposure can cause asthma-like respiratory problems, dermatitis and itching
- potential occupational carcinogen (nasal, nasopharyngeal and lung)

Ingestion causes corrosive burning of mouth, throat, and digestive tract with vomiting of tissue and blood. Ingested formaldehyde converts to formic acid, causing metabolic acidosis, liver and kidney damage, and jaundice and swelling of body tissues. Convulsions, central nervous system depression and death can follow.

Working Safely

It is crucial to take a proactive approach on how to safely handle and work with formaldehyde. Your employer must provide a safe working environment, including training on any workplace hazards. Ensure that you have received your Workplace Hazardous Materials Information System (WHMIS) training, with Needs-Specific training for this chemical. Contact your employer or JHSC for training and equipment before using this chemical.

Important steps

- adhere to Material Safety Data Sheet precautions and comply with applicable regulations
- extremely flammable - avoid using near open flames, heat,

hot surfaces, sparks and other ignition sources
- for large-scale work, consider installing leak and fire detection equipment with a suitable, automatic fire suppression system
- use non-sparking ventilation systems, approved explosion-proof equipment and intrinsically safe electrical systems in areas of use
- post No Smoking signs
- unprotected persons should avoid all contact
- if formaldehyde is released, immediately put on an appropriate respirator and leave the area
- immediately report spills, leaks and ventilation failures
- use closed handling systems for processing
- use in well-ventilated areas, away from storage areas
- avoid generating mists
- label and regularly inspect containers, keeping tightly sealed when not in use
- empty containers may contain hazardous residues
- inspect containers for damage or leaks before handling
- use containers recommended by the manufacturer
- carefully dispense into containers made of compatible materials
- use corrosion-resistant transfer equipment when dispensing
- use manufacturer's/supplier's advice on venting of drums, and contact immediately for handling instructions if drums appear swollen
- never weld, cut, solder, drill or do other hot work on an empty container or piping until all liquid, gases and vapours have been cleared
- have emergency equipment for fires, spills and leaks immediately available
- be aware of signs and symptoms of poisoning and first aid procedures
- signs of illness should be reported immediately to supervisor
- seek medical attention for all exposures

Protection & Prevention[3]

The employer must ensure that workplace assessment and hazard control protocols are in place that meet or exceed regulatory requirements. They should work with the JHSC to:
- identify all workers who may be exposed
- implement engineering and work practice controls
- maintain exposure levels at or below the 8 hour TWA and STEL
- train all workers who may be exposed
- training should be repeated annually
- provide and maintain appropriate personal protective equipment (PPE)[4]
  * for respirators, refer to CSA Standard Z94.4-93, "Section, Care and Use of Respirators"
- provide showers and eyewash stations

- provide medical surveillance for all workers exposed at or above PELs
- retain worker exposure records for 30 years
- retain worker medical records for 30 years
- allow access to medical and exposure records by current and former workers or their designate upon their request

Safer substitution products should be used when available.

The employer should work with the JHSC to provide and maintain appropriate personal protective equipment

First Aid

Ensure your own safety FIRST and call for appropriate assistance. Some of the following procedures require advanced first aid training. Work with your JHSC to ensure training is provided and routinely reviewed.

Inhalation

- wear appropriate protective equipment and use the buddy system
- remove source of contamination or move victim to fresh air
- if breathing is difficult, trained personnel should administer oxygen
- keep victim quiet and still
- transport to emergency facilities immediately (pulmonary edema can be delayed up to 48 hours after exposure)

Skin

- avoid direct contact
- wear protective chemical clothing if necessary
- remove contaminated clothing, shoes and leather products (watchbands, belts)
- flush continuously with luke-warm, gently flowing water for at least 30 minutes
- transport to emergency facilities immediately
- double bag, seal and label contaminated clothing for safe disposal

Eyes

- flush with lukewarm, gently flowing water for at least 30 minutes, holding eyelid(s) open
  * Do not interrupt flushing
- do not rinse contaminated water onto unaffected eye or face
- transport to emergency facilities immediately

Ingestion

- never give anything by mouth if victim is losing consciousness, is unconscious or convulsing
- rinse mouth thoroughly with water
- do not induce vomiting
- if vomiting occurs, rinse mouth with water
- transport to emergency facilities immediately

CAS No. 50-00-0
Formula HCHO

Permissible Exposure Limits (PELs):

0.75ppm/8 hour TWA (time weighted average)

2 ppm/15 minute STEL (short term exposure level)

Permissible does not mean safe!

Resources

AFSCME, Formaldehyde www.afscme.org

CCOHS, OSH Answers, Cancer Sites Associated with Occupational Exposures www.ccohs.ca

CCOHS, OSH Answers, Formaldehyde www.ccohs.ca

CCOHS, Health & Safety Report, Volume 6, Issue 3 – March 2008, Breathing Easy at Work: Basic Information on Formaldehyde Solutions www.ccohs.ca

CDC/NIOSH: Criteria For a Recommended Standard: Occupational Exposure to Formaldehyde, December 1976; Worker Notification Program, Embalming Students; Pocket Guide, Formaldehyde; Occupational Health & Safety Guideline for Formaldehyde, Potential Human Carcinogen www.cdc.gov.niosh

CUPE, What is Indoor Air Quality? CUPE.ca

Exposure among Industrial Workers Is Associated with Increased Risk of Cancers of the Blood and Lymphatic System; Formaldehyde and Cancer Risk www.cancer.gov

Health Canada, Environmental and Workplace Health, Priority Substances List Assessment Report for Formaldehyde www.hc-sc.gc.ca

National Cancer Institute, U.S. National Institutes of Health; Formaldehyde www.cancer.gov

OSHA, U.S. Department of Labour 2002, OSHA Fact Sheet, Formaldehyde www.osha.gov

Vermont Department of Environmental Conservation, Air Pollution Control Division www.anr.state.vt.us

Notes

1 CCOHS – OSH Answers, 1-Basic Information on Formaldehyde Solutions

2 Risky Business: Potential Hazards in the Archeological Investigation of Historic Cemeteries www.crai-ky.com/education/reports/cem-hazards.html

3 CDC/NIOSH OSHA Fact Sheet - Formaldehyde

4 CCOHS, Formaldehyde Solutions, 5 – Personal Protective Equipment Information for Formaldehyde Solutions