

APPENDIX 5-C

FORMALDEHYDE FACT SHEET

The Occupational Health and Safety Administration (OSHA) has established a chemical specific standard to protect employees from overexposure to formaldehyde in the workplace. This document provides information on the potential health effects of formaldehyde exposure and on the requirements of the OSHA Formaldehyde Standard, 29 CFR 1910.1048, as they apply to the College. This information is provided to both employees and students who may be exposed to formaldehyde in the laboratory to increase awareness of the hazards of formaldehyde overexposure and of appropriate precautions to avoid overexposure. The precise hazards associated with exposure to formaldehyde depend both on the form (solid, liquid, or gas) of the material and the concentration of formaldehyde. For example, 37-50 percent solutions of formaldehyde present a much greater hazard to the skin and eyes from spills or splashes than solutions containing less than one percent formaldehyde.

Chemical Name: Formaldehyde

Chemical Family: Aldehyde

Chemical Formula: HCHO

Molecular Weight: 30.03

Chemical Abstract Service Number (CAS#): 50-00-0

Synonyms: formalin (37% solution), formic aldehyde, paraform, methyl aldehyde, methylene glycol, methylene oxide, tetraoxymethalene, oxomethane, oxymethylene

Description: as a gas, strong pungent odor, vapor density 1.067 (air=1), soluble in water and alcohol

Description: as a solution (37%), colorless liquid, pungent odor, specific gravity 1.08 (H₂O=1), vapor density 1.04 (air=1), odor threshold 0.8-1 ppm

Fire and Explosion Hazard: as a solution (37%), flash point 185°F, lower explosion limit 7%, upper explosion limit 73%; auto ignition temperature 806°F; aqueous solutions often contain methanol as an inhibitor increasing the fire hazard

Extinguishing media: use dry chemical, carbon dioxide or water

Reactivity: Formaldehyde solutions may self-polymerize to form para-formaldehyde

Incompatible Materials: strong oxidizing agents (violent reaction), caustics, strong alkalies,

isocyanates, anhydrides, oxides and inorganic acids; reacts with hydrochloric acid to form the potent carcinogen, bis-chloromethyl ether; reacts with nitrogen dioxide, nitromethane, perchloric acid, and aniline, or peroxyformic acid to yield explosive compounds

Health Hazard Data

Permissible Exposure Limits:

8-hr time weighted average: 0.75 ppm

15-min time weighted average: 2.0 ppm

Acute Effects of Exposure: Ingestion of liquids containing 10 to 40% causes severe irritation and inflammation of the mouth, throat, and stomach.

Severe stomach pains will follow ingestion with possible loss of consciousness and death. Ingestion of dilute solution (0.03-0.04%) may cause discomfort in the stomach and pharynx. Inhalation of concentrations of 0.5 to 2.0 ppm may irritate the eyes, nose, and throat of some individuals.

Concentrations of 3 to 5 ppm also cause tearing of the eyes and are intolerable to some individuals. Concentration of 10 to 20 ppm cause difficulty in breathing, burning of the nose and throat, cough, and heavy tearing of the eyes, and 25 to 30 ppm causes severe

respiratory tract injury leading to pulmonary edema and pneumonitis. A concentration of 100 ppm is immediately dangerous to life and health. Skin contact causes irritation and may cause white discoloration, smarting, drying, cracking, and scaling. Prolonged and repeated contact can cause numbness and a hardening or tanning of the skin.

Formaldehyde is also a sensitizer. Previously exposed individuals may react to future exposure with an allergic eczematous dermatitis or hives. Eye exposure can cause injuries ranging from transient discomfort to severe, permanent corneal clouding and loss of vision. The severity of the effect depends on the concentration and whether or not the eyes are flushed with water immediately after the accident.

Chronic Effects of Exposure: Formaldehyde has the potential to cause cancer in humans. Repeated and prolonged overexposure increases the risk. Various animal experiments have conclusively shown formaldehyde to be a carcinogen in rats. In humans, formaldehyde overexposure has been associated with cancers of the lung, nasopharynx and oropharynx, and nasal passages. Formaldehyde is genotoxic in several in vitro test systems showing properties of both initiator and promoter. Prolonged or repeated overexposure may also result in respiratory impairment.

First Aid Procedures

First Aid should be administered by Campus Police.

Ingestion: if the victim is conscious, dilute, inactivate, or absorb by giving milk, activated charcoal or water. Any organic material will inactivate formaldehyde. Keep person warm and at rest, Get medical attention immediately. If vomiting occurs, keep head lower than hips.

Inhalation: Remove victim to fresh air immediately. When concentrations are very high, rescuers must wear self-contained breathing

apparatus. If breathing has stopped, give artificial respiration. Keep warm and at rest. Get medical attention immediately.

Skin Contact: Remove contaminated clothing immediately. Wash the affected area with soap and a large amount of water at least 15 to 20 minutes. If there are chemical burns or if irritation persists, get medical attention.

Eye Contact: Wash the eyes immediately with large amount of water at least 15 to 20 minutes. Get medical attention immediately.

Spill, Leak and Disposal Procedures

In the event of a leaking container, immediately place the container in a fume hood and transfer to a new container which has been properly labeled. Spills should be absorbed using vapor barrier pads and the pads collected for disposal as hazardous waste. Unused formaldehyde solutions must be disposed of as hazardous waste. Used concentrated solutions should also be collected for hazardous waste disposal. Used dilute solutions (less than one percent) can be further diluted and discharged to the sewer.

Material Safety Data Sheets and Container Labeling

Material Safety Data Sheets (MSDS) are provided by the manufacturer of all hazardous chemicals purchases. The formaldehyde MSDS will include information specific to that product such as the concentration of formaldehyde in a solution. CSC MSDS files are located at the north end of the second floor. MSDS copies are also available at Environmental Health & Safety.

Products capable of releasing 0.1 to 0.5 ppm of formaldehyde must be labeled with a warning that the product contains formaldehyde and that more information is available from the MSDS. For products

capable of releasing greater than 0.5 ppm, the label must also address health hazards and include the words "Potential Cancer Hazard". Labels are available from the Chemical Hygiene Officer.

Protective Clothing and Equipment

All contact with the eyes or skin of solutions containing 1% or more of formaldehyde must be prevented by use of chemical splash goggles, gloves, and laboratory coats (as needed). Any situations where exposure levels would require the use of a respirator will be addressed on an individual basis by the Chemical Hygiene Officer.

Work Practices

Work with formaldehyde solutions should be performed in a fume hood whenever possible. Containers should be closed when not in use. Other precautions specific to the experiment may be required by the faculty.

Exposure Monitoring Procedures

All uses of formaldehyde must be reported to the Chemical Hygiene Officer so that the need for initial exposure monitoring can be determined. Initial exposure monitoring is conducted in all

cases where exposures may be above 0.5 ppm as an 8-hr time weighted average, or 2.0 ppm as a 15-min time weighted average. If you are selected for exposure monitoring, you will be asked to wear a monitoring badge. Employees will be informed of the results of monitoring within 15 days of the receipt of the results. If initial monitoring demonstrates a potential for exceeding the permissible exposure limits, additional monitoring will be conducted.

Medical Surveillance

Medical surveillance is available in instances when routine exposures exceed 0.5 ppm as an 8-hr time weighted average or 2.0 ppm as a 15-min time weighted average, or you experience signs and symptoms related to formaldehyde exposure. Surveillance includes a medical disease questionnaire specified by OSHA and a physical examination if the physician determines it is necessary.

Questions

Any questions regarding formaldehyde exposure or the OSHA Standard should be addressed to the Lab Manager or Environmental Health & Safety.