



Formaldehyde

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This publication provides practical loss control and safety information to assist you in making your workplace safer. It is not legal advice. SAIF Corporation has made every effort to bring significant Oregon Occupational Safety and Health Administration (OR-OSHA) regulations to your attention. Nonetheless, compliance with OR-OSHA remains your responsibility. You should read and understand all relevant OR-OSHA regulations that apply to your job site(s). You may want to consult with your own attorney regarding aspects of OR-OSHA that may affect you.

Note: The information in this publication is time sensitive. Do not rely upon this document if its publication date is more than three years old. Please check the Employer Guide "Safety" section of our web site at www.saif.com/employer for a more recent, printable copy. You'll also find a variety of other valuable safety information designed to help your business prevent injuries and control costs.

Introduction

Exposure to formaldehyde may pose a significant health risk. OR-OSHA has a specific standard for formaldehyde. See the Resources section on page 16 of this publication for information on how to obtain a copy of this standard.

Scope and Application

The standard applies to all occupational exposures to formaldehyde. This may be the result of exposure to formaldehyde gas, solutions and materials that release formaldehyde. Solids and any mixture containing formaldehyde are included in the standard to the extent that they are sources of formaldehyde exposure.

Manufacturers of compressed wood products are a major concern of formaldehyde. The plastic industry uses formaldehyde based resins. Molding compounds containing melamine, phenolic or acetyl resins are capable of releasing formaldehyde when subjected to heat and or pressure in the molding process. Formaldehyde releasing agents are used to add wrinkle-free and durable press characteristics to synthetic and natural fiber textiles. Formaldehyde bearing resins are used in the coating industry primarily as modifiers in alkyd and acrylic coating systems. Formaldehyde exposure may also occur in foundries, the health care industry, cosmetology, the construction industry and general office environments.

Permissible Exposure Limit

Time Weighted Average (TWA) exposure limit is 0.75 parts per million (ppm) as an eight-hour exposure. Short Term Exposure Limit (STEL) is 2 ppm as a 15 minute exposure. Action level exposure is 0.5 ppm calculated as an eight-hour TWA concentration.

Exposure Monitoring

All employers are required to monitor for formaldehyde if they have the following conditions:

- Using a product that contains 0.1 percent or more formaldehyde and the material is capable of releasing formaldehyde into the air under any normal condition of use at concentrations reaching or exceeding 0.1 ppm.
- If employees have signs or symptoms of respiratory or dermal conditions, exposure monitoring will be initiated.

The final OSHA standard includes both an action level and a 15 minute STEL as triggers for the initial monitoring and frequency of monitoring requirement. The formaldehyde monitoring needs to be representative of the employee's full shift or short term exposure. Representative samples for each job classification need to be taken in each work area and for each shift. This is not necessary if the employer has objective data to show the equivalency among the different work areas and shifts.

Initial monitoring requires that the employer must identify all employees who may be exposed to the following formaldehyde levels:

- At or above the action level, or
- At or above the STEL

Employer needs to use a representative sampling strategy to characterize employee exposures unless all exposed employees are sampled. The sampling strategy must identify exposures based on both the STEL and action level. Initial monitoring needs to be repeated each time there is a change in the process, production, equipment, personnel or control measures which may result in new or additional exposure to formaldehyde. If the employer receives reports of signs or symptoms of respiratory or dermal conditions associated with formaldehyde exposure, the employer shall promptly monitor the affected employee's exposure.

Periodic monitoring needs to be done if the initial monitoring shows exposures are:

- At or above the action level, or
- At or above the STEL

If the exposure(s) are at or above the action level then the monitoring needs to be repeated at least every six months. If the exposure(s) are at or above the STEL, then the monitoring needs to be repeated at least once a year under worst conditions.

Termination of monitoring may be done if the sample results from two consecutive monitoring periods taken at least seven days apart show that employee exposure is below the action level and STEL.

Accuracy of the monitoring must be at the 95 percent confidence level, to within plus or minus 25 percent for the TWA and STEL and plus or minus 35 percent for the action level.

Employee notification of monitoring results must be within 15 days of receiving the results of the sampling. Notification is to be in writing. The written results may be distributed to the employees or posted. If results show exposures over the PEL, then the employer needs to develop and implement a written plan to reduce employee exposure at or below the PEL and give a written notice to employees including a description of the corrective action being taken to decrease exposure.

The opportunity to observe the monitoring needs to be provided to the affected employees or their designated representatives. The employer needs to ensure that those observing the monitoring are provided with the appropriate personal protective equipment (PPE).

Regulated Areas

The employer needs to establish regulated areas if the formaldehyde level exceeds either the TWA or the STEL. The area is to be posted at all entrances with a sign that states:

DANGER
FORMALDEHYDE
IRRITANT AND POTENTIAL CANCER HAZARD
AUTHORIZED PERSONNEL ONLY

Authorized employees need to be trained to recognize the hazards associated with formaldehyde. An employer at a multi-employer work site who establishes a regulated area needs to communicate the restrictions and locations of the regulated areas to the other employers at the work site.

Methods of Compliance

The employer shall use engineering and work practice controls to reduce and maintain employee exposures to formaldehyde at or below the TWA and the STEL. If the employer has established that feasible engineering and work practice controls cannot reduce employee exposure to or below either of the PELs, then the employer must apply these controls to reduce employee exposures to the extent feasible and shall supplement them with respirators which satisfy this standard.

Respiratory Protection

Respiratory protection needs to be worn when the TWA or STEL is exceeded. Employers must provide an air-purifying, full facepiece respirator with a canister or cartridge approved for protection against formaldehyde. However, employers may substitute an air-purifying, half mask respirator for an air-purifying, full facepiece respirator when they equip the half mask respirator with a cartridge approved for protection against formaldehyde and provide the affected employee with effective gas-proof goggles.

The rules require that respirators be provided at no cost to the employee and the employer needs to ensure that respirators are worn properly.

Respirators are to be worn under the following circumstances:

- During the time feasible engineering and work practice controls are being installed or implemented.
- During maintenance and repair activities, vessel cleaning or other work operations, where engineering controls are not feasible to reduce the exposures to below the TWA or STEL.
- In emergency situations.

Respirator selection is based on the formaldehyde concentration and type of operation being performed. If an employee experiences difficulty wearing a negative pressure respirator, then the employer needs to provide a powered air purifying respirator.

All cartridges or canisters used must be approved by the National Institute for Occupational Safety and Health (NIOSH), and Mine Safety and Health Administration (MSHA) for protection against formaldehyde.

Table 1 – Respiratory Protection

| Airborne concentration of Formaldehyde | Required Respirators |
|--|---|
| Not in excess of 7.5 ppm (10 x PEL) | Half-mask, air-purifying respirator equipped with high efficiency filters |
| Not in excess of 37.5 ppm (50 x PEL) | (1) Full facepiece, air-purifying respirator with high efficiency filters (2) Half-mask powered air-purifying respirator (PAPR) with high efficiency filters (3) Half mask supplied-air respirator operated in positive pressure mode |
| Not in excess of 750 ppm (1000 x PEL) | (1) Any full facepiece powered, air-purifying respirator with high efficiency filters (2) A full facepiece supplied-air respirator (SAR) or airline respirator in continuous or pressure-demand or other positive-pressure mode |
| Not in excess of 7,500 ppm..... (10,000 x PEL) | Full facepiece or helmet/hood self-contained breathing apparatus (SCBA) in pressure-demand or other positive-pressure mode |

Required respirator usage needs to follow the general Respiratory Protection Standard, 29 CFR 1910.134 (b) through (d) (except (d)(1)(iii), (d)(3)(iii)(B)(1), and (2), and (f) through (m), which includes requirements for use, maintenance, fit testing, employee training and program evaluation.

The formaldehyde standard also contains additional usage practices that need to be followed if exposure exceeds the TWA or STEL. These include:

- Fit Testing - If negative pressure respirators are worn then either quantitative or qualitative face fit tests need to be performed. The fit test procedures are to be done for the initial fitting and at least annually.
- Cartridge replacement - If air purifying chemical cartridges are worn to reduce exposure to below the TWA or STEL, then the cartridges need to be replaced after three hours of use or at the end of the work shift (whichever is sooner) unless the cartridges have a NIOSH approved end-of-service-life indicator.

- Canister Replacement - If canisters are not provided with an end of service-life indicator, then the rules provide for the following replacement schedule:
 - Every four hours or end of the work shift in concentrations up to 7.5 ppm
 - Every two hours or end of the work shift in concentrations up to 75 ppm for industrial sized canisters.

Employees shall be permitted to wash their face and respirator face pieces as needed to prevent skin irritation from respirator use.

Protective Equipment and Clothing

Required protective equipment and clothing need to be provided at no cost to employees and employer needs to ensure that the employee wears them.

Selection of protective equipment needs to be based on the form of the formaldehyde used, condition of use and the hazard to be prevented.

- Where contact with liquids containing 1 percent or more formaldehyde on skin or in the eyes would require the use of:
 - Skin coverings such as gloves, aprons and boots that are impervious to formaldehyde.
 - Goggles and face shields for eye and face protection.
- Full body protection needs to be worn for entry into areas where concentrations exceed 100 ppm and for emergency re-entry into areas of unknown concentration.

Maintenance of protective equipment and clothing contaminated with formaldehyde before reuse:

- Repairing, cleaning or laundering of equipment and clothing contaminated with formaldehyde before reuse.
- Contaminated equipment and clothing need to be stored in areas that would minimize employee exposure. Storage containers need to be labeled with a sign that states:

DANGER
FORMALDEHYDE-CONTAMINATED
(CLOTHING) EQUIPMENT
AVOID INHALATION AND SKIN CONTACT

- Only trained employees may be assigned to handle, clean, launder or dispose of contaminated material(s).
- Contaminated material is not to be taken home.

The employer needs to inform any person who launders, cleans or repairs contaminated equipment clothing of the potentially harmful effects of formaldehyde and proper precautions to be used.

Hygiene Protection

Change rooms are required when employees need to change from work clothing into protective clothing to prevent skin contact.

Conveniently located quick drench safety showers need to be provided if employees' skin could be splashed by a solution containing 1 percent or greater of formaldehyde. Employers need to assure that affected employees use these facilities immediately.

Eyewash facilities, within the immediate work area, need to be provided if formaldehyde material at 0.1 percent or greater could splash into employees' eyes.

Housekeeping

A leak detection and spill control program, including regular visual inspections, need to be implemented if formaldehyde liquid or gas materials are used. The plan needs to include:

- Preventive maintenance, including surveys for leaks, is at regular intervals.
- A spill control program which has provisions for containing a spill, decontamination of the area and proper disposal of the material.
- Clean-up of spills and the repair of leaks need to be done promptly and by trained employees wearing the proper protective equipment. The employees need to be trained in proper methods for cleanup and decontamination.
- Formaldehyde waste needs to be disposed of in sealed containers bearing a warning label.

Emergencies

If a possibility of an emergency involving formaldehyde exists, then appropriate procedures need to be adopted and implemented.

Medical Surveillance

A medical surveillance program needs to be instituted for:

- Routine screening examinations
- Employees exposed to formaldehyde at or above the action level or above the STEL.
- Non-routine screening examinations
- Employees who develop signs and symptoms of overexposure to formaldehyde
- Employees exposed to formaldehyde in emergencies.

The medical surveillance shall be done under the supervision of a licensed physician.

- The examination shall be provided at no cost to the employee including no loss of pay and at reasonable time and place
- The examination needs to be made available prior to assignment to a job where formaldehyde exposure is at or above the action level or above the STEL and annually thereafter.
- The routine examinations need to be provided promptly upon determining that an employee is experiencing signs and symptoms of possible overexposure to formaldehyde.

Medical questionnaires need to be given to the exposed employees. Appendix D in the OR-OSHA standard provides a medical questionnaire.

Medical examinations need to be given to:

- Any employee who the physician feels, based on information in the medical questionnaire, may be at increased risk from exposure to formaldehyde; and
- At time of initial assignment and at least annually thereafter to all employees required to wear a respirator to reduce exposure.

The examinations need to include:

- Physical examination with emphasis on evidence of irritation or sensitization of skin and respiratory system.
- Pulmonary function tests for respirator wearers.
- Any other test the examining physician deems necessary to complete the written opinion.
- Counseling of employees who have medical conditions that may be directly or indirectly aggravated by exposure to formaldehyde.

Examinations for employees exposed in an emergency need to be made available as soon as possible to all employees who have been exposed. The examination needs to include:

- Medical and work history with emphasis on any evidence of upper or lower respiratory problems, allergic conditions, skin reactions or hypersensitivity, and any evidence of eye, nose, or throat irritation. .
- Any other test the examining physician deems necessary.

The employer needs to provide the examining physician the following information:

- A full copy of the OR-OSHA formaldehyde standard.
- A description of the employee's job duties as they relate to exposure to formaldehyde.
- Formaldehyde exposure level.
- Type of personal protective equipment the employee uses.
- Information from previous medical examination, within control of the employer, that the current examining physician would not have.

- In the case of nonroutine examinations due to an emergency, the employer needs to provide as soon as possible a description of how the emergency occurred and the exposure the victim may have received.

The physician needs to provide the employer a written opinion for each examination. This written opinion cannot contain any results unrelated to occupational exposure to formaldehyde. However, it must include:

- The physician's opinion as to whether the employee has any medical condition that would place the employee at an increased risk to his/her health from exposure to formaldehyde.
- Any recommended limitations on employee's exposure or use of personal protective equipment.
- The physician needs to state that the employee has been informed of any medical conditions that would be aggravated by exposure and whether these conditions may have resulted from past exposure. The employee also needs to be informed if further examination or treatment is needed.

The employer needs to provide for retention of the medical records and shall provide a copy of the physician's written opinion to affected employee within 15 days of receipt.

Medical Removal

Medical removal applies when an employee reports:

- Significant irritation of the eyes or upper airways,
- Respiratory sensitization
- Dermal irritation, or
- Dermal sensitization attributed to workplace exposure to formaldehyde.

These provisions do not apply in the case of dermal irritation or dermal sensitization when the product suspected of causing the condition contains less than 0.05 percent formaldehyde.

An employee's report of signs or symptoms as listed above, shall be evaluated by a physician as stated on page Z -9. If the physician determines that a medical examination is not necessary, there shall be a two-week evaluation/remediation period to permit the employer to ascertain whether the signs or symptoms subside untreated or with the use of prescribed medications or personal protective equipment. Prior to the expiration of the two-week period the employee shall be referred immediately to a physician if the symptoms worsen. Earnings, seniority and benefits may not be altered during the two-week period based on the report.

If symptoms have not subsided or been remedied by the end of the two-week period or earlier, if symptoms warrant, the employee shall be examined by a physician selected by the employer. The physician shall presume that dermal irritation and sensitization are not caused by formaldehyde when products employee(s) are exposed to contain less than 0.1 percent formaldehyde unless contrary evidence exists.

Medical examinations shall be conducted as outlined on page Z-10, and, Appendix C of the OR-OSHA formaldehyde standard.

If the physician finds significant signs or symptoms resulting from workplace formaldehyde exposure and recommends workplace restrictions or removal, the employer shall promptly comply. If removal is recommended, the employer shall remove the affected employee from the current formaldehyde exposure and, if possible, transfer the employee to work having no or significantly less exposure to formaldehyde.

When removed, the employer shall transfer the employee to comparable work for which the employee is qualified or can be trained in up to six months. The formaldehyde exposures must be as low as possible, but not higher than the action level. Earnings, seniority, and other benefits shall be maintained at the employee's current levels. If there is no such work, the employer shall maintain current benefits until:

- Work becomes available,
- The employee is unable to return to workplace formaldehyde exposure,
- The employee is able to return to original job status, or six months, whichever comes first.

A follow-up exam shall be arranged by the employer within six months after removal. The physician shall determine whether the employee can return to the original job status, or if the removal is to be permanent. The decision must be made within six months from the date the employee was removed.

An employer's obligation to provide earnings, seniority and other benefits to a removed employee may be reduced to the extent that the employee is compensated, during removal period, by a publicly or employer-funded compensation program or from employment with another employer while removed.

The employer may rely on objective data for determining formaldehyde concentration in materials.

Multiple Physician Review

After an employer has selected a physician, the employee may designate a second physician to review findings of the first physician and conduct similar evaluations as the second physician deems necessary and appropriate to evaluate the employee.

The employer must promptly notify an employee after each occasion that an initial physician conducts a medical examination or consultation for medical removal or restriction, of the right to seek a second medical opinion.

The employer may condition its participation and payment for the multiple physician review based upon whether the employee completes the following in 15 days:

- Informs employer of intentions to seek a second opinion.
- Sets up an appointment with a second physician.

If the second physician's opinion differs from the initial physician's opinion, then employer and employee shall assure that the two physicians resolve the disagreement. If they are unable to resolve the disagreeing opinions, employer and employee shall designate through their physicians a specialist to do the following:

- Review the findings of both physicians
- To conduct necessary examinations, consultations, laboratory tests, and discussions with prior physicians to resolve the disagreement.

Employee and employer may designate a third physician if necessary.

The employer must act in accordance with the findings, determinations and recommendations of the third physician, unless an agreement is made with the employee that is consistent with one of the three physicians' opinions.

Hazard Communication

A section of the formaldehyde standard provides a definition of what constitutes a formaldehyde health hazard for purposes of the Hazard Communication regulations. A formaldehyde health hazard is: "Formaldehyde gas, all mixtures or solution composed of greater than 0.1 percent formaldehyde, and all materials capable of releasing formaldehyde into the air under normal condition of use at concentrations reaching or exceeding 0.1 ppm."

In addition, for purposes of hazard determination, the formaldehyde standard specifies that the Hazard Communication Program address, at a minimum, the following formaldehyde hazards:

- Cancer
- Irritation and sensitization of the skin and respiratory system.
- Eye and throat irritation
- Acute toxicity

Chemical manufacturers and importers must provide appropriate labels, and Material Safety Data Sheets (MSDSs) to all downstream product users.

Labels

Employers shall provide that all hazard warning labels comply with the requirements of the Hazard Communication Code unless inconsistent with the labeling section of the formaldehyde standard.

For all material listed in paragraph (m)(1)(i) capable of releasing formaldehyde at levels of 0.1 ppm to 0.5 ppm, labels shall include the following information as a minimum:

- "Contains formaldehyde"
- Name and address of responsible party
- Statement that physical and health data is readily available from the employer and material safety data sheets

For all materials capable of releasing formaldehyde at levels above 0.5 ppm, labels shall address all hazards as defined in pertinent OR-OSHA regulations and Appendixes A and B of the formaldehyde standard, including:

- Respiratory sensitization
- and shall contain the words "Potential Cancer Hazard"

Objective data may be used for anticipated levels of formaldehyde release.

Substitute labels as required by other regulations that impart the same information as required by this code may be used.

Material Safety Data Sheets (MSDS)

Any employer who uses formaldehyde-containing materials shall comply with the OR-OSHA regulation for Hazard Communication standard with regard to the development and updating of MSDSs.

Manufacturers, importers and distributors of formaldehyde-containing materials shall assure that MSDSs and updated information are provided to all employers purchasing such materials at the time of the initial shipment and at the time of the first shipment after an MSDS is updated.

A Written Hazard Communication Program shall be developed, implemented, and maintained for formaldehyde exposures in the workplace by the employer. This program must describe at a minimum how the following requirements are met:

- Labeling and any other forms of warning
- Material safety and data sheets
- Employee information and training

Employee Information and Training

All employees who are assigned to work in areas where there is a formaldehyde health hazard need to participate in a training program, except where the employer can show, using objective data, that employees are not exposed to formaldehyde at or above 0.1 ppm.

The training and information need to be provided at the time of the initial assignment and whenever a new hazard from formaldehyde is introduced. Training shall be repeated at least annually.

The training program needs to include:

- Review of the regulations and the contents of the MSDS.
- The purpose and description of the medical surveillance program.
- A description of the potential health hazards, including the signs and symptoms of exposure.

- The need to immediately report any signs or symptoms of exposure to the employer.
- Description of the work areas where formaldehyde is present and the proper work practices for limiting exposure.
- The purpose, proper usage and limitations of personal protective clothing and equipment.
- Instruction on handling emergencies, including spills and clean-up procedures.
- An explanation of the types of controls used for reducing formaldehyde exposure and any necessary instruction in the use of the controls.
- A review of emergency procedures, including the specific duties or assignments of each employee, in the event of an emergency.

The training materials need to be accessible to all affected employees. They need to be informed of the location of written training materials. The materials need to be readily available for the employees without cost to the affected employees.

Recordkeeping

Employers are required to keep specific and accurate records relating to their formaldehyde compliance program. This record needs to include:

- Date of sampling
- Operation sampled
- Methods of sampling and analysis and evidence of the accuracy and precision of the methods
- Number, time, duration and results of the samples
- Name, job classifications, social security numbers and exposure estimates of the employees whose exposures are represented by the actual monitoring.

If the employer determines no air monitoring is necessary then the objective data used to make that determination must be retained.

Medical surveillance records need to be maintained. The records include:

- A copy of the protocol used for respirator fit testing
- A copy of the fit testing results
- Size and manufacturer of the types of respirators available for selection
- Date of most recent fit testing, the name and social security number
- A copy of the fit testing results
- Size and manufacturer of the types of respirators available for selection
- Date of most recent fit testing, the name and social security number of each tested employee and the type of respirator selected.

Record retention time depends on the type of record. The schedule is:

- Exposure records - 30 years
- Medical records - duration of employment plus 30 years
- Respirator fit testing - most recent test

Availability of records:

- Employer needs to have all records available to representatives of OR-OSHA.
- Employer needs to have exposure and medical records made available to the affected employees or former employees, or to anyone having the specific written consent of the employee.

Appendixes

Four appendixes are included in the OR-OSHA formaldehyde standard.

- Appendix A – Substance Technical Guidelines for Formalin. Employers are specifically required by the standard's training provision to provide the employees with the information contained in this appendix.
- Appendix B – Sampling strategies and analytical methods for formaldehyde are designed to aid employers in complying with the requirements.
- Appendix C – Medical surveillance guidelines for formaldehyde.
- Appendix D – Non mandatory medical disease questionnaire provides examining physicians with the information necessary to conduct the medical surveillance programs mandated by the standard.

Resources

OR-OSHA

<http://orosha.org/subjects/formaldehyde.html>

Fed-OSHA

<http://www.osha.gov/SLTC/formaldehyde/index.html>

Employee Information and Training Example

Introduction

_____ (Employer) has designated this formaldehyde training program to ensure that our employees are provided with information regarding the hazards and regulations associated with formaldehyde.

1. The training program includes the following information.
2. Review of the regulations and the contents of the material safety and data sheets (MSDSs).
3. The purpose and description of the medical surveillance program.
4. A description of the potential health hazards including the signs and symptoms of exposure.
5. The need to immediately report any signs of symptoms of exposure to the employer.
6. Description of the work areas where formaldehyde is present and the proper work practices for limiting exposure.
7. The purpose, proper use, and limitations of personal protective clothing and equipment.
8. Instruction on handling emergencies including spills and clean-up procedures.
9. An explanation of the types of controls used for reducing formaldehyde exposure and any necessary instructions on the use of the controls.
10. A review of emergency procedures including the specific duties or assignments of each employee in the event of an emergency.

FORMALDEHYDE STANDARD

The rules apply to products that contain more than 0.1 percent formaldehyde and during conditions where airborne exposures exceed 0.5 parts per million (ppm) for an eight-hour average or above the short-term limit of 2 ppm.

Medical Surveillance

One area that you need to clearly understand is the purpose of the medical monitoring program required by the regulations. Medical surveillance helps to protect your health. You are encouraged strongly to participate in the medical surveillance program we developed.

The program makes medical surveillance available to employees at no cost who are exposed to concentrations of formaldehyde above 0.5 ppm as an eight-hour average or 2 ppm over any 15 minutes. Those work locations include: (Noted this would not be listed if routine exposures are below the required exposure levels).

- 1.
- 2.
- 3.

If you work in one of the listed locations, you will be offered medical surveillance at the time of your initial assignment and once a year afterward as long as your exposures exceed the action and short-term exposure levels.

If your exposures are below these levels and you experience signs and symptoms that you relate to your formaldehyde exposure, you may also need medical surveillance to determine if your health is being affected by your exposure.

The surveillance program includes:

1. A medical disease questionnaire.
2. A physical examination if the physician determines this is necessary, based on your medical questionnaire.

If you are required to wear a respirator, then you will need to have a pulmonary function test annually. The required respirator protection areas are:

- 1.
- 2.

After a medical examination, the physician will provide your employer with a written opinion that includes any special protective measures recommended and any restrictions on your exposure. For future information please refer to the formaldehyde standard section on medical surveillance and Appendix C of the standard.

The formaldehyde containing products used in our workplace are:

Produce

Location/Usage

- 1.
- 2.
- 3.

The MSDSs for those products state (**Review contents of plant MSDSs**).

Health Effects and Signs and Symptoms of Exposure

The potential ill- health effects from formaldehyde exposure include both immediate or acute effects and long- term chronic health conditions.

Acute Effects of Exposure:

Ingestion: Liquids containing 10 to 40 percent formaldehyde cause severe irritation and inflammation of the mouth throat, and stomach. Ingestion of dilute solutions of 0.03 to 0.04 percent may cause discomfort in the stomach and throat.

Inhalation: Formaldehyde is highly irritating to the upper respiratory tract and eyes. The following effects are commonly reported at the concentrations shown below:

Concentrations of 0.5 to 2 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 persons.

Concentrations of 10 to 20 ppm cause difficulty in breathing, burning of nose and throat, cough and heavy tearing of the eyes.

Concentrations of 25 to 30 ppm cause severe respiratory tract injury leading to pulmonary edema and pneumonitis.

A concentration of 100 ppm is immediately dangerous to life and health.

Skin: 37 percent solution is a severe skin irritant and is seen as a sensitizer by some. Contact with the solution causes white discoloration, smarting, drying, cracking, and scaling. Prolonged and repeated contact can cause numbness and a hardening or tanning of the skin.

Eye Contact: Formaldehyde solutions splashed in the eye 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 of formaldehyde in the solution and whether or not the eyes are flushed with water immediately after the accident.

Chronic Effects of Exposure:

Cancer Agent: Formaldehyde has the potential to cause cancer in humans. Repeated and prolonged exposure increases the risk. Various animal experiments have shown formaldehyde to be a cancer agent in rats. In humans, formaldehyde exposure has been associated with cancer of the lungs, nose and throat.

Mutagen: Formaldehyde in experimental studies has been shown to change cellular structures.

Respiratory toxicity: Prolonged or repeated exposure to formaldehyde may result in respiratory impairment. Some persons have developed asthma or bronchitis following exposure to formaldehyde, most often as the result of an accidental spill involving a single exposure at high concentrations of formaldehyde.

Any employee having any possible signs or symptoms of exposure needs to report this immediately to (supervisor, safety director, occupational nurse).

Areas of Possible Formaldehyde Exposure and Controls:

Formaldehyde exposures are found in the following locations:

- 1.
- 2.

The exposures are controlled to within (Exposure Levels) by the usage of various control measures including:

1. Use of low formaldehyde-containing products
2. Ventilation / exhaust systems
3. Proper usage of respirators and personal protective equipment
4. Proper work practices that reduce exposure time and proximity to the process.

Personal Protective Equipment (PPE)

PPE is provided to reduce exposure of the skin, eyes and respiratory system. We have provided the following PPE for your usage during the following work procedures.

Gloves are required to be worn when there is a potential for skin contact with products containing more than 1 percent formaldehyde.

Goggles are required for prevention of splashes in the eyes when products containing more than 0.1 percent formaldehyde are used.

Respirators are required to be used in areas with exposures that exceed the Permissible Exposure Limit of 0.75 ppm of the Short- Term level of 2 ppm. In our facility, this includes the following areas or tasks:

- 1.
- 2.

The PPE needs to be used as directed by your and within the guidelines listed by the manufacturers.

If any of the PPE or other controls does not appear to be performing or functioning correctly, please immediately inform your supervisor.

Emergencies

This includes our procedures for handling spills and other unexpected releases of formaldehyde. The specific procedures are provided on the product MSDSs under emergency information. We have provided each of the areas with spill kits and proper PPE. The formaldehyde standards provide emergency handling procedures for formalin (37 percent free formaldehyde).