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Understanding formaldehyde management

Scope

This Technical Information Paper has been written to help boxplant employees understand the role of formaldehyde in the work environment.

Safety precautions

One of the purposes of this TIP is to highlight the safe use of formaldehyde. Please refer to the material in all sections of this TIP.

What is formaldehyde?

1. Formaldehyde is a flammable colorless gas at room temperature. When present in high concentrations, it has a pungent suffocating odor.

Melting Point	-92.0°C	- 133.6°F
Boiling Point	-19.5°C	-3.1°F
Ignition Temperature	300.0°C	572.0°F

2. Formaldehyde is a chemical which has a very reactive nature. This reactivity is exploited in the manufacture of hundreds of items including plastics, agricultural chemicals, antiseptics, cosmetics, dyes for cloth and leather, photography, adhesives, and explosives.

What is formaldehyde exposure?

Formaldehyde exposure can occur as follows:

- A. Inhalation
- B. Skin Absorption
- C. Ingestion

How is formaldehyde exposure measured?

Since formaldehyde is quite irritating to the eyes, skin, and lungs at high exposure levels most users of the substance experience exposure at very low levels. Also, in an overwhelming number of cases, exposure at the lower level is either by inhalation or skin absorption via direct contact. Thus, formaldehyde exposure is measured as follows:

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Airborne Exposure: Formaldehyde concentration measured in parts per million, ppm.

Direct Contact: Formaldehyde concentration measured in parts per hundred or percent.

Why be concerned about formaldehyde exposure?

1. Exposure to excessive levels of formaldehyde will be extremely irritating to eyes, skin, and throat. Very sensitive individuals may exhibit allergic type symptoms during exposure.
2. Several studies conducted by the federal government and private industry have shown a connection between low level formaldehyde exposure and nasal tumors and/or genetic abnormalities in laboratory animals.

What are the federal occupational exposure guidelines for formaldehyde?

1. The Occupation Safety and Health Administration (OSHA) published its Final Rule on occupational exposure to formaldehyde on December 4, 1987 in the Federal Register 29 CFR Parts 1910 and 1926.

This rule was revised and reissued on May 26, 1992.

Copies can be obtained by contacting OSHA <http://www.osha.gov/SLTC/formaldehyde/index.html>. Search for the Final Rule on Occupational Exposure to Formaldehyde.

2. The highlights of the Final Rule are as follows:

A. The maximum average exposure for a worker over an eight hour period is 0.75 ppm. This is known as the Time Weighted Average or TWA.

TWA Calculation Example - A worker is exposed to 1 ppm airborne formaldehyde for two hours. During the next six hours, there is no exposure to formaldehyde.

$$\begin{aligned} \text{TWA} &= \frac{\text{Hours of Exposure X ppm of Exposure}}{\text{Total Hours}} \\ &= \frac{2 \text{ Hours X } 1 \text{ ppm/Hour}}{8 \text{ Hours}} \\ &= 0.25 \text{ ppm} \end{aligned}$$

B. The Short-Term Exposure Limit or STEL is 2 ppm for 15 minutes.

C. An action level of 0.5 ppm TWA for 8 hours has been established. This means that when an 8 hour TWA of 0.5 ppm formaldehyde is detected the employer needs to consider additional methods of reducing worker exposure to avoid reaching the maximum exposure of 0.75 ppm TWA (8 hours).

D. All solutions which contain formaldehyde gas at a concentration greater than 0.1% shall be classified as a "Health Hazard."

E. Employers should provide changing rooms, protective clothing, and quick drench showers for those employees who may have skin or eye contact with solutions containing 1% or more formaldehyde. Eyewash facilities should be provided for contact with solutions of formaldehyde of 0.1% or greater.

Sample Formaldehyde Concentration Calculation

A 700 gallon batch of water resistant starch based corrugating adhesive contains 80 pounds of a wet strength resin which has 2% free formaldehyde (FF).