



The Importance of Adequate Ventilation with Glutaraldehyde

Maintaining a suitable work atmosphere by exercising appropriate precautions and/or engineering controls enables workers to handle glutaraldehyde safely, and without the discomfort associated with overexposure.

Exposure Limits and Controls

Worker exposure to glutaraldehyde should be maintained below the permissible exposure limit at all times. Known irritant effects for humans, if exposed to vapor above the irritation threshold value of 0.3 ppmv, include stinging sensations in the eyes; excess tear production and blinking; discomfort in the nose and throat; runny nose; coughing and sneezing; chest discomfort; and rarely nosebleeds. However, there have been a few reports of respiratory hyper-reactivity in a small number of people. There is no evidence of systemic toxicity, and there is no mechanistic evidence in humans that glutaraldehyde causes respiratory sensitization. By repeated exposure to vapor above concentrations of 0.3 ppmv, there is a steep slope on the concentration-response curve.

If the product is handled in closed equipment, general (mechanical) room ventilation should be satisfactory. Glutaraldehyde has a recognizable odor with a very low detection threshold of less than a part per billion and is more than 100 times below typical global regulatory standards. Thus, because human beings perceive glutaraldehyde in air well below the air concentration that causes irritation to mucous membranes, the smell of glutaraldehyde may have no health significance. If, however, the odor of glutaraldehyde is accompanied by irritation to the nose and eyes, then the exposure limit is probably being exceeded and special ventilation and/or respiratory protection may be required.

The Dow Chemical Company currently has an Industrial Hygiene Guideline (IHG) of 0.05 ppmv as a ceiling value⁽¹⁾. If the odor of glutaraldehyde persists in the workplace, industrial hygiene studies should be employed to form a practicable basis for the design of both engineered and personal protection safeguards against potential chronic exposure.

The likelihood of exposure to glutaraldehyde vapor above the exposure limit will depend on the room size, the temperature, the quantities of glutaraldehyde in use, the prompt cleanup of drips and spills, and use of engineering controls and equipment. Rooms in which glutaraldehyde is used should be large enough to ensure adequate dilution of vapor and/or have adequate engineering controls. Since glutaraldehyde vapor is typically generated at bench top levels in laboratories, vents should be placed at bench or floor levels to prevent vapor from being drawn into or through the employee breathing zone. It is also important for the ducts to be vented to the outside. Containers of glutaraldehyde should be covered/closed.

Precautions

The odor threshold for glutaraldehyde is less than a part per billion which is more than 100 times below typical global regulatory standards. This is an early indicator that attention should be given to ventilation or work practices.

Vapor exposure levels should be monitored to assure healthy and safe working conditions, as well as compliance with applicable laws and regulations. Caution should be exercised and additional monitoring is recommended when there is a major change in operating protocol, workplace ventilation systems, workload, or any complaint of respiratory discomfort. Immediate action should be taken if the vapor level is above the pertinent exposure limit.

When choosing a monitoring device, the following may be considered:

- What gases or contaminants will interfere with the performance of the device?
- Can potential interferences be measured to obtain an accurate glutaraldehyde measurement?
- Can the analysis be conducted in the hospital's own laboratory, and what accessories will be needed?
- Has the device been field-tested by independent laboratories? (A copy of the protocol and the individual laboratory results should be supplied.)
- Does the device meet the accuracy criteria for sampling techniques as specified by a governmental agency or certifying body? (A copy of the protocol and individual laboratory results should be provided.)
- Are other facilities or organizations using this device? If so, which ones?
- How long will it take to receive the results of the sampling if the collection media are sent to the manufacturer's laboratory for analysis?
- Are other benefits offered, such as a tracking system to provide at least an annual recapitulation of the results of periodic monitoring?

Footnotes

1. For many substances, the exposure limit is expressed as a time-weighted average over an eight-hour working day (TWA_8). For others, it is expressed as a TWA_8 qualified by a short-term exposure limit (STEL), which is a 15-minute TWA that should not be exceeded at any time. The American Conference of Governmental Industrial Hygienist recommends that exposures above the TWA_8 up to the STEL should not be longer than 15 minutes and should not occur more than four times per day. There should be at least 60 minutes between successive exposures in this range. Where the exposure limit may be expressed as a ceiling limit, this value should not be exceeded at any time during the workday.

The Dow Chemical Company has a formal review process to establish an exposure value to be applied to its workplaces; this is referred to as an Industrial Hygiene Guideline (IHG). IHGs are reviewed periodically to ensure that they provide adequate protection to the worker. This is a compliance limit, applicable worldwide within The Dow Chemical Company. This value must be used within any Dow Chemical plant worldwide in the absence of any regulatory limit or, if it is lower than applicable regulatory limits. Because glutaraldehyde vapor exposure limits are defined differently from country to country, The Dow Chemical Company recommends maintaining levels at or below the applicable requirements of your locale. In the absence of any requirements, The Dow Chemical Company currently recommends maintaining vapor exposure levels at or below 0.05 ppmv as a ceiling value.

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