



Eye Contact With Glutaraldehyde

Liquid Contact With Eyes

Glutaraldehyde solution of 2% and greater will produce severe, irreversible eye injury.

Solutions of 1% glutaraldehyde in water, if splashed on the eye, can cause moderate-to-severe irritation, which is experienced as discomfort or pain, excess blinking, and tear production, with marked excess redness and swelling of the conjunctiva. Contact with such solutions can cause minor-to-severe corneal injury which may persist and, if not adequately and promptly treated.

Studies⁽¹⁾ have shown that the lowest concentration causing minor corneal injury and conjunctival irritations was 0.25% with a no-effect concentration of 0.1%.

Vapor Contact With Eyes

Glutaraldehyde has a peripheral sensory irritant effect, i.e., it is capable of reversibly interacting with sensory nerve-endings in exposed body surfaces, such as the skin or covering/lining membranes of the eye and respiratory tract. As a result, there is a local sensation or discomfort where contact with the vapor occurs, together with the development of certain reflex effects. For example, exposure of the eye to airborne glutaraldehyde causes a stinging sensation in the eye accompanied by excess tearing and blinking. This is an entirely normal biological response to sensory irritant materials and gives warning of exposure to such materials together with some degree of protection, e.g., both blinking and excess tearing will limit exposure.

Furthermore, such effects are generally experienced at concentrations below those producing any inflammation or injury. For glutaraldehyde, a study with a volunteer panel has shown that for the eyes the threshold for sensory irritation by vapor exposure is 0.3 ppmv for humans. [The odor threshold for glutaraldehyde, based on data from an ongoing volunteer panel study, is less than a part per billion, and is more than 100 times below typical global regulatory standards. Thus, because human beings perceive glutaraldehyde vapors 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 nasal and eye irritation, then the ceiling limit may have been exceeded, and attention should be given to improving ventilation or workplace practices. The Dow Chemical Company has established an Industrial Hygiene Guideline (IHG) of 0.05 ppmv as a Ceiling value. Because glutaraldehyde vapor exposure limits are defined differently from country to country, Dow recommends maintaining levels at or below the applicable requirements of your locale.]

Precautions

- Always wear splashproof monogoggles, or both safety glasses with side shields and a wraparound full-face shield, when working around glutaraldehyde solutions. Many face shields alone may not offer total protection against eye contamination and should be used as an adjunct to protect facial skin.
- If glutaraldehyde solutions come in contact with the eye, immediately flush eyes with water and continue washing for at least 30 minutes. Remove contact lenses after the first 5 minutes and continue washing. Obtain prompt medical consultation without delay, preferably from an ophthalmologist.
- Suitable eyewash units should be available in all glutaraldehyde usage locations.

- Glutaraldehyde solutions should be used only in properly ventilated areas in which atmospheric glutaraldehyde vapor concentrations are maintained below regulatory limits, or in the absence of any regulatory limits, below the Dow Chemical Company IHG limit. 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 eye discomfort. Immediate action should be taken if the vapor level is above regulatory limits, or in the absence of regulatory limits, above the Dow Chemical IHG value.

Footnotes

1. The Dow Chemical Company, "Toxicology of Glutaraldehyde Review of Studies and Human Health Effects," revised 1995. Prepared by Bryan Ballantyne, M.D., D.Sc., Ph.D., Director of Applied Toxicology for The Dow Chemical Company.
2. 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.
3. 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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