



Glutaraldehyde and Formaldehyde

Glutaraldehyde is frequently confused with formaldehyde. Although glutaraldehyde and formaldehyde share the chemical family name “aldehyde,” their chemical and toxicological properties are significantly different. Glutaraldehyde does not contain formaldehyde, nor does it release formaldehyde, even after prolonged storage under adverse conditions.

Glutaraldehyde Does Not Release Formaldehyde

Glutaraldehyde is a simple, five-carbon molecule with aldehyde groups at each end:

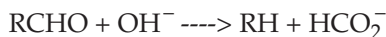


As such, it is classified as an aliphatic dialdehyde. Any proposed generation of formaldehyde, *i.e.*,



would necessarily involve the cleavage of one or both of the carbonyl groups from the rest of the molecule. Such a reaction is known as a decarbonylation. More specifically, this cleavage would have to result in the formation of formaldehyde, as opposed to simple carbon monoxide. The latter would be a deformylation reaction.

1. It is well known that “ordinary aldehydes do not give this reaction, nor do any other aldehydes that readily undergo aldol condensations or the Cannizzaro reaction under deformylation conditions”⁽¹⁾. Glutaraldehyde undergoes aldol condensations, even under conditions that are much less alkaline than those necessary for deformylation. Therefore, glutaraldehyde neither contains nor degrades into formaldehyde.
2. Even if this decarbonylation were to occur, formate ion would be liberated from the molecule rather than formaldehyde:



The formate ion is much too reactive to withstand the conditions necessary for deformylation and would be converted to other products even if it were produced.

Glutaraldehyde’s Toxicological Profile Differs from Formaldehyde

Allergic contact dermatitis can be caused by exposure of susceptible individuals to formaldehyde. However, when such individuals are exposed to glutaraldehyde, no cross-sensitization occurs^(2,3).

Glutaraldehyde is **not** covered by any governmental formaldehyde-release standards or restrictions, thus formaldehyde-related requirements are not applicable to glutaraldehyde users. The above does not contain and does not constitute legal advice. Laws and regulations are subject to change and the user must be familiar with all applicable laws and other governmental enactments. Please seek legal advice regarding compliances and possible changes in the law.

References

1. Shubert, W.M. and Kintner, R.R. (1966). "Decarbonylation" in S. Patai (ed.). *The Chemistry of Functional Groups*. Interscience Publishers, London, pp. 695-760.
2. Cronin, E. (1980). *Contact Dermatitis*. Churchill Livingstone, Edinburgh, pp. 795-797.
3. Mailbach, H. (1975). "Glutaraldehyde: Cross-reaction to Formaldehyde?" *Contact Derm.*, 1:326-327.

**For further information visit our website:
www.dowbiocides.com or call...**

United States 1-800-447-4369 (phone)
and Canada: 1-989-832-1560 (phone)
1-989-832-1465 (fax)
Europe: 800-3-694-6367 (phone)
32-3-450-2240 (phone)
32-3-450-2815 (fax)
Pacific: 603-7958-3392 (phone)
603-7958-5598 (fax)
Latin America: 55-11-5188-9555 (phone)
55-11-5188-9937 (fax)
Other Global 1-989-832-1560 (phone)
Areas: 1-989-832-1465 (fax)

NOTICE: No freedom from any patent owned by Seller or others is to be inferred. Because use conditions and applicable laws may differ from one location to another and may change with time, Customer is responsible for determining whether products and the information in this document are appropriate for Customer's use and for ensuring that Customer's workplace and disposal practices are in compliance with applicable laws and other governmental enactments. Seller assumes no obligation or liability for the information in this document. NO WARRANTIES ARE GIVEN; ALL IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE ARE EXPRESSLY EXCLUDED.

