



# Formalin vs. Hydrogen Peroxide Decontamination

Decontamination is the process of removing contaminants such as microorganisms from an area and making objects safe to handle. This is a necessary treatment for cleanrooms and laboratory areas in maintaining a high level of cleanliness and microbial control. All infectious materials and equipment must be decontaminated before leaving the area to remove any contamination it may have adhered to. Decontamination should be performed periodically and certain procedures make use of disinfectants capable of killing the target contaminants. Formalin (CH<sub>2</sub>O) and hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>) are common disinfectants used for cleanroom and laboratory applications.



## FORMALIN DECONTAMINATION

Formaldehyde is a well-known fumigant and is usually associated with containment laboratories and biosafety cabinets. It is a naturally occurring organic gas and a common option for decontaminating safety cabinets. Its solid polymeric form is called paraformaldehyde, while its aqueous form is referred to as formalin.

Formalin decontamination is done by vaporizing 37% formalin solution or depolymerization of paraformaldehyde to form formalin gas with a concentration of > 8000 ppm. The general procedures for decontaminating a biosafety cabinet are as follows:

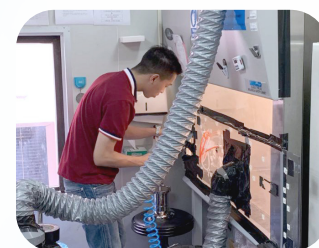
1. Set up and airtight seal the cabinet
2. Formalin vaporization
3. Allow ample contact time with vaporized formalin
4. Ammonia vaporization to neutralize formalin
5. Allow enough contact time for ammonia to neutralize formalin
6. Exhaust the ammonia residue
7. Teardown and clean the substantial residue in the cabinet

## HYDROGEN PEROXIDE DECONTAMINATION

Hydrogen peroxide is another effective disinfectant. It is a colorless liquid and a strong oxidizing agent at standard conditions. When vaporized, hydrogen peroxide is compatible with various materials, has a rapid antimicrobial efficacy, and lower safety concerns compared to formaldehyde.

Hydrogen peroxide decontamination is done by flash vaporization of an aqueous peroxide mixture to produce a vapor that would spread throughout the biosafety cabinet. The general process is as follows:

1. Set up and seal the cabinet to make it semi-airtight
2. Conditioning and decontamination cycle
3. Ducting out H<sub>2</sub>O<sub>2</sub> or H<sub>2</sub>O<sub>2</sub> generator doing aeration
4. Teardown



Hydrogen Peroxide Decontamination of Biosafety Cabinet

## FORMALIN VS. HYDROGEN PEROXIDE DECONTAMINATION

FORMALIN DECONTAMINATION	HYDROGEN PEROXIDE DECONTAMINATION
<b>ADVANTAGES</b>	
<ul style="list-style-type: none"> <li>• Good material compatibility</li> <li>• Long history of successfully decontaminating rooms and safety cabinets</li> <li>• Inexpensive</li> </ul>	<ul style="list-style-type: none"> <li>• Good material compatibility</li> <li>• Broad-spectrum, rapid antimicrobial</li> <li>• Breaks down into non-toxic substances</li> <li>• Non-carcinogenic and environmentally friendly</li> <li>• Leaves no residue</li> </ul>
<b>DISADVANTAGES</b>	
<ul style="list-style-type: none"> <li>• Time-consuming</li> <li>• Efficacy varies due to inconsistent penetration</li> <li>• Toxic and carcinogenic</li> <li>• Strictly regulated in some countries</li> <li>• Requires removal of residue at end of decontamination</li> </ul>	<ul style="list-style-type: none"> <li>• Time-consuming if the cabinet is not ducted</li> <li>• Efficacy is affected by organic and inorganic substances</li> <li>• Requires expensive specialist equipment</li> </ul>

Formalin decontamination is one of the oldest methods still used in some laboratories today but with hydrogen peroxide being a safer alternative, there is a decline in the use of formalin. Although the hydrogen peroxide decontamination process may require more expensive equipment, it is much less time-consuming because it does not require a neutralization step. Hydrogen peroxide breaks down into water and oxygen, saving lab personnel from being exposed to hazardous fumes and residues. Thus, it is highly recommended that biological safety cabinets and cleanroom facilities undergo decontamination using hydrogen peroxide due to it having far fewer health effects compared to formalin.



Esco Lifesciences offers reliable services, scan the QR to find out more.

Reference:

[1] Sandle, T. (2017, January 25). Biodecontamination of Cleanrooms and Laboratories Using Gassing Systems. IVT Network. <https://www.ivtnetwork.com/article/biodecontamination-cleanrooms-and-laboratories-using-gassing-systems>

