

Risk Assessment for New Disinfectants

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Hazardous Properties of The Disinfectant

A risk assessment is required for the preparation and use of disinfectants. Some may have toxic or corrosive properties and particular caution must be exercised in choosing powerful sensitizers such as formaldehyde and glutaraldehyde.

The potential formation of hazardous/toxic products, either in use or as a result of mixing with other disinfectants must also be considered. Consult the manufacturer's safety data sheet.

Safety Data Sheets (SDS) 16 Sections

1. Identification
2. Hazard(s) identification
3. Composition/ information on ingredients
4. First-aid measures
5. Fire-fighting measures
6. Accidental Release Measures
7. Handling and storage
8. Exposure control/ personal protection
9. Physical and chemical properties
10. Stability and reactivity
11. Toxicological information
12. Ecological information
13. Disposal considerations
14. Transport information
15. Regulatory information
16. Other information.

Safety Data Sheets (continued)

Section 2 - Hazards Identification:

- Hazards of the chemical presented on the SDS
- Appropriate warning information associated with those hazards.

Section 3 – Composition / Ingredients:

- Identifies the ingredient(s) contained in the product indicated on the SDS, including:
 - impurities and stabilizing additives.
 - information on substances, mixtures, and all chemicals where a trade secret is claimed

Section 4 - First-Aid Measures:

- Describes the initial care that should be given by untrained responders to an individual who has been exposed to the chemical.

Section 8 – Exposure Controls / Personal Protection:

- Indicates the exposure limits, engineering controls, and personal protective measures that can be used to minimize worker exposure.

Risk Assessment

Review of Disinfectants and their health hazards

Other Considerations

Surfaces and Property Risk Assessment

Exposure Control for Disinfectants

Risk Management

Activated Hydrogen Peroxide

Hydrogen peroxide works by producing destructive hydroxyl free radicals that can attack membrane lipids, DNA, and other essential cell components. Catalase, produced by aerobic organisms and facultative anaerobes that possess cytochrome systems, can protect cells from metabolically produced hydrogen peroxide by degrading hydrogen peroxide to water and oxygen. This defense is overwhelmed by the concentrations used for disinfection.

Vaporized Hydrogen Peroxide commonly utilized in lab fumigation.

Hypochlorite

Is rapidly active and is inactivated by protein and organic matter

When mixed with acid chlorine vapor is produce.

Hypochlorite forms a carcinogenic gas when mixed with formaldehyde.

Solutions of Hypochlorite decompose rapidly and must be replenished daily.

Strong odor

some documented cases of heart issues for users of the disinfectant.

Phenolics

An effective disinfectant against mycobacterium.

Phenol is very toxic and can cause skin burns.

- Safety procedures shall be in place for skin contamination

It will also damage plastic.

Alcohols

70% Ethanol and 60% iso-propanol have relatively poor efficiency and are susceptible to interference.

Can be used as a surface disinfectant for metal parts and surfaces where the use of other products may not be possible.

Flammability hazard.

Aldehydes

Formaldehyde and glutaraldehyde are extremely hazardous chemicals, being both irritant and toxic.

Utilized for general disaffection but may be used for fumigation of Cat 3 labs or of specific items of sensitive equipment.

A written safe operating procedure is required.

OSHA Standard, maximum exposure limits

Quaternary Ammonia (Quats)

widely used as disinfectant

good cleaning agents

good stability and toxicology

lack of odor

Some cases of occupational asthma

Exposure Assessment

Inhalation and skin exposure are typically of more concern since ingestion of disinfectants is less likely.

Measuring airborne chemicals and comparing to exposure limits.

Gloves are often used to limit skin contact but inhalation can occur if disinfectants become airborne as gases, vapors or aerosol particulates.

Air concentrations should be kept below limits, where they are applicable, and sometimes testing of the air may be needed to verify exposure limits are not exceeded.

- Respiratory Protection

Other Considerations for Risk Assessment of Disinfectants

The following factors should be considered when choosing a disinfectant

- The spectrum of organisms to be inactivated. Check manufacturers' details.
- The circumstances of use.

The organic load will affect efficiency. Efficacy against virus will be less if virus is intracellular. The following can affect activity:

- presence of other chemicals e.g. salts
- organic material may affect activity.
- pH
- Temperature
- Hardness of water used to dilute product

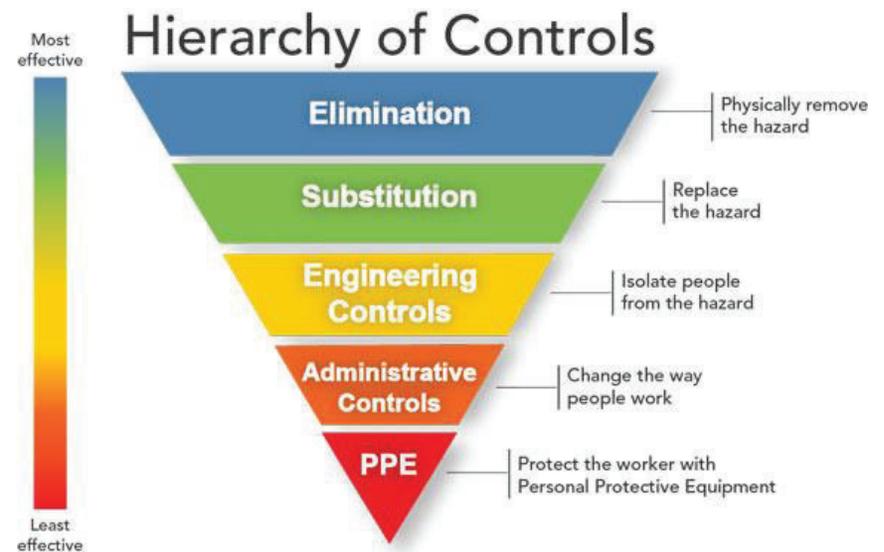
Risk Assessment of Surfaces to be Disinfected

Disinfectants containing acids, alkalis, electrolytes and hypochlorites can adversely affect metal parts and cause corrosion.

Disinfectants containing organic solvents can damage plastic

Risk Management

If the evaluation indicates there is too much health risk, exposure reduction may be needed.



<https://www.cdc.gov/niosh/topics/hierarchy/default.html>

Engineering and Administrative Controls

ENGINEERING CONTROLS

Ventilation

- General Dilution
- Fume Hoods
- Point Source

ADMINISTRATIVE CONTROLS

Standard Operating Procedures

Hazard Communication Training

Hygiene training

Glove Removal

Make Training Fun



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Personal Protective Equipment (PPE)

Gloves

Safety Glasses, Goggles

Faceshield

Long Sleeves

Gowns/Aprons

Respiratory Protection

N95 v. Surgical Mask

Filtering Facepiece N95 Respirators

Definition: An N95 respirator is designed to filter particles 0.1 – 0.3 micron diameter in size with a filter efficiency of at least 95 percent.

* The filter efficiency for larger particles is >95%

- Most common disposable respirator
- Particulate & Aerosol protection
 - Some are designed for VOC protection, commonly utilized for disinfectants
- Single Use
- For Required Use persons must be: Medically Cleared, Annually fit tested and trained.
- Commonly used by Health Care Workers, Animal Care Workers, and the Skilled Trades

Surgical Masks

- Are not Respirators
- Surgical masks are used for several different purposes, including the following:
 - Placed on immune-compromised Individuals or animals
 - Worn by workers to protect themselves from splashes or sprays of blood, bodily fluids or other potentially infectious materials
- Not designed or certified to prevent the inhalation of microscopic airborne contaminants
- Not designed to seal tightly against the user's face.

Testing and Feedback

Re-evaluate the risk assessment periodically as process and properties change.

Feedback

- Workers
- Process
- Property
- Product



Thank you



Sources

Disinfection and Sterilization Guidelines in Healthcare Facilities.

- <https://www.cdc.gov/infectioncontrol/guidelines/disinfection/index.html>
- <https://www.cdc.gov/infectioncontrol/guidelines/disinfection/disinfection-methods/chemical.html>
- <https://www.cdc.gov/infectioncontrol/pdf/guidelines/disinfection-guidelines.pdf>

EPA Registered Hard Surface Disinfectants Comparison Chart.

https://www.education.nh.gov/instruction/school_health/documents/disinfectants.pdf

American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLV) 2014.

Occupational Safety and Health Administration (OSHA) Permissible Exposure Limits (PEL).

Plog, Barbara. Fundamentals of Industrial Hygiene, 6th Edition, 2012, National Safety Council.