

Characteristics of Select Disinfectant Classes

This table provides general microbial spectrums for disinfectant chemical classes.

Antimicrobial activity and characteristics vary with formulation and concentration.

Always read and follow directions on the product label.

Disinfectant Class	Acids	Alcohols	Aldehydes	Alkalis	Chlorine Compounds	Peroxygen Compounds	Phenols	Quaternary Ammonium Compounds
Example Active Ingredients	citric acid, acetic acid	ethanol, isopropanol	formaldehyde, glutaraldehyde,	sodium hydroxide, ammonium hydroxide	sodium hypochlorite, chlorine dioxide	hydrogen peroxide, peracetic acid, peroxymonosulfates	orthophenylphenol	alkyl dimethyl benzyl ammonium chloride (ADBAC)
Mechanism of Action	<ul style="list-style-type: none"> Slow acting Alters pH 	<ul style="list-style-type: none"> Fast acting Precipitates proteins Denatures lipids 	<ul style="list-style-type: none"> Slow acting Denatures proteins Alkylates nucleic acids 	<ul style="list-style-type: none"> Slow acting Alters pH Fat saponification 	<ul style="list-style-type: none"> Fast acting Denatures proteins 	<ul style="list-style-type: none"> Fast acting Denature proteins and lipids 	<ul style="list-style-type: none"> Denatures proteins Disrupts cell wall 	<ul style="list-style-type: none"> Denatures proteins Binds phospholipids of cell membrane
Characteristics	<ul style="list-style-type: none"> Characteristics depend on acid type Corrosive at high concentrations to metals and concrete 	<ul style="list-style-type: none"> Rapid evaporation No residue or residual action Can swell or harden rubber and plastics 	<ul style="list-style-type: none"> Pungent odor Noncorrosive 	<ul style="list-style-type: none"> Corrosive to metals 	<ul style="list-style-type: none"> Strong oxidizer Degrades rapidly once prepared May damage metals, rubber, concrete 	<ul style="list-style-type: none"> Strong oxidizer May damage some metals (aluminum, copper, brass, zinc, steel) 	<ul style="list-style-type: none"> Strong odor Residual film Can damage rubber, plastic Non-corrosive 	<ul style="list-style-type: none"> Stable in storage High concentrations corrosive to metals
Factors Affecting Effectiveness	<ul style="list-style-type: none"> Affected by pH, organic matter, water hardness 	<ul style="list-style-type: none"> Inactivated by organic matter 	<ul style="list-style-type: none"> Affected by organic matter, hard water, soaps/detergents, pH, temperature, and relative humidity 	<ul style="list-style-type: none"> Effective in presence of organic matter Affected by pH, soaps/detergents, hard water, temperature 	<ul style="list-style-type: none"> Rapidly inactivated by organic matter, UV light, heat Affected by pH, temperature, cationic products 	<ul style="list-style-type: none"> Some have efficacy in presence of organic matter, hard water, soaps/detergents 	<ul style="list-style-type: none"> Affected by cationic cleaners and temperature May be effective in presence of organic matter, hard water, 	<ul style="list-style-type: none"> Inactivated by organic matter, hard water, anionic cleaners Affected by pH; best at neutral or alkaline
Health Hazards	<ul style="list-style-type: none"> Severe skin burns 	<ul style="list-style-type: none"> Irritation to skin 	<ul style="list-style-type: none"> Highly irritating to skin, mucous membranes Only use in well ventilated areas 	<ul style="list-style-type: none"> Severe skin burns Mucous membrane irritation 	<ul style="list-style-type: none"> Irritation to mucous membranes, skin, eyes 	<ul style="list-style-type: none"> Powder can irritate mucous membranes Low toxicity at lower concentrations 	<ul style="list-style-type: none"> Irritation to skin, eyes, respiratory tract High conc can cause burns 	<ul style="list-style-type: none"> Irritation to skin, eyes, respiratory tract
Precautions		<ul style="list-style-type: none"> Flammable 	<ul style="list-style-type: none"> Formaldehyde is carcinogenic 	<ul style="list-style-type: none"> Very caustic 	<ul style="list-style-type: none"> Toxic gas if mixed with acids or ammonia 		<ul style="list-style-type: none"> Toxic to animals, especially cats, pigs 	<ul style="list-style-type: none"> Can accumulate in environment
General Chemical Class Microbial Spectrum								
Bactericidal	+	+	+	+	+	+	+	+ Gram positive +/- Gram negative
Virucidal	+/-	+/-	+/-	+/-	+	+/-	+/-	+/-
Fungicidal	+/-	+	+	+	+	+/-	+	+/-
Tuberculocidal	-	+	+	+/-	+	+/-	+	-
Sporicidal	+/- ^A	-	+	+	+ ^A	+/- ^A	-	-

Microbial spectrum legend: **+** effective; **+/-** variable or limited effectiveness; **-** not effective

A-requires high concentrations

Data compiled from: Maillard JY. 2013. Factors Affecting the Activities of Microbiocides. IN: Fraise AP et al. (eds). *Russell, Hugo & Ayliffe's Principles and Practice of Disinfection, Preservation and Sterilization*, 5th ed. 2013; McDonnell G. 2020. Microorganisms and resistance. IN: *Block's Disinfection, Sterilization, and Preservation*, 6th edition; Quinn PJ et al. Disinfection and biosecurity in the prevention and control of disease in veterinary medicine. IN: *Block's Disinfection, Sterilization, and Preservation*.



IOWA STATE UNIVERSITY®