



# guide to popular disinfectants (active ingredients) what's the difference?



disinfectant	recommended application	how it kills/ destroys pathogens	pros	cons	environmental/ human impact
<b>1st to 3rd Generation QAC</b> eg benzalkonium chloride, alkyl dimethyl benzyl ammonium chloride	Disinfection and cleaning of hard, nonporous surfaces (walls, floors, countertops, furniture, etc.) <ul style="list-style-type: none"> <li>Healthcare and institutional settings</li> </ul>	Attaches to cell wall and affects the proteins and cell membrane of the microorganism, causing destruction. Releases nitrogen and phosphorous from the cell.	<ul style="list-style-type: none"> <li>Can be formulated with surfactants (cationic or nonionic) to provide effective cleaning and disinfecting in one step</li> <li>Rapid action, colorless, odorless, and highly stable</li> <li>May be used on food preparation surfaces.</li> <li>Broad spectrum kill</li> </ul>	<ul style="list-style-type: none"> <li>Severe eye &amp; skin irritant</li> <li>Work related asthma reported</li> <li>Toxic to marine life</li> <li>Lowest relative biocidal activity - commonly used as preservatives</li> <li>Does not eliminate spores, TB bacteria, and some viruses</li> <li>Effectiveness influenced by hard water</li> <li>Layer of soap interferes with action</li> <li>Can degrade and leave traces of aromatic compounds that are very undesirable, can be carcinogenic and mutagenic.</li> </ul>	
<b>4th Generation QAC</b> didecyl dimethyl ammonium chloride	Disinfection and cleaning of hard, nonporous surfaces (walls, floors, countertops, furniture, etc.) <ul style="list-style-type: none"> <li>Healthcare and institutional settings</li> <li>Pesticides</li> </ul>	Attaches to cell wall and affects the proteins and cell membrane of the microorganism, causing destruction. Releases nitrogen and phosphorous from the cell.	<ul style="list-style-type: none"> <li>Superior in germicidal performance, lower foaming, and have an increased tolerance to protein loads and hard water.</li> <li>Can be formulated with surfactants (cationic or nonionic) to provide effective cleaning and disinfecting in one step</li> <li>Rapid action, colorless, odorless, and highly stable</li> <li>May be used on food preparation surfaces. Broad spectrum kill</li> </ul>	<ul style="list-style-type: none"> <li>Severe eye &amp; skin irritant</li> <li>Reported to cause respiratory sensitization and occupational asthma</li> <li>Degradation product is highly corrosive</li> </ul>	
<b>4th Generation QAC</b> didecyl dimethyl ammonium carbonate/ bicarbonate	Disinfection and cleaning of hard, nonporous surfaces (walls, floors, countertops, furniture, etc.) <ul style="list-style-type: none"> <li>Healthcare and institutional settings</li> <li>Food production &amp; service</li> </ul>	Attaches to cell wall and affects the proteins and cell membrane of the microorganism, causing destruction. Releases nitrogen and phosphorous from the cell.	<ul style="list-style-type: none"> <li>Broad spectrum kill</li> <li>Effective &amp; it breaks down to benign CO<sub>2</sub> &amp; H<sub>2</sub>O and unlike chloride counter ion QACs actually prevents corrosion</li> <li>Superior in germicidal performance, lower foaming, and have an increased tolerance to protein loads and hard water.</li> <li>Can be formulated with surfactants (cationic or nonionic) to provide effective cleaning and disinfecting in one easy step</li> <li>Rapid action, colorless, odorless, and highly stable</li> <li>May be used on food preparation surfaces</li> </ul>	<ul style="list-style-type: none"> <li>Corrosive to skin in high concentrations</li> </ul>	
<b>Modified 4th Generation QAC</b> didecyl dimethyl ammonium ascorbate 	Disinfection and cleaning of hard, nonporous surfaces (walls, floors, countertops, furniture, etc.) <ul style="list-style-type: none"> <li>Healthcare and institutional settings</li> <li>Food production &amp; service</li> <li>Agriculture</li> <li>In-can preservation</li> <li>Water treatment</li> <li>Formulation as active ingredient into 3rd party commercial, industrial and retail brand disinfectants and sanitisers</li> </ul>	Attaches to cell wall and affects the proteins and cell membrane of the microorganism, causing destruction. Releases nitrogen and phosphorous from the cell.  By replacing the carbonate counter ion with natural products from citrus the efficacy of the original DDA cation is increased. This enhancing effect is thought to be due to the fact that the microorganisms perceive the compound as a food source and as such aids in absorption thus increasing the contact between the DDA cation and the cell membrane and thus increasing the efficacy.  The citrus also has inherent biocidal activity and as such a second mechanism is at play to further increasing efficacy	<ul style="list-style-type: none"> <li>Broad spectrum kill, it is between 8-52% more effective, with much lower toxicity than traditional QACs</li> <li>The compounds are completely biodegradable - break down to benign CO<sub>2</sub>, H<sub>2</sub>O &amp; N<sub>2</sub> after 96 hours and unlike chloride counter ion QACs actually prevents corrosion</li> <li>Can be formulated with surfactants (cationic or nonionic) to provide effective cleaning and disinfecting in one easy step</li> <li>Rapid action, colorless, odorless, and highly stable</li> <li>May be used on food preparation surfaces.</li> <li>Non-corrosive to skin at concentrations below 3 000 ppm</li> </ul>		
<b>&gt;70% Isopropyl Alcohol Solution</b>	<ul style="list-style-type: none"> <li>Cleaning some instruments</li> <li>Cleaning skin</li> </ul>	Changes protein structure of microorganism.  Presence of water assists with killing action.	<ul style="list-style-type: none"> <li>Fairly inexpensive</li> </ul>	<ul style="list-style-type: none"> <li>Using &lt; 70% not very effective</li> <li>Flammable</li> <li>Not active when organic matter (eg blood, bodily fluids, fats, faecal matter) is present</li> <li>Not active against certain types of viruses</li> <li>Evaporates quickly; contact time is not sufficient</li> </ul>	
<b>Chlorine Compounds</b>	<ul style="list-style-type: none"> <li>Cleaning up human bodily fluids</li> <li>Bactericidal</li> <li>Fungicidal</li> <li>Sporicidal</li> </ul>	Hypochlorous acid forms when chlorine is added into water. The hypochlorous acid allows oxygen to combine with the cell protoplasm and the chlorine inhibits enzymatic activities, destroying the microorganism.	<ul style="list-style-type: none"> <li>Kills hardy viruses</li> <li>Kills a wide range of organisms</li> <li>Inexpensive</li> <li>Penetrates well</li> <li>Relatively quick microbial kill</li> <li>May be used on food preparation surfaces</li> <li>Tuberculocidal with extended contact time</li> </ul>	<ul style="list-style-type: none"> <li>Corrodes metals such as stainless steel and aluminium</li> <li>Organics may reduce activity</li> <li>Increase in alkalinity decreases bactericidal property</li> <li>Unpleasant taste and odor</li> <li>Unstable</li> <li>Will bleach and discolour</li> <li>Corrosive to skin</li> <li>If breathed in could cause damage to sensitive lung mucosa</li> </ul>	
<b>Glutaraldehyde</b>	<ul style="list-style-type: none"> <li>Sterilize precleaned equipment</li> <li>Bactericidal</li> <li>Fungicidal</li> <li>Tuberculocidal</li> <li>Virucidal</li> <li>Sporicidal</li> </ul>	Denatures cell proteins by reacting with cell constituents.	<ul style="list-style-type: none"> <li>Non-staining and relatively noncorrosive</li> <li>Usable as a sterilant on plastics, rubber, lenses, stainless steel, and other items that can't be autoclaved</li> </ul>	<ul style="list-style-type: none"> <li>Not stable in solution</li> <li>May leave greasy residue</li> <li>Has to be in alkaline solution</li> <li>Deactivated by organic matter</li> <li>Needs high ppm for effect: Sanitizing: &gt; 1,000 ppm; Disinfection: &gt; 1%</li> </ul>	
<b>Iodophors</b>	<ul style="list-style-type: none"> <li>Disinfecting some semi-critical medical equipment</li> <li>Bactericidal</li> <li>Excellent Fungicidal</li> <li>Excellent Virucidal</li> </ul>	Free iodine enters microorganism and binds with cellular components. Surfactant [carrier] helps penetrate soil/fat.  Need 30 - 50 ppm. Kills by disorder of protein synthesis due to oxidation of amino acids.	<ul style="list-style-type: none"> <li>Kills broad range of organisms</li> <li>Highly reactive</li> <li>Low issue toxicity</li> <li>Kills immediately rather than by prolonged period of stasis</li> <li>Not affected by hard water</li> <li>May be used on food preparation surfaces</li> <li>Tuberculocidal with extended contact time</li> </ul>	<ul style="list-style-type: none"> <li>May stain plastics or corrode metal</li> <li>May stain skin or laundry</li> <li>Stains most materials</li> <li>Unpleasant odor</li> <li>Some organic and inorganic substances neutralize effect</li> <li>Effective only in acid solutions</li> <li>Costly</li> </ul>	
<b>Phenolic Compounds</b>	Excellent as a: <ul style="list-style-type: none"> <li>Bactericidal</li> <li>Fungicidal</li> <li>Tuberculocidal</li> <li>Virucidal</li> </ul>	Gross protoplasmic poison disrupts cell walls and precipitates cell proteins. Low concentrations inactivate essential enzyme systems.	<ul style="list-style-type: none"> <li>Nonspecific concerning bactericidal and fungicidal action</li> <li>While boiling water could cause rusting, the presence of phenolic substances produce an antirusting effect</li> </ul>	<ul style="list-style-type: none"> <li>Unpleasant odor</li> <li>Some areas have disposal restrictions</li> <li>Effectiveness is reduced by alkaline pH, natural soap, or organic material</li> <li>Effective over narrow pH range</li> <li>Easily deactivated by nonionic surfactants</li> <li>Photodegradable</li> <li>Too toxic for use on hands</li> </ul>	
<b>Hydrogen Peroxide</b>	<ul style="list-style-type: none"> <li>Bactericidal</li> <li>Virucidal</li> <li>Fungicidal</li> <li>Antiseptic</li> </ul>	Hydrogen Peroxide combines with and oxidizes necrotic matter and bacteria.	<ul style="list-style-type: none"> <li>Does not leave a residue</li> <li>Degrades into oxygen and water</li> </ul>	<ul style="list-style-type: none"> <li>Strong oxidizer; reacts with a variety of chemicals</li> <li>Useful at a limited pH range (avoid alkalinity)</li> <li>Corrosive</li> <li>While Hydrogen Peroxide is inflammable, the oxygen produced from it is flammable</li> <li>Reactions with Hydrogen Peroxide can cause fire due to excess heat</li> <li>Ineffective as a disinfectant at low concentrations</li> </ul>	