

PERFORMANCE CHARACTERISTICS OF SURFACE DISINFECTANTS

DISINFECTANT CLASS	ADVANTAGES	DISADVANTAGES	CRA FINDINGS ¹	COMMENTS
Ethyl Alcohol <i>CLINICAL is an Ethyl alcohol based disinfectant containing >68% (w/w) (75%v/v) ethyl alcohol.</i>	<ul style="list-style-type: none"> Broad germicidal activity Non-corrosive Limited residual activity Effective in the presence of organic matter Short contact time for effective kill rates 	<ul style="list-style-type: none"> Flammable Not effective against spores 	CRA tested 25 alcohol based disinfectants against Tuberculosis bacteria & Poliovirus. ² <ul style="list-style-type: none"> 4 Out of 25 passed the CRA test requirements. As a general rule the best performing disinfectants contained ≥ 68% (w/w) (75% v/v) ethyl alcohol Effective kill rates were achieved within 1 minute <i>No isopropyl alcohol products passed the CRA disinfectant tests.</i> 	Human immunodeficiency virus (HIV) is reported to be readily inactivated by most disinfectants. ³ Complete loss of HIV infectivity after 1 minute exposure to 70% ethyl alcohol has been reported by Resnick et. al. ⁴
Chlorines	<ul style="list-style-type: none"> Broad germicidal activity Low toxicity Limited residual activity 	<ul style="list-style-type: none"> Corrosive Stain surfaces & bleach fabric Limited activity in the presence of organic matter Not effective against spores 	CRA tests indicated that chlorine based disinfectants were effective on clean surfaces but are inactivated in the presence of organic soils. ⁵ The findings showed that recommended dilutions of household bleach resulted in solutions that did not pass the required tests in the presence of organic soil.	CRA recommends care in the use of chlorine based disinfectants as they are quickly deactivated by organic soils. If diluted too far they will become ineffective under dirty conditions
Quaternary Ammonium Compounds (“Quats”)	<ul style="list-style-type: none"> Non-corrosive Low toxicity Limited residual activity 	<ul style="list-style-type: none"> Long contact times required for effective kill rates Limited germicidal activity Stain surfaces Not effective against spores Limited activity in the presence of organic matter 	<ul style="list-style-type: none"> 6 “Quats” based disinfectants tested. All failed to kill poliovirus in the presence of blood.⁶ 2 Out of the 6 “quats” tested killed tuberculosis bacteria in the presence of blood if a contact time in excess of 3 minutes was maintained. No “quat” disinfectant killed both polio virus and tuberculosis bacteria in the presence & absence of blood. 	Proteins in blood, serum & milk inactivate “quats” by adsorption. Anionic surfactants and soaps inactivate by chemical reaction. Activity is reduced in the presence of calcium, magnesium and ferric ions. ⁷
Phenolics	<ul style="list-style-type: none"> Broad germicidal activity Low toxicity Slightly corrosive 	<ul style="list-style-type: none"> Strong odour Not effective against spores 	10 Phenolic based disinfectants tested by CRA. All 10 failed to kill both tuberculosis and poliovirus in the presence and absence of blood. ⁸	CRA comments that: “Inability to inactivate non-enveloped viruses is a major weakness of phenolic-based disinfectants that has been well described in the literature for many years. But this point has been continuously ignored by disinfectant manufacturers and distributors.” ⁸
Pre-Wet Wipes	<ul style="list-style-type: none"> Convenience 	<ul style="list-style-type: none"> Limited germicidal activity Highly variable performance Evaporation and loss of antimicrobial activity over time Poor release of disinfectant to surfaces 	<ul style="list-style-type: none"> 8 Disinfectant wipes tested, none were effective against poliovirus & only 1 was effective against the tuberculosis bacteria.⁹ Evaporation of the alcohol from “pull-out” wipes can decrease the antimicrobial effectiveness of the wipes.⁹ Individual packaging did not improve antimicrobial performance 	A major problem with pre-wet wipes is achieving intimate contact of the disinfectant with the microorganisms. Most pre-wet wipes are formulated with a combination of “quats” and low levels of alcohol.

** CRA Tests found: 1. “No quaternary ammonium chloride based products killed both test virus & test bacteria in the absence & presence of blood”
 2. CRA Identified 5 disinfectants having specified characteristics and kill. Of these disinfectants 4 were ethyl alcohol based disinfectants.

¹ The Clinical Research Associates (CRA) carried out a series of test on commercial disinfectants. Tuberculosis bacteria & Poliovirus were used as test organisms which were exposed to disinfectants for 1,3& 10 minutes using the mean of at least 3 separate tests performed in triplicate, with and without blood present. By convention < 3 log₁₀ reduction constitutes inadequate kill. Please refer to CRA articles for complete protocols and results.

² Clinical Research Associates Newsletter, “Environmental Surface Disinfectants, Alcohols”, Volume 20, Issue 1, p1-2, 1996.

³ Disinfection, Sterilization, and Preservation., 4th Edition, Seymour S. Block, Publisher Lea & Febiger, Philadelphia.

⁴ Resnick, L., Veron, K., Salahuddin, S. Z., Tondreau, S., & Markham, P.D., “Stability and inactivation of HTLV-III/LAV under clinical and laboratory environments. JAMA, 255, 1887-1981, 1986.

⁵ Clinical Research Association Newsletter, “Environmental Surface Disinfectants, Chlorines”, March, p 2, 1994.

⁶ Clinical Research Association Newsletter, “Environmental Surface Disinfectants, Quaternary Ammonium Chlorides”, December, p 2-3, 2000.

⁷ Huntsman Surfactants handbook, 2nd edition, October 2000.

⁸ Clinical Research Association Newsletter, “Environmental Surface Disinfectants, Phenolics”, January, p 2, 1995.

⁹ Clinical Research Association Newsletter, “Environmental Surface Disinfectants, Pre-Wet Wipes”, April, p 3, 1999.