

Efficacy of Asthma-Safe Disinfectants

Green Schools Initiative and Green Purchasing Institute developed this list of “asthma-safe” disinfectants based on a review of products that do not contain bleach, quaternary ammonium compounds, pine oil, or ortho-phenylphenol. The product tables are organized by “active ingredient.” This is a list of representative products, not an exhaustive list. For a fuller discussion of the health and environmental criteria used to review disinfectants see the *Green Schools Buying Guide* section on “Cleaners” at www.greenschools.net.

Efficacy Information for Antimicrobial Products Containing Accelerated Hydrogen Peroxide (AHP)						
Product	Bacteria	Viruses	Fungi	Kill Rate	Dwell Time	
Oxivir Tb (RTU, 0.5% AHP) ¹ This product has the same formulation and efficacy as Carpe Diem Tb and Accel Tb. This product is available as a pre-diluted liquid (EPA Reg. No. 70627-56) and wipes (EPA Reg. No. 70627-56)	<ul style="list-style-type: none"> • E. coli • Antibiotic-resistant Enterococcus faecalis (VRE) • Klebsiella pneumonia • Pseudomonas aeruginosa • Salmonella enterica • Staphylococcus aureus/MRSA) 			Sanitizing level	30 seconds	
	<ul style="list-style-type: none"> • Acinetobacter baumannii • Clostridium difficile • E. coli • Enterococcus faecium/VRE • Pseudomonas aeruginosa • Salmonella enterica • Staphylococcus aureus/MRSA 	<ul style="list-style-type: none"> • Feline Calicivirus (surrogate for Norovirus) • Hepatitis B/C • Herpes Simplex • HIV-1 • Human Coronavirus • Influenza A (flu virus, surrogate for H1N1) • Poliovirus • Rhinovirus • Rotavirus 		Disinfection level	1 minute	
	<ul style="list-style-type: none"> • Mycobacterium bovis (TB) 				Disinfection level	5 minutes
				<ul style="list-style-type: none"> • Athletes Foot Fungus 	Disinfection level	10 minutes

Oxivir Tb is a ready-to-use product containing 0.5% accelerated hydrogen peroxide (AHP) as the only active ingredient. This product is registered with CA DPR as a disinfectant, bactericide, and virucide. Fungi are also listed as a target pest. It carries a signal word of CAUTION.

The product is dispensed from a trigger spray bottle, which is sold in two sizes – 12 and 32 oz. It also is available as wipes. It is designed to be used on hard, non-porous surfaces such as vinyl, plastic, glazed ceramic, baked enamel, tile and porcelain; chrome, and laminated surfaces including walls, ceilings, tables, chairs, counter tops, telephones, fixtures, toilet exteriors, sinks, and shower stalls.



Heavily soiled areas should be pre-cleaned prior to application. Once sprayed on a surface, the surface should remain wet for 1 minute to kill bacteria and viruses, 5 minutes to kill Tb, and 10 minutes to kill fungi. After applications, wet surface areas can be wiped dry or be left to air-dry; rinsing is not required. This product should not be used to sanitize or disinfect food contact surfaces or items such as glassware, utensils, or dishes.²

Efficacy Information for Antimicrobial Products Containing Accelerated Hydrogen Peroxide (AHP)

Product	Bacteria	Viruses	Fungi	Kill Rate	Dwell Time
Oxivir Five 16 ³ Concentrate (4.25% AHP, diluted 1:16) EPA Reg. No. 70627-58	<ul style="list-style-type: none"> • E. coli • Enterococcus faecium • Klebsiella pneumoniae • Listeria monocytogenes • Pseudomonas aureginos • Salmonella • Staphylococcus aureus 			Sanitizing level (99.9%)	3 minutes
	<ul style="list-style-type: none"> • Acinetobacter baumannii • E. coli • Enterococcus faecium/VRE • Klebsiella pneumoniae • Listeria monocytogenes • Pseudomonas aureginos • Salmonella • Shingella dysenteriae • Staphylococcus aureus/MRSA • Staphylococcus epidermidis/MRSE • Streptococcus pyogenes 	<ul style="list-style-type: none"> • Canine parvovirus • Hepatitis B/C • Herpes • HIV-1 • Human Coronavirus • Influenza A (flu virus, surrogate for H1N1) • Norovirus • Para-influenza • Poliovirus • Respiratory Syncytial Virus • Rotavirus • Vaccina virus (smallpox) 		Disinfection level	5 minutes
				<ul style="list-style-type: none"> • Athletes Foot Fungus • Mildew 	Disinfection level

**The following CA-registered products have the same active ingredients and are expected to have equivalent efficacies: Carpe Diem Five 16*



Oxivir Five 16 is a concentrated product that contains 4.25% accelerated hydrogen peroxide (AHP). This product is registered with CA DPR as a disinfectant, bactericide, virucide, and fungicide. It is not approved to kill Tuberculosis. It is registered an antimicrobial cleaner, as its tests were conducted in the presence of 5% organic matter. It carries a signal word of CAUTION. It has a pH of 1.9 at the 1:16 dilution.

Oxivir Five 16 is available in portable Ready-to-Dispense (RTD) containers with hand-held automatic dilution equipment capable dispensing solutions at various concentrations, including 1:16 and 1:64 for two levels of disinfecting, 1:128 for sanitizing non-food-contact surfaces, and 1:256 for all-purpose cleaning. It can also be dispensed at the same concentrations through the JohnsonDiversey J-Fill and SmartDose automatic dilution systems, which are wall-mounted units.⁴ This product is registered for use on hard, non-porous surfaces such as floors, walls, stainless steel, glazed porcelain, and plastic surfaces in hospitals, nursing homes, schools, and commercial facility settings.

This product can be applied using a trigger spray bottle for disinfection and a mop for sanitizing and cleaning. The manufacturer recommends letting a surface remain wet for 5 minutes after application for disinfection, 3 minutes for sanitizing, and 10 minutes to kill fungi. After letting the surface remain wet for a specified dwell time, the product should be rinsed away or can be left to air-dry.⁵

Efficacy Information for Antimicrobial Products Containing Accelerated Hydrogen Peroxide (AHP)

Product	Bacteria	Viruses	Fungi	Kill Rate	Dwell Time
Alpha HP ⁶ Bathroom Disinfectant Concentrate (4.25% AHP, concentrate diluted 1:64) EPA Reg. No. 70627-54	<ul style="list-style-type: none"> • E. coli • Klebsiella pneumoniae • Pseudomonas aureginosa • Enterococcus faecalis (not VRE) • Salmonella choleraesuis • Staphylococcus aureus 			Sanitizing Level (99.9%)	3 minutes
	<ul style="list-style-type: none"> • Pseudomonas aureginosa • Salmonella choleraesuis • Staphylococcus aureus 	<ul style="list-style-type: none"> • HIV-1 	None listed	Disinfection level	1 minute
		<ul style="list-style-type: none"> • Herpes simplex • Influenza A (flu virus, surrogate for H1N1) 		Disinfection level	5 minutes
	<ul style="list-style-type: none"> • Pseudomonas aureginosa • Salmonella choleraesuis • Staphylococcus aureus 			Disinfection level	10 minutes
Alpha HP ⁷ Bathroom Disinfectant Concentrate (4.25% AHP, concentrate diluted 1:128) EPA Reg. No. 70627-54	<ul style="list-style-type: none"> • E. coli • Klebsiella pneumoniae • Pseudomonas aureginosa • Enterococcus faecalis (not VRE) • Salmonella choleraesuis • Staphylococcus aureus 			Sanitizing Level (99.9%)	3 minutes
		<ul style="list-style-type: none"> • Herpes simplex • Influenza A (flu virus, surrogate for H1N1) 		Disinfection level	5 minutes
		<ul style="list-style-type: none"> • HIV-1 	None listed	Disinfection level	1 minute

Alpha HP Bathroom Disinfectant Cleaner is a concentrated antimicrobial cleaning product containing 4.25% accelerated hydrogen peroxide (AHP). It is registered with CA DPR as a disinfectant, bactericide, and virucide. It has efficacy against a limited number of bacteria and viruses that are typically found in restrooms. It is not registered as a fungicide or tuberculocide. It carries a signal word of DANGER but is much less hazardous when it is diluted at varying strengths for use as a disinfectant, sanitizer or general purpose cleaner.

This product is available in portable Ready-to-Dispense (RTD) containers with hand-held automatic dilution equipment capable creating solutions of various concentrations, including 1:64 for disinfecting, 1:128 for sanitizing non-food-contact surfaces, and 1:256 for all-purpose cleaning.⁸ The manufacturer recommends using it on hard, non-porous surfaces such as mirrors, glass, sinks, faucets, tubs, glazed tiles/ceramic/porcelain, chrome and stainless steel in bathrooms, nursing homes, and hospital settings. It can be applied using trigger spray bottles for disinfection at a 1:64 dilution. At a 1:128 dilution, it can be applied using a trigger spray bottle or dispensed into a bucket and applied with a mop for sanitizing larger surfaces such as restroom floors. This product has dwell times ranging from 3 minutes for basic bacterial sanitizing to 5-10 minutes for disinfecting against a broader range of bacteria and viruses. This product can be wiped off or left to air-dry after application and should not be used on surfaces with food contact.⁹

Efficacy Information for Antimicrobial Products Containing Hydrogen Peroxide

Product	Bacteria	Viruses	Fungi	Kill Rate	Dwell Time
Envirox Concentrate 118 ¹⁰ (3.95% Hydrogen Peroxide diluted 10 oz per gallon or 1:12.8) EPA Reg. No. 69268-2	<ul style="list-style-type: none"> • E. coli • Klebsiella pneumoniae • Salmonella choleraesuis • Staphylococcus aureus (not MRSA) • Streptococcus faecalis 	<ul style="list-style-type: none"> • Hepatitis B • Herpes • HIV-1 • Influenza A (flu virus) 	None listed	99.99% (of bacteria) 99.9% (of viruses)	5 minutes



Envirox Concentrate 118 is a concentrated product containing 3.95% hydrogen peroxide that is designed to be diluted 10 ounces per gallon (1:12.8). It is registered with CA DPR as a disinfectant, but not as a fungicide or virucide. Bacteria and viruses are listed as target pests on its EPA label. It carries a signal word of CAUTION.

This concentrated product is designed to be automatically diluted using the Envirox Eco-Blend Wall Mount Dispenser and Eco-Blend Hand-held Dispenser. However, because it is sold in an open container, it can be poured directly into a mop bucket or spray bottle, which may result in misuse. For manual dilution, Envirox supplies a Bucket Buddy tool that can be used on trigger spray bottles, mop buckets, and gallon containers to measure the correct amount of product.

The product label recommends using this product on hard, non-porous surfaces such as: walls, stalls, floors, sinks, fixtures, counters, toilets, and carpet for spot treatment and cleaning. According to its label, this product can be used as a bacterial sanitizer and virucide by applying to pre-cleaned surfaces with a mop, sponge or cloth. The surface should remain wet with the solution for 5 minutes and then either wiped away to remove excess liquid or left to air-dry.¹¹

Efficacy Information for Antimicrobial Products Containing Hydrogen Peroxide

Product	Bacteria	Viruses	Fungi	Kill Rate	Dwell Time
H2Orange2 120 One ¹² (RTU, 1% Hydrogen Peroxide) EPA Reg. No. 69268-3	<ul style="list-style-type: none"> • E. coli • Klebsiella pneumoniae • Pseudomonas aeruginosa • Salmonella choleraesuis • Staphylococcus aureus (not MRSA) • Streptococcus faecalis 	<ul style="list-style-type: none"> • HIV-1 • Influenza A (flu virus) 	<ul style="list-style-type: none"> • Athletes Foot Fungus* 	99.9% (of bacteria) 99.99% (of Influenza A virus)	5 minutes

H2Orange2 One is a ready-to-use product containing 1% hydrogen peroxide. It is registered with CA DPR as a bacterial disinfectant and virucide. Its DPR label also includes fungi as a target pest. It carries a CAUTION signal word. H2Orange2 One is sold in trigger spray bottles. The manufacturer recommends using it on hard, non-porous surfaces including: sinks, faucets, counters, toilets, wall, stalls, and floors in bathroom and institutional settings. For bacterial sanitizing and killing viruses and fungi, the product label recommends spraying pre-cleaned surfaces and allowing it to remain wet for 5 minutes before wiping away excess liquid. After application, the surface can be left to air-dry; rinsing is not required.¹³



Efficacy Information for Antimicrobial Products Containing Thymol

Product	Bacteria	Viruses	Fungi	Kill Rate	Dwell Time
Benefect Broad Spectrum Disinfectant (RTU, 0.23% Thymol) ¹⁴ EPA Reg. 84683-3 (liquid) and 84683-4 (wipes)	<ul style="list-style-type: none"> • E. coli • Pseudomonas aeruginosa • Salmonella enterica • Staphylococcus aureus (not MRSA) 	<ul style="list-style-type: none"> • HIV-1 • Influenza A (flu virus, surrogate for H1N1)¹⁵ 	<ul style="list-style-type: none"> • Athletes Foot Fungus 	99.99%	10 minutes
	Mycobacterium (TB)			99.99%	5 minutes



Benefect is an EcoLogo-certified, broad-spectrum disinfectant that lists 0.23% thymol as its only active ingredient. It is registered by the CA DPR as a bactericide, virucide and fungicide. It can kill both Athletes Foot Fungus and TB. However, it does not have demonstrated efficacy against antibiotic-resistant bacteria (such as MRSA or VRE) and has only limited efficacy against viruses. This product is available as a liquid and wipes; it must be left on surfaces for at least 10 minutes to kill most organisms. However, according to the manufacturer of this product, it does not need to be rinsed or wiped off after being applied. It is marketed for use on countertops, sinks, toilet seats, diaper pails and changing areas, toys, sports equipment and carpeting in schools, daycare centers, nurseries, fitness gyms, hospitals, nursing homes, hotels and restaurants. The manufacturer also claims that it can be used in food preparation areas because it is a botanical product.¹⁶

Efficacy Information for Antimicrobial Products Containing Thymol

Product	Bacteria	Viruses	Fungi	Kill Rate	Dwell Time
Cleanwell Daily/ Weekly/ Monthly Cleaner (RTU, 0.05% Thymol)* ¹⁷ EPA Reg. No. 84683-3-86066	<ul style="list-style-type: none"> • E. coli • Pseudomonas aeruginosa • Salmonella choleraesuis • Staphylococcus aureus (not MRSA) 	<ul style="list-style-type: none"> • HIV-1 • Influenza A (flu virus, surrogate for H1N1) • Rhinovirus 37 	None listed.	99.99%	10 minutes

**This is the same formulation as Seventh Generation's Disinfecting Bathroom Cleaner.*

Cleanwell Daily Cleaners are ready-to-use solutions that are marketed to the consumer and institutional marketplaces. They registered as bactericides and virucides by the CA DPR but are not registered against fungi or Tb.



According to the product label for Seventh Generation Disinfecting Multi-Surface Cleaner, it “cleans, disinfects, and deodorizes” and is “suitable for use on all hard, nonporous surfaces where bacteria or unpleasant odors are a concern including: children’s toys, garbage cans, appliances, countertops, high chairs and changing tables.... To disinfect: (1) Wet the surface with the spray; (2) Leave for 10 minutes. Allow to air-dry. No rinsing or wiping is required, except on direct food contact surfaces which require a potable water rinse after treatment. For heavily soiled or greasy areas, pre-cleaning is required.”

Efficacy Information for Antimicrobial Products Containing Thymol and Citric Acid

Product	Bacteria	Viruses	Fungi	Kill Rate	Dwell Time
	<ul style="list-style-type: none"> E. coli Staphylococcus aureus (not MRSA) 			99.9%	1 minute
Sol-U-Guard 2X Botanical Disinfectant* (concentrate; 0.092% Thymol + 4% Citric acid) ¹⁸ EPA Reg. No. 66251-2	<ul style="list-style-type: none"> Pseudomonas aeruginosa Salmonella enterica Streptococcus pyogenes (Strep) 	<ul style="list-style-type: none"> Influenza A (flu virus, surrogate for H1N1) Poliovirus 1 Rhinovirus 37 	None listed.	99.9%	10 minutes

**This product is also called SBT 2 to 1 Concentrate.*



Sol-U-Guard is a concentrated disinfectant that contains both thymol and citric acid. It is registered as a disinfectant but does not have demonstrated efficacy against antibiotic-resistant bacteria such as MRSA or VRE. It also is not registered to kill fungi (such as Athletes Foot Fungus), Tb, or Hepatitis viruses. This product has a dwell time of 10 minutes for most organisms. According to the marketing material for this product, “The Sol-U-Guard Botanical 2x formula is the first EPA approved disinfectant to combine thymol and citric acid as active ingredients. Together these proven botanical disinfectants kill over 99.9%* of common household germs on hard, nonporous surfaces, some in as little as 1 minute.”¹⁹

Efficacy Information for Antimicrobial Products Containing Citric Acid

Product	Bacteria	Viruses	Fungi	Kill Rate	Dwell Time
Clean-Cide ²⁰ [0.6%, RTU liquid] EPA Reg. No. 34810-35	<ul style="list-style-type: none"> E. coli Enterococcus faecalis Vancomycin/VRE Listeria monocytogenes Pseudomonas aeruginosa Salmonella choleraesuis Staphylococcus aureus/MRSA Staphylococcus epidermis/MRSE Mycobacterium bovis (TB) Acinetobacter baumannii 	<ul style="list-style-type: none"> Adenovirus Feline Calicivirus (surrogate for Norovirus) Herpes HIV-1 Influenza A (flu virus) Respiratory Syncytial virus Rotavirus Vaccina virus Canine Parvovirus Hepatitis B Poliovirus 	<ul style="list-style-type: none"> Athletes Foot Fungus 	Disinfectant level	5 minutes
				Disinfectant level	10 minutes

Clean-Cide Ready to Use Germicidal Detergent is a ready-to-use disinfecting cleaner with 0.6% citric acid. Citric acid is the only active ingredient reported by CA DPR for this product, and there are no hazardous ingredients listed on its MSDS.²¹ It is registered with CA DPR as a bactericide, virucide and fungicide, and according to US EPA, it is effective against a broad range of bacteria (including antibiotic-resistant strains such as MRSA and VRE), TB, and viruses, except Hepatitis C.²² A technical information sheet for Clean-cide states that it is formulated to clean and disinfect, meets OSHA Requirements for Bloodborne Pathogens, and is effective against both gram-negative and gram-positive bacteria.²³ It is not approved for use on food-contact surfaces.



Clean-Cide is available as a liquid and wipes. According to the product label instructions, the liquid must be applied at full strength to previously cleaned, hard, non-porous surfaces with a cloth, mop or brush, or by immersing equipment to be disinfected.²⁴ "The surface must remain wet with Clean-Cide for at least 10 minutes. Wipe or let air dry."²⁵

This product is approved for use in California generally on non-porous surfaces and specifically in veterinary hospitals, nursing homes, food processing/handling facilities (only on non-food contact surfaces), and household sickrooms as well as on hospital critical/semi-critical items.²⁶

Efficacy Information for Antimicrobial Products Containing Citric Acid + Silver Ions					
Product	Bacteria	Viruses	Fungi	Kill Rate	Dwell Time
Envirox Critical Care* (RTU, 4.84% citric acid + 0.003% silver ions)	<ul style="list-style-type: none"> • Listeria monocytogenes • Pseudomonas aeruginosa • Salmonella choleraesuis • Staphylococcus aureus 	<ul style="list-style-type: none"> • HIV-1 		Disinfectant level	30 seconds
		<ul style="list-style-type: none"> • Herpes 		Disinfectant level	1 minute
Various products have different EPA registration numbers	<ul style="list-style-type: none"> • MRSA • VRE 			Disinfectant level	2 minutes
		<ul style="list-style-type: none"> • Influenza A • Rhinovirus • Polio Type 2 	<ul style="list-style-type: none"> • Athletes Foot Fungus 	Disinfectant level	10 minutes

*The following CA-registered products have the same active ingredients and are expected to have equivalent efficacies: Clean Kill 30, Duraclean, Germ Control 24 – Silver Formula, One Shot Plus, PureGreen24, Spectrum 24, Staph Attack and Staph Control.

RECOMMENDED FOR LIMITED USE. Silver ions stabilized with citric acid are found in antimicrobial surface cleaning products used as broad spectrum disinfectants and non-food contact sanitizers. These products are capable of killing bacteria, viruses and fungi on hard, nonporous surfaces. They are approved for use in hospitals, schools and office buildings as well as other commercial and residential settings. They are also EPA-registered for use on toys.



As of September 2009, there were nine products containing silver ions and citric acid as active ingredients registered for use in California by the CA DPR. They are all ready-to-use products that contain 0.003% silver (ionic or metallic) and 4.84% citric acid, and can be applied by spraying, washing, soaking or dipping.

Although it can kill some pathogens (such as HIV and “Staph” bacteria) in as little as 30 seconds, the typical citric acid-stabilized silver ion surface disinfectant needs to be left on surfaces (dwell) for 10 minutes to kill other viruses (such as Rhinovirus and Influenza A, which can cause colds and flu) and fungi (such as the fungus that causes Athlete’s Foot). None of these products are found on EPA’s lists of antimicrobial products capable of killing Tuberculosis (TB)²⁷ or Hepatitis²⁸.

One of the primary benefits of silver is that because metals are inherently persistent, the antimicrobial effects of silver ions can last long after they have been applied. The CDC cited a “comparative evaluation of six disinfectant formulations for residual antimicrobial activity [that] demonstrated that only the silver disinfectant demonstrated significant residual activity against *S. aureus* and *P. aeruginosa*.”²⁹ According to manufacturers, SDC-containing products have “24 hour residual effectiveness” and a shelf life of several years. Disinfectants containing silver ions may also be useful in case of a MRSA outbreak because of its short, 2-minute dwell time against antibiotic-resistant bacteria. However, because this product is only available in a ready-to-use formulation that are typically packaged in spray bottles, it would be most practical and cost-effective for use on small “touch-point” surfaces such as sinks, restroom door handles, etc.

¹ JohnsonDiversey, Inc., 2008. *Oxivir Tb Product Information*, 2008; http://www.ahptechnology.com/products/disinfectants/united_states_disinfectants.

² US EPA, 2009. *Pesticide Product Label System Product Label Information for Oxivir Tb (EPA #70627-56)*; 7/9/09; <http://oaspub.epa.gov/pestlabl/Ppls.getimage?imgid=198577>.

³ JohnsonDiversey, Inc., 2008. *Oxivir Five 16 Product Information*; 2008; http://www.ahptechnology.com/products/disinfectants/united_states_disinfectants.

⁴ JohnsonDiversey, Inc., 2009. *J-Fill Dispensing System Product Information*, 2009; <http://www.johnsondiversev.com/Cultures/en-US/OpCo/Products+and+Systems/Categories/JWP+HK+US+CMS+JFill.htm>.

⁵ JohnsonDiversey, Inc., 2009. *Oxivir Five 16 Concentrate Specification Sheet*, 2009; http://www.johnsondiversev.com/wcmt/ProductAttachments/en-US/PIS/SPC750_OxivirFive16.pdf.

⁶ JohnsonDiversey, Inc., 2008. *Oxivir Five 16 Product Information*; 2008; http://www.ahptechnology.com/products/disinfectants/united_states_disinfectants.

⁷ JohnsonDiversey, Inc., 2008. *Oxivir Five 16 Product Information*; 2008; http://www.ahptechnology.com/products/disinfectants/united_states_disinfectants.

⁸ JohnsonDiversey, Inc., 2009. *J-Fill Dispensing System Product Information*, 2009; <http://www.johnsondiversev.com/Cultures/en-US/OpCo/Products+and+Systems/Categories/JWP+HK+US+CMS+JFill.htm>.

⁹ US EPA, 2009. *Pesticide Product Label System Product Label for Alpha HP (EPA #70627-54)*; 3/18/2009; <http://oaspub.epa.gov/pestlabl/Ppls.getimage?imgid=196553>.

¹⁰ Envirox, LLC, 2007. *Envirox Concentrate 118 Product Information*; 2007; <http://www.h2orange2.com/products-genl-pur-cleaning.asp>. <http://www.h2orange2.com/products-genl-pur-cleaning.asp>

¹¹ Envirox, LLC, 2008. *Envirox Concentrate 118 Total Facility Care Pamphlet*; 2008; http://www.h2orange2.com/docs/Literature/EVX_TriadREV_082508.pdf.

¹² Envirox, LLC, 2007. *H2Orange2 One Product Information*; 2007; <http://www.h2orange2.com/products-genl-pur-cleaning.asp>.

¹³ US EPA, 2005. *Pesticide Product Label System Product Label for H2Orange2 One (EPA #69268-3)*; 6/7/06; <http://oaspub.epa.gov/pestlabl/Ppls.getimage?imgid=178960>.

¹⁴ Sensible Life Products, 2008. *Benefect Botanical Disinfectant Efficacy*, <http://www.benefect.com/usa/products/efficacy.htm>.

¹⁵ The efficacy data sheet on this company’s website does not include Influenza A; however, it is included on the US EPA’s list of products with efficacy against the flu virus. For a full list, go to US Environmental Protection Agency, Office of Pesticide Programs, *Antimicrobial Products Registered for Use Against Influenza A Virus on Hard Surfaces*, April 28, 2009, <http://www.epa.gov/oppad001/influenza-a-product-list.pdf>.

¹⁶ Sensible Life Products, *Benefect Botanical Disinfectant*, <http://www.benefect.com/usa/products/disinfectants.htm>.

¹⁷ Cleanwell Company 2005. *Cleanwell Ingenium™ Laboratory Validation: AOAC Germicidal Spray Method and Virucidal Efficacy for Use on Inanimate Environmental Surfaces (Confidential)*,

¹⁸ Melaleuca, Inc., 2009. *Sol-U-Guard Botanical® 2x Concentrate*, undated website viewed on September 15, 2009, <http://www.saferforyourhome.com/sol-u-guard.htm#effective>.

¹⁹ Melaleuca, Inc., *Solu-U-Guard Botanical 2X Disinfectant*, 2009; <http://www.melaleuca.com/ProductStore/Product.aspx?sku=4020>.

²⁰ US EPA Pesticide Product Label System, Wexford Labs, Inc. Label for Clean-Cide; see EPA # 34810-35 <http://oaspub.epa.gov/pestlabl/ppls.srchreslt>

²¹ Wexford Labs, Inc., 2009, *Material Safety Data Sheet Clean-Cide [0.6%]*, 2/17/2009, www.wexfordlabs.com/techdata/cleancide%20rtu%20msds.pdf

²² US EPA 2009, *EPA’s Registered Sterilizers, Tuberculocides, and Antimicrobial Products Against Certain Public Health Bacteria and Viruses*, 1/9/09, <http://www.epa.gov/oppad001/chemregindex.htm>,

²³ Wexford Labs, Inc., undated. *Clean-Cide Ready to Use Product Information Sheet*, viewed on 11/19/09; http://www.wexfordlabs.com/pdf/tds_cleancide.pdf.

²⁴ US EPA. Pesticide Product Label System, Wexford Labs, Inc. Label for Clean-Cide; see EPA # 34810-35 <http://oaspub.epa.gov/pestlabl/ppls.srchreslt>

²⁵ US EPA. Pesticide Product Label System, Wexford Labs, Inc. Label for Clean-Cide; see EPA # 34810-35 <http://oaspub.epa.gov/pestlabl/ppls.srchreslt>

²⁶ CA DPR, 2007. Pesticide label information for Clean-Cide, 4/1/07; <http://apps.cdpr.ca.gov/cgi-bin/label/label.pl?typ=pir&prodno=56090>.

²⁷ US Environmental Protection Agency, Office of Pesticide Programs, *List B: Registered Tuberculocide Products Effective Against Mycobacterium tuberculosis*, January 9, 2009; http://www.epa.gov/oppad001/list_b_tuberculocide.pdf.

²⁸ US Environmental Protection Agency, Office of Pesticide Programs, *List B: Registered Tuberculocide Products Effective Against Mycobacterium tuberculosis*, January 9, 2009;

²⁹ Bradley MJ, Lisay CM, Yurkovetsky AV, Sawan SP. Persistent silver disinfection for the environmental control of pathogenic bacteria, *American Journal of Infection Control*, 2003; 31:208-214 cited in CDC 2008.