APPENDIX 13.3-A

SOME COMMONLY USED INDOOR ANTIMICROBIAL PRODUCTS			
Antimicrobial[1]	Action [2]	Advantages	Disadvantages
Alcohols	B, F, V	non-staining; not irritating; non-corrosive	inactivated by organic matter; highly flammable; not effective against spores
Aldehydes (formaldehyde)	B, F, V, S**	inexpensive; not affected by organics	irritating; slow penetration rate; toxic
Chlorine dioxide			Extremely toxic; not recommended for treating occupied areas
Gluteraldehydes;	B, F, V, S**	not affected by organics; not corrosive; less toxic than aldehyde	irritating; expensive; slow penetration
Hydrogen peroxide	B, F, V, S**	stable at low concentrations	corrosive; degrades in heat and ultraviolet light; expensive
Hypochlorites (bleach)	B, F, V, S**	inexpensive	toxic; corrosive; inactivated by organic matter; removes color from fabrics; dissolves protein fibers (wool, silk); NEVER mix with ammoniated detergent (releases chlorine gas)
Iodophors (iodine compounds)	B, F, V, S**	stable; residual action	inactivated by organic matter; expensive; irritating
Ozone			Extremely toxic; not recommended for treating occupied areas
Phenolics	B, F, V	inexpensive; residual action; considered effective against vegetative (growing) bacteria and fungi	toxic; irritating; corrosive; not effective against spores
Quaternary Ammonia Compounds	B*, F, V*	inexpensive; relatively non-toxic; odorless; non-corrosive; stable	inactivated by organic matter; limited efficacy; not considered sporicidal

[1] The Environmental Protection Agency (EPA) registers and regulates antimicrobial pesticides under the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA). To obtain registration, manufacturers of antimicrobial products must meet the basic standards, the foremost being: 1) that the product will not cause unreasonable adverse effects to human health or the environment, and 2) that product labeling and composition comply with the requirements of FIFRA. Full details on antimicrobial registration, labeling, and data requirements are in 40 CFR Parts 152, 156, and 158.

[2] **ACTION Key** B = bacteriocide
F = fungicide
V = virucide
S = sporicide

* Limited effectiveness
** Requires prolonged contact time

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(Reproduced from http://www.epa.gov/opp00001/factsheets/antimic.htm July 2014)

Antimicrobial pesticides are substances or mixtures of substances used to destroy or suppress the growth of harmful microorganisms such as bacteria, viruses, or fungi on inanimate objects and surfaces. Antimicrobial products contain about 275 different active ingredients and are marketed in several formulations: sprays, liquids, concentrated powders, and gases. Today, approximately one billion dollars each year are spent on a variety of different types of antimicrobial products. More than 5000 antimicrobial products are currently registered with the U.S. Environmental Protection Agency (EPA) and sold in the marketplace. Nearly 60% of antimicrobial products are registered to control infectious microorganisms in hospitals and other health care environments.

Antimicrobial pesticides have two major uses:

1. disinfect, sanitize, reduce, or mitigate growth or development of microbiological organisms;
2. protect inanimate objects (for example floors and walls), industrial processes or systems, surfaces, water, or other chemical substances from contamination, fouling, or deterioration caused by bacteria, viruses, fungi, protozoa, algae, or slime.

This category does not include certain pesticides intended for food use but does encompass pesticides with a wide array of other uses. For example, antimicrobial pesticides act as preserving agents in paints, metalworking fluids, wood supports, and many other products to prevent their deterioration. Some examples of antimicrobial pesticide chemicals can be found in the Antimicrobial Chemical Indexes, which are available on the EPA Pesticide Web site .

Types of Antimicrobial Products

Antimicrobial products are divided into two categories based on the type of microbial pest against which the product works.

Non-public health products are used to control growth of algae, odor-causing bacteria, bacteria which cause spoilage, deterioration or fouling of materials and microorganisms infectious only to animals. This general category includes products used in cooling towers, jet fuel, paints, and treatments for textile and paper products.

Public health products are intended to control microorganisms infectious to humans in any inanimate environment. The more commonly used public health antimicrobial products include the following:

Sterilizers (Sporicides): Used to destroy or eliminate all forms of microbial life including fungi, viruses, and all forms of bacteria and their spores. Spores are considered to be the most difficult form of microorganism to destroy. Therefore, EPA considers the term Sporicide to be synonymous with "Sterilizer." Sterilization is critical to infection control and is widely used in hospitals on medical and surgical, instruments and equipment. Types of sterilizers include steam under pressure (autoclaving), dry heat ovens, low temperature gas (ethylene oxide), and liquid chemical sterilants. Gaseous and dry heat sterilizers are used primarily for sterilization of medical instruments. Liquid sterilants are primarily used for delicate instruments which cannot withstand high temperature and gases.

Disinfectants: Used on hard inanimate surfaces and objects to destroy or irreversibly inactivate infectious fungi and bacteria but not necessarily their spores. Disinfectant products are divided into two major types: hospital and general use. Hospital type disinfectants are the most critical to infection control and are used on medical and dental instruments, floors, walls, bed linens, toilet seats, and other surfaces. General disinfectants are the major source of products used in households, swimming pools, and water purifiers.

Sanitizers: Used to reduce, but not necessarily eliminate, microorganisms from the inanimate environment to levels considered safe as determined by public health codes or regulations. Sanitizers include food contact and non-food contact products. Sanitizing rinses for surfaces such as dishes and cooking utensils, as well as equipment and utensils found in dairies, food-processing plants, and eating and drinking establishments comprise the food contact Sanitizers. These products are important because they are used on sites where consumable food products are placed and stored. Non-food contact surface sanitizers include carpet sanitizers, air sanitizers, laundry additives, and in-tank toilet bowl sanitizers.

Antiseptics and Germicides: Used to prevent infection and decay by inhibiting the growth of microorganisms. Because these products are used in or on living humans or animals, they are considered drugs and are thus approved and regulated by the Food and Drug Administration (FDA).