

Disinfecting & Sanitizing Handbook



Introduction

The Multi-Clean Disinfecting & Sanitizing Handbook is designed to be a guide and reference manual that will help educate you and your staff on the importance on what germs are and why germicidal cleaners are needed.

As housekeeping professionals, an important part of your job is to clean areas that require a high degree of cleanliness, such as restrooms, classrooms, hotel rooms, restaurants, medical facilities such as hospitals, nursing homes, etc. The correct use of germicidal cleaners is required to achieve the desired level of cleanliness. Understanding how germicides work and which ones to use are critical to your success.

Information contained in this bulletin is designed to help you achieve your goal. Topics include: what germs are, specific germs of concern, types of germicides, chemistry of germicides, choosing a disinfectant, cleaning procedures, disinfectant terminology, and more.

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Germ

What is a germ

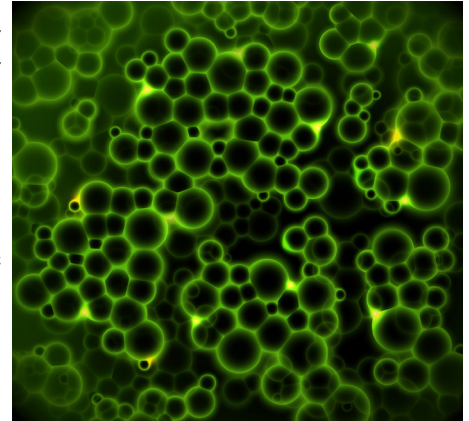
The term “germ” is a generic term used to describe microorganisms that can cause disease. These microorganisms can be bacteria, viruses, fungi, mold or mildew: all single cell organisms that can only be seen with the use of a microscope.

Bacteria: Microorganisms that do not depend on other organisms for survival. They can survive on surfaces for long periods, including door handles, sinks, mops, rags, countertops, cooking utensils, floors, bedposts, etc. Common examples of bacteria include Pseudomonas, Staphylococcus, Salmonella, Streptococcus, and E. coli.

Viruses: Microorganisms that must attach to other organisms (hosts) to survive. They do not survive on hard surfaces for long. Direct contact is required for these microorganisms to survive. Common examples of viruses include: Influenza, Hepatitis, HIV, Norovirus, and Ebola.

Fungus: A primitive plant that is parasitic (obtains nourishment from other living organisms) or saprophytic (feeds on dead or decaying plant or animal material). Common examples of fungi include: Yeast, Mushrooms, and Athlete’s Foot.

Mold and Mildew: Mold lives in the soil, on plants, and on dead or decaying matter. Mold is a fungus, and unlike plants, they lack chlorophyll and must survive by digesting plant materials, using plant and other organic materials for food. Molds produce tiny spores to reproduce, just as plants produce seeds. Molds have the potential to cause health effects, including allergies and asthma. Mildew is a living organism that grows with warmth, humidity, and nutrients. It is a thin, black or sometimes white, growth produced by mold.



Spores: The reproductive element of certain microorganisms. Spores are generally dormant and can survive for long periods of time, sometimes years, and are very difficult to kill. Spores can be thought of as being similar to the seed of a plant. The seed (or spores) will not germinate until they are planted in the ground and the conditions are favorable for growth, such as warmth (spring sun), moisture (rain), and food (fertilizer). Spores are generally not killed by most disinfectants.

Good “Non-Pathogenic” Microorganisms vs. Bad “Pathogenic” Microorganisms: All microorganisms do not cause disease. There are many helpful germs called Non-Pathogenic Microorganisms. In fact, we could not live without non-pathogenic microorganisms. For example: you could not digest your food without the bacteria present in your stomach. Some fungi (yeast) help make food such as bread, beer, wine, or spirits. Bacteria break down dead organic material (compost piles). Molds are used to make medicines, such as penicillin.

However, many other germs can make people sick and even cause them to die. These are called pathogenic microorganisms. The pathogenic microorganisms (germs) are the ones we need to control by stopping their growth before they make people sick.



How germs are transmitted

There are various ways that germs can be spread from one person to another. Some germs can be spread multiple ways, but some can only be spread certain ways, such as through the air or by direct contact.

Direct Contact: This is the easiest way for germs to be transmitted. Direct contact occurs when someone who is sick touches or comes into contact with another person, and the germ is spread directly from the sick person to the other person. All types of germs can be spread this way.

Indirect Contact: Indirect contact occurs when germs are spread through objects called fomites. A fomite is any surface that is capable of carrying an infectious agent or pathogen, which is then spread to someone else. For example, when a sick person touches a fomite such as a doorknob, germs are deposited onto the doorknob. When another person touches that doorknob, germs are spread through indirect contact with the sick person. Examples of fomites include clothing, countertops, bedding, and even skin cells. Bacteria are most commonly spread through indirect contact, while viruses are not usually spread this way due to their inability to survive outside the human body for long periods of time.

Another form of indirect contact is contact with bodily fluids such as blood. If a person touches the blood of a sick person, germs that are present in that blood spread to that person. Viruses are commonly spread through bodily fluid.

Airborne Transmission: Some germs can be spread through droplets of water, saliva, or mucus that travel through the air. When a sick person coughs or sneezes, tiny droplets enter the air and spread germs. These droplets can land on surfaces that are touched by others or they can be breathed in. TB is a common germ that can only be spread through the air.

Specific Germs You Need to Know About

C. Diff.: *Clostridium difficile* (C. Diff.) is a bacteria that often exists in a spore form, meaning it can live for long periods on surfaces and making it very difficult to eliminate. C. Diff. causes colitis, or inflammation of the colon, which leads to fever, nausea, and diarrhea. C. Diff is generally spread through surfaces contaminated with fecal matter.

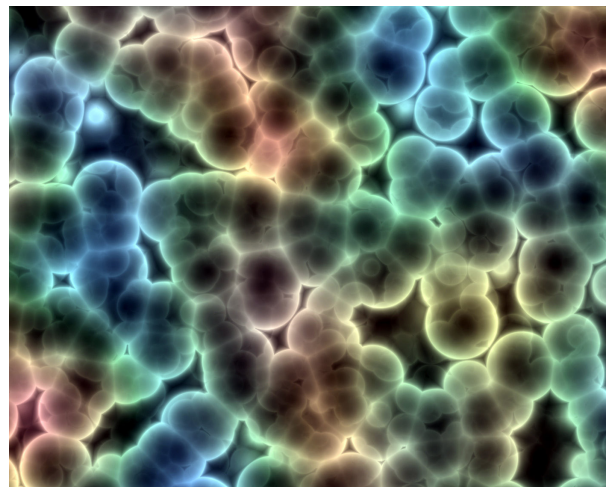
C. Diff. actually lives naturally in the colon, but is neutralized by other bacteria found in the colon. When antibiotics are administered, they can eliminate the other bacteria in the colon, leaving the difficult-to-kill C. Diff. to grow without restriction. This is why overuse of antibiotics can sometimes lead to C. Diff. infection.

There are very few germicides that are registered to kill C. Diff. spores. The most common is an EPA-REGISTERED bleach product.

Super Germs: Antibiotic-resistant “Super Germs” are a significant concern to health care related facilities. These bacteria have developed resistance against treatment with common antibiotics and are easily transmitted. In some hospitals, particularly in intensive care units and nursing homes, where antibiotic use is often highest, there is a higher prevalence of these resistant germs. These Super Germs are more difficult to treat as there are fewer antibiotics with which to treat them.

MRSA & VRE: Methicillin-resistant *Staphylococcus Aureus* (MRSA) is a strain of staph bacteria that is resistant to many antibiotics, namely methicillin. Vancomycin-resistant Enterococci (VRE) is a strain of enterococci (found in the intestines) that is resistant to vancomycin, which is commonly used to treat enterococci infection. These germs are a serious concern in many healthcare facilities due to the serious health problems they can cause.

MRSA and VRE are both spread through direct contact with an infected wound or through contaminated hands. MRSA can be particularly problematic because many people who are infected do not show any symptoms, meaning that they can unknowingly spread it to others. In fact, 2 in 100 people carry MRSA but do not show symptoms. MRSA and VRE can cause serious health issues such as bloodstream infections, pneumonia, and surgical site infections.



HAI's: Healthcare Acquired Infections (HAI's) are those that patients acquire during the course of receiving treatment for other conditions in a healthcare setting. For example, going to the hospital to have a gall stone removed, and consequently contracting a urinary tract infection is one instance of an HAI. HAI's can be spread through the hands of healthcare workers and improperly disinfected tools, equipment, and surfaces. Common HAI's include bloodstream infections, urinary tract infections, surgical site infections, and pneumonia.

The statistics on HAI's are staggering. Current statistics show that 1 in 20 patients contracts an HAI, adding up to 1.8 million cases each year. 99,000 people die from HAI's each year, which makes them the 4th leading cause of patient deaths in the U.S. The cost of treating all of these HAI's after they have been contracted is roughly \$40 billion per year.

Ebola: Ebola virus disease, also known as Ebola hemorrhagic fever, has recently been a widespread public concern due to the largest outbreak in history that has recently spread throughout Africa and also spread on a very limited basis into Europe and North America. Ebola is a very serious and potentially fatal illness, with a mortality rate of about 50%. Symptoms of Ebola start with fever, headache, and fatigue, followed by vomiting and diarrhea. If the virus turns for the worst, internal hemorrhaging begins which significantly increases mortality rate.

Recovery from Ebola depends greatly on proper clinical care and each patient's immune response. In underdeveloped countries such as those in Africa, the health care system is much less developed and has trouble coping with Ebola outbreaks, which leads to higher infection and mortality rates. In developed countries such as the U.S., the health care system is more than equipped to combat Ebola patients, which lowers mortality rates and brings infection rates down to near zero. While Ebola is a major concern in other parts of the world, and is concerning if it contracted by a patient here in the U.S., as long as proper disinfection is performed and other infection control practices are used, Ebola is not a major concern in the U.S. Ebola is actually one of the easier viruses for disinfectants to kill, and the CDC recommends using a disinfectant armed with claims against Non-Enveloped viruses to ensure that Ebola is eliminated.



Non-Enveloped Viruses: The term “Non-Enveloped Virus” refers to the presence, or lack thereof, of a viral envelope in the virus' structure. This envelope is generally made from proteins. Contrary to what you would think, non-enveloped viruses are much more difficult for disinfectants to eliminate. For this reason, certain non-enveloped viruses are major cause for concern. Common non-enveloped viruses include: Adenovirus, Enterovirus, Norovirus, and Rotavirus.

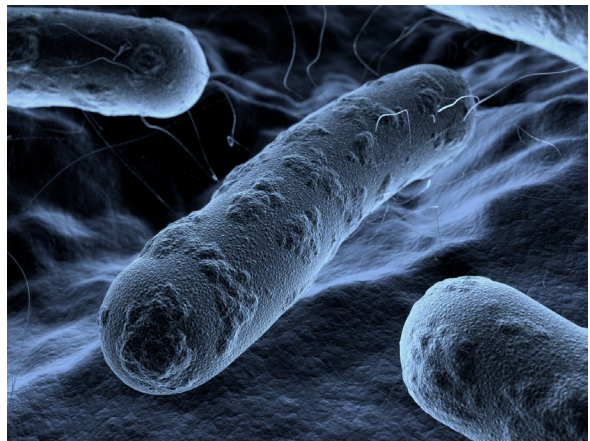
Enterovirus EV-D68: Enterovirus D68 is a specific strain of the non-enveloped Enterovirus. This virus is spread through coughing, sneezing, and indirect contact. Mild symptoms include fever, runny nose, and cough, but more severe symptoms include wheezing and difficulty breathing. There has recently been an outbreak of EV-D68 in the U.S. associated with severe respiratory illness, including 1149 confirmed cases from August to December 2014. It is important to note that each year different strains of viruses like Enterovirus can emerge, but they can be treated similarly in terms of infection control.

Norovirus: Norovirus is an extremely contagious virus that is spread through contaminated food and direct or indirect contact. Norovirus causes the digestive system to become inflamed, causing nausea, vomiting, and diarrhea. Many people associate these symptoms with “stomach flu” but they are actually most commonly caused by Norovirus. Norovirus is also known as the “cruise ship virus” because it can run rampant in closed quarters such as cruise ships; numerous outbreaks have been reported among cruise ships, schools, and healthcare facilities. Each year, Norovirus contributes to 20 million illnesses, 64000 hospitalizations, and 700 deaths.

Hepatitis B Virus: Hepatitis B Virus (HBV) is a virus that attacks the liver and can cause lifelong infection, cirrhosis (scarring) of the liver, liver cancer, liver failure, and death. About 30% of infected persons have no signs or symptoms. Symptoms are less common in children than adults and can include: jaundice, fatigue, abdominal pain, loss of appetite, nausea, vomiting and joint pain. HBV is transmitted when blood or bodily fluids from an infected person enters the body of a person who is not immune. Sexual contact, sharing needles with an infected person, or from an infected mother to her baby during birth are other ways to contract HBV.

Worldwide, it is estimated that there are over 350 million Hepatitis B carriers, which represents 5% of the world's population. HBV is responsible for killing about one million people each year. It is estimated that 10 to 30 million people become infected with the virus each year. HBV is very common in Asia, China, the Philippines, Africa, and the Middle East. In Europe and North America, the incidence of known Hepatitis B carriers is about 1 in 1000 people. Infected persons can be lifelong carriers of the disease. There is no known cure, although there are some medications to treat long lasting HBV (which are effective for only 40% of infected persons). The good news is that vaccinations are available for HBV.

HIV & AIDS: AIDS stands for Acquired Immune Deficiency Syndrome, and is caused by a virus called HIV (Human Immunodeficiency Virus). If you get infected with HIV, your body will try to fight the infection. It will make "antibodies", special molecules that are supposed to fight HIV. When you get a blood test for HIV, the test is really looking for these antibodies. If you have these antibodies in your blood, it means that you are HIV-positive. Being HIV-positive is not the same as having AIDS. Many people are HIV-positive but don't get sick for many years. As HIV continues, it slowly wears down the immune system. Viruses, parasites, fungi, and bacteria that don't usually cause problems can make you very sick when your immune system is damaged. The blood, vaginal fluid, semen and breast milk of people infected with HIV has enough of the virus in it to infect other people. You can get HIV from anyone who is infected, even if they don't look



sick, and even if they haven't tested positive. Most people get the HIV virus by sexual contact with an infected person, sharing a needle with someone who is infected, being born to an infected woman, or drinking the breast milk of an infected woman. Getting a blood transfusion of blood from an infected blood donor used to be a way people got AIDS, but now the blood supply is screened very carefully and the risk is very low.

Once infected, the virus will multiply in your body for a few weeks or even months before your immune system responds. During this time, you won't test positive, but you can infect other people. When your immune system responds, it starts to make antibodies. When you start making antibodies, you will test positive for HIV.

There is no cure for AIDS. There are drugs that can slow down the HIV virus; however there is no way to get all the HIV out of your body.

A Note About Antibiotic-Resistance: Remember that these germs have become resistant to antibiotics, not disinfectants. The difference between antibiotics and disinfectants is like the difference between hunting with a bow & arrow and hunting with a bazooka. An antibiotic is designed to enter the living body and target a specific cellular target, e.g. a particular site in an enzyme. Just one slight change, a simple mutation, and the germs will become resistant to the antibiotics.

Quat disinfectants are nonspecific in their attack. They attach to anything anionic in nature, like the bacterial proteins (i.e. the amino, carboxyl or phosphate groups) that surround the bacteria. The quat, by surrounding the bacteria, disrupts the charges on the cell wall, causing a change in charge distribution (disorganization/denaturing). This disruption causes a subsequent release of the intracellular material or autolysis to take place. Thus the cell is killed.

Germicides

Germicides: What are they? What do they do?

A germicide is a chemical compound that kills or destroys microorganisms (bacteria, viruses, fungi). Each germicide has a set of "kill claims," or a list of microorganisms that the product is certified to kill. Germicides can come in several forms and employ various chemistries. These different forms lend different attributes, such as different use levels, cleaning ability, and sets of kill claims.

Types of Germicides

Germicides come in different forms:

Ready to Use: Aerosol (Foaming & Non-Foaming) or Non-Aerosol (usually with a trigger sprayer)

Concentrated: ¼ ounce per gallon up to 28 ounces per gallon of water.

Hospital Grade: Must have claims to kill *Pseudomonas aeruginosa*, *Staphylococcus aureus* & *Salmonella choleraesuis* (the hospital trio) as a minimum.

Institutional Grade (schools, industry, hotels etc.): Must have claims to kill *Staphylococcus aureus* & *Salmonella choleraesuis* as a minimum.

Germicides employ different levels of germ control:

There are different levels of sanitation that are used to reduce or kill microorganisms depending on the need.

Sanitization: Reduces germs to a safe level, as judged by public health standards. Sanitizing must reduce the number of germs by 99.99%. While 99.99% sounds like it should be good enough, it still can leave a significant number of germs on a surface. There can be several billion germs on a dirty surface, such as a dirty plate. If you have 5,000,000,000 germs on a surface, and you are able to take away 99.99% of them, you are left with 500,000 germs on the surface. Again, sanitization reduces germs to safe levels.

Disinfection: Kills 100% of the germs claimed on a disinfectant label when used as directed. It does not kill spores unless noted.



Sterilization: Will eliminate 100% of all germs and their spores. This is accomplished by the use of autoclaves. Autoclaves are equipment that use high heat and pressure to kill any germs and spores.

Disinfectants have different "levels":

Low Level Disinfectant: Kills most bacteria (such as Staph), some viruses (such as Influenza and bloodborne pathogens), and some fungi. Does not kill TB or bacterial spores. This is most common type of disinfectant.

Intermediate Level Disinfectant: Kills *Mycobacterium Tuberculosis* (TB), vegetative bacteria, and most viruses and fungi. Does not usually eliminate bacterial spores.

High Level Disinfectant: Kills all microorganisms, with the exception of certain bacterial spores.

Chemistry of Germicides

Quaternary Ammonium Chlorides (Quats)

- Low level disinfection
- Most common type of disinfectant and sanitizer
- Many different grades of quats, each with its own specific advantages/claims
- Can be Hospital Grade or Institutional Grade (or both depending on dilutions)
- Pleasant odor, not medicinal (like phenolics). Easy to formulate with different fragrances
- Great Cleaner. Can be formulated with detergents and builders to make disinfectants “One Step Cleaner and Disinfectant”
- Can be used on food contact surfaces
- Can be formulated into neutral, acid, or alkaline-based cleaners/disinfectants
- Not effective against TB (Tuberculosis) by itself. Certain quat/solvent blend technologies are effective against TB, such as Multi-Clean’s Microcide TB

Phenolics

- Intermediate level disinfection
- Effective against TB
- Medicinal Fragrance
- Moderate Cleaning ability
- Effective in Hard Water
- Not to be used of food contact surfaces
- Harsh on floor finishes
- Used at ½ - 2 ounce per gallon
- NOTE: Phenolics should not be used to clean infant bassinets or incubators while occupied, due to the association between exposure to phenolics and hyperbilirubinemia, a source of jaundice that can cause brain damage. Infant bassinets or incubators cleaned with phenolics should be thoroughly rinsed with water and dried before use

Bleach

- Bleach has no cleaning ability. All surfaces to be disinfected must be pre-cleaned first before disinfecting or sanitizing. This makes it a two-step process
- Strong chlorine odor
- Bleach can damage some surfaces, including floor finishes
- Solutions may be inactivated by organic soil and sunlight. Must be made fresh each day
- Must use at 10% dilution (12 oz per gal)
- Inexpensive concentrated. Expensive in diluted state
- Form: 5.5% Sodium Hypochlorite Solution (household bleach)



Peroxide

- Greener option in terms of disinfecting
- Generally low level disinfection
- Excellent cleaner
- Can be used on food contact surfaces
- Acid disinfectant, so not recommended on some surfaces (concrete, floor finishes)

Chemistry of Germicides Summary

	Quat	Phenolic	Peroxide	Bleach
Where to Use	General Care Areas	Critical Care Areas (ICU, ER, etc.)	General Care Areas	General Care Areas
Cleaning Ability	Excellent Cleaner	Moderate Cleaner	Excellent Cleaner	NO CLEANING ABILITY. Must pre-clean surfaces before disinfecting
Fragrance	Pleasant Fragrance	Medicinal Fragrance	Pleasant Fragrance	Strong Chlorine Odor
Food Contact	May be used on food contact surface	May NOT be used on food contact surface	May be used on food contact surface	May be used on food contact surface
Efficacy in Soil	Tested in the presence of organic soil	Tested in the presence of organic soil	Tested in the presence of organic soil	Inactivated by organic soil
Stability	Stable when diluted	Stable when diluted	Stable when diluted	Unstable. Solutions must be made up prior to each use
Concentrate Cost	Moderate cost per gallon	High cost per gallon	Moderate/High cost per gallon	Low cost per gallon
Diluted Cost	Low cost when diluted	Moderate cost when diluted	Moderate cost when diluted	High cost when diluted
Typical Dilution	½ oz – 2 oz per gal (1:256 – 1:64)	½ oz – 2 oz per gal (1:256 – 1:64)	½ oz – 2 oz per gal (1:256 – 1:64)	12 oz per gallon (1:10)

Choosing the Correct Disinfectant

Many factors must be considered when choosing the correct germicide for your applications. Each disinfectant will have different properties that must be evaluated. Below are some of the areas that need to be considered to make an intelligent choice.

Questions to ask before selecting a germicide:

- What organisms do I need to control?
- Do I need a disinfectant & cleaner or a product to disinfect/sanitize surfaces that have been already pre-cleaned?
- What is the proper contact time for this germicide?
- What is the proper dilution or activity level? How expensive is the germicide IN DILUTION?
- What pH does the germicide need to be?
- Is the germicide registered with the EPA? How about the state it is being used in?
- What safety concerns must be addressed before use?

What microorganisms do I need to control?

Do you want to control bacteria from handling raw meat or eggs, or how about mold and mildew in shower rooms, or HIV and HBV in medical facilities, or cleaning up after a basement floods from a sewer back-up, or cleaning up vomit in a school, or cleaning a hallway vinyl tile floor with floor finish? Each of these scenarios has their own specific needs and requires a specific germicide to handle a specific problem. You must know what you are trying to accomplish and then check the germicide label to determine if it has efficacy against these germs.

Efficacy is the ability to destroy a specific claimed germ. All disinfectants must undergo strict laboratory tests to prove that they are effective against each germ that they have made claims for. These results are then submitted to the EPA for review, before the label is approved. The label will also list “directions for use” that will include proper dilution, contact time, and any pre-cleaning steps that may be required. It is important to know what types of germs you are concerned about and if a germicide will be able to make the claims that it will be effective against these germs.

If a germ is not listed on the label of a disinfectant, do not assume that the product will kill that specific germ, the health inspectors won’t, so read the label.

Proper contact time for germicides

Each germicide will state how long it must remain in contact with a surface to achieve the full efficacy of the stated claims. Generally, a 10 minute contact time is standard for most quat germicides. Spray and wipe cleaning generally is not sufficient for full disinfecting. Mopping a floor and letting it air dry generally is sufficient contact time, as most floors will take about 10 minutes to dry. You must read the “directions” or “procedures” section of the label to determine the proper dilution and contact time to get the full benefits of the germicide.

Proper dilution or activity level

A germicide will either be ready-to-use or it will be concentrated and must be diluted. Proper dilution of concentrates is important to get the full benefit of the germicide. By using a dilution higher than what is recommended, either by intention or by accident (glug, glug method), you do not get any additional benefit. It will only be more expensive as you will purchase more chemical than you really need.

Know the activity level or ppm (parts per million) of active ingredients for germicidal cleaners. The percentage of active ingredients is found on the label and can be translated into ppm by simply using this formula:

$$\frac{\% \text{ of active ingredient}}{\text{dilution rate of product}} \times 10,000 = \frac{15}{256} \times 10,000 = 586 \text{ ppm}$$

$$\frac{1}{2} \text{ oz./gal} = 256 \text{ (1:256)}$$

$$1 \text{ oz./gal} = 128 \text{ (1:128)}$$

$$2 \text{ oz./gal} = 64 \text{ (1:64)}$$

Knowing the quat ppm active is important because the effectiveness can deteriorate as the quat germicidal solutions become dirty. The ppm of quat in a mop bucket or spray bottle can be easily tested with test strips that are dipped into a germicide solution and then compared to a color chart on the test kit that will translate into % active PPM quat.

Germicide cost

Never choose a germicide based on the cost per gallon of concentrate. Always focus on the end use cost which is calculated using this formula:

$$\frac{\$ \text{ per gallon concentrate}}{\text{dilution rate of product}} = \text{End Use Cost}$$

Example: Compare the end use cost of a ½ ounce per gallon hospital disinfectant at \$25.60 per gallon vs. a 2 ounce per gallon hospital disinfectant at \$12.30 per gallon.

$$\frac{\$12.30 \text{ per gallon}}{64} = \$0.19 \text{ per gallon diluted}$$

$$\frac{\$25.60 \text{ per gallon}}{256} = \$0.10 \text{ per gallon diluted}$$

As you can see, the ½ oz/gal disinfectant at \$25.60/gallon is more economical to use than the 2 oz/gal. product at \$12.30/gallon. This end use cost will tell you how much it costs every time you use the product. This cost is much more important than the price per gallon of concentrate.

Germicide pH

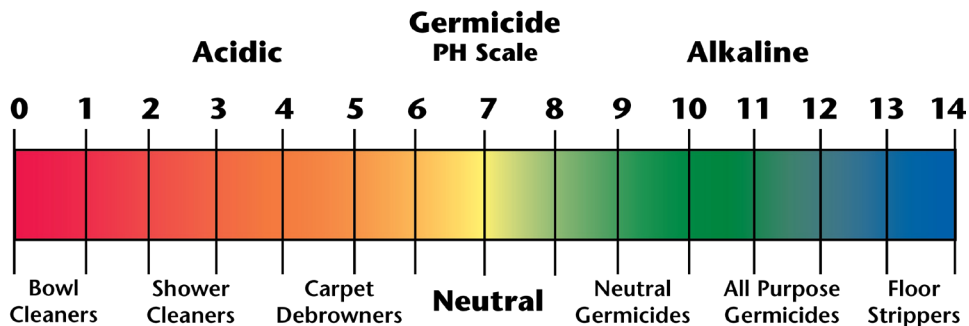
Germicides come in many different pH ranges. The pH of a germicide will be listed on the literature sheet and the Safety Data Sheet for that product. It is important to know the pH of the germicide and how it will affect the surface to which it is being applied.

The pH scale is 0-14 and measures the amount of acidity or alkalinity of a solution.

Acid Germicides: pH 0 - 6 is generally effective in restroom cleaning. Acids are useful for dissolving mineral deposits (hard water), soap scum, and rust stains in sinks, shower rooms, toilet bowls, etc.

Neutral Germicides: pH 7 - 8 is generally used for daily cleaning of vinyl tile and terrazzo floors sealed with acrylic floor finish. Neutral cleaners will not harm the shine and leave no residue when used properly.

Alkaline Germicides: pH 8 - 14 is considered alkaline. Generally, the higher the pH, the better cleaning and degreasing properties a cleaner/germicide will have. However, cleaner/germicides over pH 10 can be harmful to floor finishes.



Make sure your germicidal product is EPA registered.

Every pesticide (including disinfectants and sanitizers) sold in the United States must be registered with the Environmental Protection Agency (EPA). The EPA registration number can be found on the label. In addition, each manufacturer must register each pesticide in each state that the pesticide will be sold in. This registration must be renewed every year. Distributors should check with the manufacturers to verify that every disinfectant they are selling is properly registered for the states they are selling into. The cost of registering each disinfectant in all 50 states can be expensive, so some manufacturers choose to register their disinfectants regionally or only in states where they expect to sell them.

Safety

This is a rather broad area, but is extremely important to the user. Employees charged with the responsibility of using disinfectant products expect and deserve products that will not be detrimental to their health. If the product has potential for health concerns (i.e., skin irritation), the proper protective equipment should be available and be utilized by those using the product.

One of the most common safety complaints about disinfectants is the fumes given off by the product when used. Typically this is due to one or more of three reasons:

1. Mixed too strong: User failed to follow the label directions and either used too much product or too little water.
2. Used hot water: Increasing the water temperature will cause rapid evaporation of the product, fragrance, and/or the disinfectant ingredients, causing respiration and eye irritation, not to mention insufficient contact time. **USE COLD OR WARM WATER.**
3. Aerosolized: Most "above the floor" cleaning is done with hand held spray bottles filled with a solution of the disinfectant. It is common for users to dial the nozzle to the "fine" spray, then when the user sprays the product, to clean a mirror for example, the fine spray is in the user's "breathing zone," and this irritates the nostrils and mucous membranes. In extreme cases, this could lead to a serious respiratory problem. **USE COARSE SPRAY** or use a rag & bucket method. Immerse the rag in the bucket containing the disinfectant and then wring out the rag prior to cleaning a surface.

Cleaning Procedures

The following are recommended cleaning procedures for many different types of facilities. While every facility has different cleaning procedures, these recommendations can be used as either a starting point for developing a procedures manual for a new facility or it may be of use to compare to current cleaning procedures to determine if existing cleaning procedures are optimized or could be updated to be more efficient.

Bloodborne Pathogens: The OSHA Blood Borne Pathogen Act The Bloodborne Pathogen Act was created by OSHA (Occupational Safety and Health Administration) to reduce the number of cases of infectious Hepatitis B and HIV (AIDS) transmitted from infected blood and bodily fluids in the workplace. It covers any employee who may be exposed to infected blood and bodily fluids. Health care workers are particularly affected.

In the early 1980's, OSHA knew very little about HIV (AIDS) and HBV (Hepatitis B Virus), two relatively new bloodborne pathogens at that time. However, they knew that thousands of health care workers were getting sick from these viruses and some were dying. Due to this, OSHA determined that they needed to implement a law to help protect workers from these pathogens. The OSHA Bloodborne Pathogen Act was instituted on December 6, 1991.



Under the Act, employers must:

1. Develop a written exposure control plan including:
 - a) The determination of which employees may be exposed.
 - b) Procedures for evaluating the circumstances of an exposure.
 - c) A schedule and methods for implementing the plan.
2. Provide information and training for each employee covered by the act.
3. Vaccinations for infectious hepatitis must be made available to all employees covered by the Act.
4. Established engineering and work practice controls to reduce exposure to the potentially infected fluids. Personal protection and equipment may also be covered. Proper housekeeping, including the use of appropriate disinfectants, is also required. Containers and equipment holding potentially infected blood or body fluids must be labeled accordingly.
5. If an exposure incident occurs, a medical evaluation must be made available to the exposed employee.
6. Records must be kept for each employee covered by the Act. Medical training records are required.

Products approved for use by the OSHA Bloodborne Pathogen Act

Originally, only chlorine and tuberculocidal (TB) disinfectants were defined as appropriate. In the early 1980's, little was known about HBV and HIV. They did not know how difficult it was to kill HBV and HIV. Since TB was already known to be a very difficult virus to kill, OSHA decided to pick it as a standard. They assumed that if a disinfectant could kill TB, it would also be effective against HBV or HIV.

This caused lots of confusion, as people assumed that this standard had something to do with TB. TB is not transmitted by blood, body fluids or from surfaces. It is caused by airborne particles that must be breathed in. TB was only the standard by which disinfectants were measured.

Since then, research has shown that the HBV and HIV viruses are actually fairly easy to kill. Most disinfectants now have listed claims for both HIV and HBV, and bloodborne pathogens are an almost universal disinfectant kill claim.

Disinfectant Terminology

Bactericidal: The property of killing bacteria.

CDC: Center for Disease Control, a division of the Department of Health, Education, and Welfare.
Web site: <http://www.cdc.gov>. An excellent source of information on disease and health related topics.

Contact Time: The time a disinfectant or sanitizer must remain in contact for full efficacy of stated claims, generally 10 minutes, you must read label to obtain this information.

Disinfection: The destruction of 100% of claimed pathogenic organisms.

Efficacy: The ability to destroy a specific germ as tested by the A.O.A.C Use Dilution Test for disinfectants.

EPA: Environmental Protection Agency, responsible for the registration of pesticides.

Fungus: Multi-cellular organisms including molds, mildews, and mushrooms. Reproduction is accomplished through the formation of spores.

Germicide: Chemical compounds which kills microorganisms, i.e. sanitizers, disinfectants, and sterilants.

High Level Disinfectant: Kills all microorganisms, with the exception of certain bacterial spores.

Hospital Grade Disinfectant: Disinfectants which have been proven effective against three organisms: *Staphylococcus aureus*, *Salmonella choleraesuis*, and *Pseudomonas aeruginosa* (the hospital trio).

Institutional (General) Disinfectant: A disinfectant with efficacy claims against *Staphylococcus aureus* and *Salmonella choleraesuis* (not *Pseudomonas aeruginosa*).

Intermediate Level Disinfectant: Kills *Mycobacterium Tuberculosis* (TB), vegetative bacteria, and most viruses and fungi, does not usually eliminate bacterial spores.

Low Level Disinfectant: Kills most bacteria (such as Staph), some viruses (such as Influenza and bloodborne pathogens), and some fungi, does not kill TB or bacterial spores. This is most common type of disinfectant.

Mold & Mildew: Forms of fungus. Molds lack chlorophyll and must survive by digesting plant materials, using plant and other organic materials for food. Molds produce tiny spores to reproduce. Mildew is a living organism that grows in warmth, humidity and nutrients. It is a thin, black or sometimes white growth produced by mold.

One Step Cleaner/Disinfectant: A product capable of cleaning lightly soiled surfaces and disinfecting them in one step. Without this claim, a pre-cleaning step is required.

No-Rinse Sanitizer: Sanitizer used in food processing plants, not rinsed after use.

Non-Pathogenic Organism: A non-disease-causing organism. Non-pathogenic bacteria can be used in carpet, odor digesters, trap & drains, sewage treatment plants, etc.

Phenol: Carboic Acid. Phenol derivatives are used in disinfectant compounds. Originally extracted from coal tar, they are produced synthetically today.

PPM: Parts per million, this can also be stated as milligrams per liter.

Quat: Shortened name for quaternary ammonium compounds. These surfactants are the active ingredients used in the manufacturing of quat based disinfectants. The active ingredients destroy or disrupt the cell wall of microorganisms.

Sanitizer: A chemical which will kill 99.99% of claimed organisms, normally used in food processing facilities.

Spores: The reproductive element of certain microorganisms. Spores are generally dormant and can survive for long periods of time, sometimes years, and are very difficult to kill.

Sterilize: To kill 100% of all germs and their spores.

Virus: A microorganism which reproduces only within other living cells.

Multi-Clean Germicides



256 Century Q Super Concentrated One Step Cleaner/Disinfectant: A neutral pH, ½ ounce per gallon, hospital grade cleaner/disinfectant. Use on high-gloss finished floors without dulling. Broad Spectrum efficacy including Influenza A, HBV, MRSA, VRE and HIV-1 (AIDS virus) (see Method Bulletin for complete list). Fresh fragrance. EPA Registration Number 47371-129-5449.



64 Millennium Q Multi-Purpose Cleaner/Disinfectant: Hospital Grade Disinfectant used at 1 ounce per gallon of water. Multi-purpose restroom cleaner. Bactericidal (Pseudomonas, Staphylococcus, Salmonella, Streptococcus, MRSA, VRE), Virucidal (HIV-1, HBV, HCV), Fungicidal (Trichophyton) and Mold/Mildew. Includes claims for Norovirus and Canine Parvovirus. Citrus scent. pH: 12.0-12.4. EPA Registration Number: 1839-95-5449.



128 E-FECTicide Super Concentrated One Step Cleaner/Disinfectant: New with fast 5 minute contact times, 1 ounce per gallon, delivers non-acid disinfectant and cleaning performance in an economical concentrate.. Use on high-gloss finished floors without dulling. Broad Spectrum efficacy including Influenza A, HBV, HCV, MRSA, SARS, Norovirus, and HIV-1 (AIDS virus) (see Technical Bulletin for complete list). Fresh fragrance. EPA Registration Number 6836-365-5449.



Fresh 100 Non-Acid Disinfectant Bowl Cleaner: Hospital grade, ready-to-use disinfectant cleaner for restroom maintenance. Its germicidal formula and clinging action makes this exceptional for toilet bowl and urinal sanitation. Effective against: Pseudomonas aeruginosa, Staphylococcus aureus, Salmonella choleraesuis (the hospital trio), Streptococcus pyogenes, Influenza Type A, Herpes Simplex, and HIV-1 (AIDS). Citrus/Fresh Fragrance, pH: 10.8 - 11.0, EPA Registration Number: 47371-97-5449.



Microcide TB Restroom Disinfectant/Cleaner: Microcide TB is a ready-to-use spray cleaner that disinfects as it cleans. Effective against: Pseudomonas aeruginosa, Staphylococcus aureus, Salmonella choleraesuis (the hospital trio), Escherichia coli, HBV, HIV-1, Canine Parvovirus, Trichophyton Mentagrophytes (athletes foot fungus), Clostridium difficile (vegetative form) and Mycobacterium tuberculosis (TB). pH: 11.5. EPA Registration Number: 1839-83-5449.



Peroxi-Cide Disinfects, Deodorizes, Cleans is ready to use and offers a faster kill time than many disinfectants for common pathogens. Kills Human Coronavirus in 1 minute. Kills Norovirus in 3 minutes. Approved on EPA List N under EPA reg no. 6836-385-5449.



MC Wipes: No-rinse disinfectant wipe that cleans and disinfects in one easy step. Effective against MRSA, VRE, HBV, HIV-1, Influenza A, and Norovirus, five minute contact time. Kills SARS-CoV-2, the cause of COVID-19 on hard, non-porous surfaces in 30 seconds. EPA Registration Number: 1839-190-5449.



M-C 10 Sanitizer, High Potency Quaternary: Highly effective no-rinse sanitizer recommended in all phases of food processing and in food service environments. When used at ¼ ounce per gallon (1: 512), it supplies 200 ppm active quaternary and meets the USDA performance standards for D2 type products. pH: 6-8, EPA Registration Number: 10324-63-5449.



Quat Test strips: Test quat levels in parts per million (PPM).

LIST N: DISINFECTANTS FOR USE AGAINST SARS-CoV-2

Disinfectant Name	Primary Registrant Product Name	Primary EPA Reg. No.	Contact Time	Active Ingredient	Primary Registrant	Follow Directions for this Virus	Emerging Pathogen Claim	Formulation Type
Microcide TB	Detergent Disinfectant Pump Spray	1839-83	1 min	Quaternary Ammonium	Stepan	SARS-CoV-2	Y	Ready To Use
Peroxi-Cide	DS-6640	6836-385	1 min	Hydrogen Peroxide	Lonza	SARS-CoV-2	Y	Ready To Use
E-Fecticide	Nugen MB5N-128	6836-365	1 min	Quaternary Ammonium	Lonza	SARS-CoV-2	Y	Dilutable; Electrostatic Spray
MC Disinfecting Wipes	Stepan Disinfecting Wipe	1839-190	30 secs	Quaternary Ammonium	Stepan	SARS-CoV-2	Y	Wipes
Millennium Q	NP 4.5 (D&F) Detergent/Disinfectant	1839-95	10 mins	Quaternary Ammonium	Stepan	Norovirus	Y	Dilutable
E-Fecticide One Shot	Nugen MB5N-128	6836-365	1 min	Quaternary Ammonium	Lonza	SARS-CoV-2	Y	Dilutable; Electrostatic Spray
Century Q	HWS-256	47371-129	1 min	Quaternary Ammonium	Lonza	SARS-CoV-2	Y	Dilutable

Four Common Mistakes Made with Germicides:

1. Contact Time: To achieve proper contact time, disinfected surfaces should be left visibly moist and allowed to air dry. Read labels on all disinfectants for specific instructions on contact time. Mopping floors and allowing to air dry, or wiping a surface with a damp rag that was immersed in a bucket of containing the disinfectant and wrung out and then allowed to air dry, is acceptable.

2. Fresh Solutions/Cross Contamination: All concentrated disinfectants should be made up fresh each day or when the mop bucket solution becomes visually dirty.

3. Mixing Disinfectants with other Cleaners: Do not play junior chemist. Never, mix a disinfectant with another chemical, unless directed to by a disinfectant label.

4. Not mixing the proper dilutions: Read the label for specific dilutions for each application. Adding more disinfectant than directed does not give you more effectiveness for disinfecting a surface, it will cost you more money by wasting chemical. Using less disinfectant than required will not give you the disinfecting properties that you need, which is why you are using a disinfectant in the first place.



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