[Organization Name/Logo]

[Organization Address
Contact Number]

STANDARD OPERATING PROCEDURE #7

Work Instructions for Selection and Effective Use of Disinfectants

Revision Register:

Documentation and Responsibility	Name	Title	Date
Amended by:			

Last Review Date	Next Review Date

Created for James R. Favor & Company by
Council Rock Consulting, Inc.

OBJECTIVE

To provide instructions on the selection and effective use of disinfectants.

DEFINITIONS

1) "Work" in this standard operating procedure (SOP) refers to any activity that may result in exposure to a potentially-infectious pathogen (e.g., virus, bacteria) or caustic agent (e.g., ammonia).
2) PPE – Personal Protective Equipment
3) OSHA – Occupational Safety and Health Administration
4) EPA – Environmental Protection Agency
5) Disinfectants –chemical agents that can effectively reduce the level of microbial contamination and the risk of spreading infection
6) Cleaning – Removal of germs, dirt and impurities from surfaces, cleaning lowers the risk of spreading infection but it alone does not kill germs
7) Disinfection – Killing of large number of germs/micro-organisms on surfaces, which can further lower the risk of spreading infection
8) Decontamination – Removal of all microbial contamination to render the environment completely safe

SAFETY

The Occupational Safety and Health Administration (OSHA) has written regulations (29CFR1910.1200) to ensure that workers at any work site understand the hazards of the use of chemical agents and the use of appropriate Personal Protection Equipment (PPE). This also applies to residents and maintenance personnel who engage in cleaning, decontamination, and other activities where there is a chance of exposure to potentially-infectious germs and/or caustic agents.

Disinfectants are chemical agents that can effectively reduce the level of microbial contamination and the risk of spreading infection. PPE must be worn to minimize exposure to hazards associated with a disinfectant that may result in serious illnesses or injuries. Additionally, engineering controls, administrative controls and safe work practices should be implemented to mitigate potential hazards and risks associated with the work.

PROCEDURES

1) Selection of Disinfectants

a. Choose an EPA-registered disinfectant.

Disinfection and decontamination of surfaces are accomplished through the use of chemical disinfectants. To qualify as a disinfectant, EPA requires that the product can reduce the level of germs by 99.9% in 5-10 minutes. The EPA registration number (EPA Reg. No.) on the label can confirm whether the product is qualified. Manufacturers/distributors often sell multiple products under different brand names with similar formulations and efficacy as the primary products. These can be identified by the EPA Reg. No. The first set of numbers refers to the company identification number and the second set represents the product number. The third set of numbers represents the distributor/re-labeler ID number. For example, EPA Reg. No. 12345-12-2567 is a distributor product with an identical formulation and effectiveness as the primary product with the EPA Reg. No. 12345-12.

b. Be specific with the type of germs that you want to eradicate.

i. Determine what type of germs (e.g. bacteria, virus) to be removed in order to make the appropriate selection of disinfectant. Bacteria and enveloped viruses (such as coronavirus) are generally more susceptible to disinfection, so most of the commercially available disinfectants containing bleach, peroxide, quaternary ammonium (quats), alcohol, phenolics and aldehydes can be used.

ii. On the other hand, bacterial spores are more resistant to disinfection and cannot be removed by some disinfectants such as peroxide and quats.

iii. Always consult the product label to be sure that the specific germs you want to eradicate are listed. If the germs are unknown, it is best to choose a broad-spectrum disinfectant that is effective against multiple germs.

c. Determine the surface/item being disinfected.

i. Determine what needs to be disinfected. Germs live on dry and moist surfaces, and they can persist on surfaces for long periods. Frequently touched surfaces can accumulate a concentration of pathogens and should be disinfected frequently.

ii. Some products like bleach are corrosive and may degrade surfaces over time. These products may require a rinse step with water when used with certain surfaces, such as stainless steel.

iii. For surfaces that may come into contact with food, such as countertops or cutting boards, rinse them with water after the disinfectant dries.

iv. For porous surfaces, such as marble top, refer to the surface manufacturer's recommendations. Do not use acidic disinfectant on a porous material as it will ruin the surface.

v. For electronics, follow the manufacturer's instructions for disinfection. Consider the use of alcohol-based wipes to disinfect surfaces like touch screens, computer mouse, keyboard, and cell phones. Allow surface to dry thoroughly. Do not use aerosol spray.

d. Understand the nature of the disinfectant.

i. The properties and limitations of each type of disinfectant should be compared to determine which the appropriate disinfectant is. Here is a summary table for the most common types of commercially available disinfectants:

Type	**Properties**	**Limitations**
Quaternary ammonium compounds (quats)	Non-corrosive Non-irritating Slight residue Some scent Lower contact time Longer shelf life	Varied activity Not active against bacterial spores Can be inactivated by organic matter, such as soap residues and detergents
Chlorine/Sodium Hypochlorite (such as household bleach)	Least Expensive Broad effectiveness Fast-acting Effective against bacterial spores at higher contact time Little residue Readily available	Corrosive May be inactivated by organic matter, such as soap residues and detergents Longer contact time Limited shelf life once diluted – should be made fresh and used within the same day it is prepared
Alcohols (70% or above)	Inexpensive No residue No odor	Varied activity Sufficient contact time can be challenging due to product evaporation Flammable

Iodophors	Broad effectiveness Long shelf life	Inactivated by organic matter Poor residual activity May stain surfaces
Phenolics	Non-corrosive Not easily inactivated by organic matter	May require additional PPE due to toxicity Unpleasant smell Residue
Hydrogen peroxide	Broad effectiveness Non-corrosive Lower contact time No scent Minor residue Non-toxic and non-staining Longer shelf life	Generally not active against bacterial spores, unless it has additional acid component in the product (which requires additional PPE)
Aldehydes (Formaldehydes, Paraformaldehydes, Glutaraldehydes)	Non-corrosive Broad effectiveness, including bacterial spores at extended contact time Note: these chemicals range from toxic to carcinogenic and must be used with caution. Follow all manufacturer recommendations for exposure prevention.	Limited shelf-life once diluted May require additional PPE

ii. Most disinfectants come in a concentrated form and it has to be diluted to the working concentration with water. Others come in a ready-to-use form. Ready-to-use disinfectants can be more expensive upfront, but they are pre-formulated and require no preparation time.

iii. Use of disinfecting wipes are convenient and easy to use, but it may be necessary to use more than one wipe to keep the surface wet for the entire duration of the contact time required for effective disinfection. Check the product directions to find out the contact time for disinfection.

2) Effective use of Disinfectants

a. Contact time

Contact time is how long the disinfectant must remain in contact on the surface to ensure proper disinfection. **The surface must remain wet during the contact time required.** Refer to the label directions.

b. Shelf life

Shelf life refers to how long disinfectants remain effective. Concentrated products that require dilution generally lose effectiveness faster once diluted as compared to ready-to-use products.

c. Dilution factor

If the disinfectant comes in concentrate form, always use a freshly mixed solution for effective disinfection. Use only cold or room temperature water to dilute concentrated products. They must be diluted in exactly the ratio indicated on the label. Always write on the container of the mixed solution the date so you know when it was prepared.

d. Product safety

i. Many disinfectants pose chemical hazards and are irritant to users. They require additional PPE, such as aldehydes, phenolics, peroxide and acid products. If possible, use a less hazardous product.

ii. **Do not mix disinfectants with cleaners or other chemicals**, such as bleach with an acid, as it can cause dangerous chemical reactions leading to serious injuries or deaths. Use a single disinfectant at a time.

3) EPA List N Tool: COVID-19 Disinfectant

A recently published research letter in the American Journal of Infection Control[1], says that ***"[V]iruses like SARS-CoV-2 are some of the most vulnerable pathogens to the microbicidal agents in many detergents and cleaning solutions, including soaps for personal care and liquid hand washes."*** A disinfectant that kills bacteria and viruses such as the norovirus designed for home use should be sufficient. Shop for disinfectants with labels that read "Kills 99.9% of bacteria and viruses."

Disinfectant products reviewed by the EPA and approved as effective against COVID-19 when properly used can be looked up by name or EPA registration number on the EPA List N Tool: COVID-19 Disinfectant, https://cfpub.epa.gov/giwiz/disinfectants/index.cfm. On the main page, select "Use Site" and then "Residential," then scroll down to view the table. This table has filters in the header row to sort your search. If you are searching for disinfectants,

it is recommended to start with looking for products that have a short Contact Time, are either Wipes or Ready-to-Use, and are not "Food Contact Post-Rinse Required."

EPA Registration Number	Active Ingredient(s)	Product Name	Company	Follow the disinfection directions and preparation for the following virus	Contact Time (in minutes)	Formulation Type	Surface Type	Use Site	Emerging Viral Pathogen Claim?
5813-58	Quaternary ammonium	Spruce-ups	The Clorox Company	Rotavirus	0.25	Wipe	Hard Nonporous (HN)	Institutional; Residential	Yes
10492-5	Quaternary ammonium; Isopropanol (Isopropyl alcohol)	Discide Ultra Disinfecting Spray	Palmero Healthcare LLC	Human coronavirus	0.5	Ready-to-use	Hard Nonporous (HN)	Healthcare; Institutional; Residential	No
37549-2	Sodium hypochlorite	Micro-kill Bleach Solution	Medline Industries Inc	Norovirus	0.5	Ready-to-use	Hard Nonporous (HN); Food Contact Post-Rinse Required (FCR)	Healthcare; Institutional; Residential	Yes

Manufacturers like Clorox and Lysol will list the uses of their products including the kill time to be effective against COVID-19 on their website, such as Clorox Clean Up Cleaner with Bleach. Other products like DisCide Ultra Disinfecting Spray and Towelettes are only available through distributors. Diversey™ Oxivir® 1 Ultra Disinfecting Spray and Towelettes utilize a patented cleaning blend called Accelerated Hydrogen Peroxide® (AHP®) which cleans efficiently (kill time less than 1 minute) and is safe to use and for the environment. These products are only available through distributors and are in high demand. To read more about this product: http://solutionsdesignedforhealthcare.com/solutions/products/disinfectants/technologies/accelerated-hydrogen-peroxide%C2%AE.

4) Five Steps of Cleaning and Disinfection

a. Wear Appropriate PPE

i. Before the initiation of work, assess the potential hazards and risks associated with the work and put on appropriate PPE. At a minimum, gloves, eye protection and long sleeves/protective clothing should be used for cleaning and disinfection. They should be compatible with the disinfectant products being used. Before donning the PPE, perform hand hygiene by washing hands for 20 seconds. Use alcohol-based hand sanitizer if a sink is not available. Also ensure adequate ventilation at the work site.

b. Understand the Disinfectant

i. Read the directions printed on the label of the disinfectant. Check that the product is not past its expiration date. Follow manufacturer's instructions for proper use such as recommended dilutions, material compatibility, shell-life, storage and disposal. Check that the product is EPA-registered on the EPA website below.

c. Cleaning

i. If surfaces are dirty, they should be damp wiped using a detergent or soap and water prior to disinfection. Cleaning should be from the cleanest to dirtiest areas. For example, when scrubbing a sink in the bathroom, always start with the sides of the basin and work your way down, as the drain is the most contaminated area.

d. Disinfection

i. For disinfection, most common EPA-registered household disinfectants should be effective. Follow the manufacturer's instructions for all cleaning and disinfection products for concentration (dilution), application method and contact time.

ii. When dilution is required, use water at room temperature for dilution, unless stated otherwise on the label. Use no more than the amount recommended on the label. Avoid mixing chemical products such as household bleach with ammonia. Prepare diluted solutions as needed.

iii. Disinfection should be from the cleanest to dirtiest areas. Surfaces should be sprayed or wiped with a clean cloth soaked in disinfectant.

iv. Follow the contact time. The surface should be visibly wet the whole time to ensure the product is effective. Allow proper ventilation during and after application.

e. Remove PPE

i. PPE should be removed carefully to avoid contamination of the wearer and the surrounding area. Perform hand hygiene immediately after gloves are removed by washing hands for 20 seconds. Use alcohol-based hand sanitizer if a sink is not available.

5) REFERENCES

EPA – Selected EPA Registered Disinfectants

EPA – COVID-19 Disinfectants

OSHA – Occupational Safety and Health Standards – Toxic and Hazardous Substances

6) VENDORS

Clorox Products – Coronavirus Products
https://www.clorox.com/resources/coronavirus/products/
Clorox® Clean-up® Cleaner + Bleach (not Multi-Surface Cleaner, Food Post-Rinse Required)
Clorox Disinfectant Wipes

Clorox Professional Products, cloroxpro.com
(Select Distributor for Colleges/Universities through this site)
Clorox Commercial Solutions® Hydrogen Peroxide Cleaner Disinfectant Wipes

Lysol
https://www.lysol.com/products/
Lysol Bleach Mold and Mildew Remover
Lysol Brand All Purpose Cleaner

Palmero DisCide Ultra Disinfecting Spray and Towelettes
Distributor: Spectrum Chemical Mfg. Co., spectrumchemical.com

Diversey™ Oxivir® 1 Wipes and Disinfectant Spray
(AHP® technology, disinfects <1 min.)
Distributor: National Everything Wholesale, nationalew.com