BUL 1068

Using Disinfectants, Sanitizers, and Cleaners Safely and Effectively

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Introduction

CONSUMERS USE MANY DIFFERENT TYPES of cleaning, sanitizing, and disinfecting products to prevent the spread of bacteria and viruses in and around their homes. Because maintaining a healthy home space is important, using these products properly is a crucial responsibility. This guide provides the information you need to safely and effectively use antimicrobials.

Antimicrobial Types

Many different types of cleaning, sanitizing, and disinfecting products are available to consumers for use in and around the home. These products are used to help prevent the spread of bacteria and viruses, keeping home spaces clean and healthy. Antimicrobials are products that kill or reduce the spread of various germs or microorganisms. These microorganisms include fungi, bacteria, viruses, and protozoans. Mold and mildew are types of fungi. Viruses include influenza (flu) and the severe acute respiratory syndrome (SARS) virus responsible for coronavirus (SARS-Cov-2). Some examples of bacteria include *Listeria*, *Escherichia coli* (*E. coli*), and *Salmonella*.

Antimicrobial products are divided into three types of public health products: disinfectants, sanitizers, and sterilizers. Any product designated for use on hard and nonliving surfaces is a pesticide. Children should never be allowed to use these products.

- **Disinfectants** are often used to control germs, bacteria, and viruses on hard surfaces and nonliving items and to kill fungi, bacteria, and some viruses. Disinfectant products are the most powerful chemicals for controlling a variety of microbes; however, no single disinfectant product can control them all. Disinfectant products were widely used during the pandemic and, in some situations, were improperly used. The selection of disinfectants to control for microbes is shared in List N (see US EPA 2023a).

- **Sanitizers** reduce, but do not eliminate fungi, bacteria, and viruses on hard surfaces and nonliving objects. They are not as strong as disinfectants and do not kill all microbial organisms. Some may be used on surfaces that contact food items; some are only allowed to be used on hard surfaces that do **not** contact food.
- **Sterilizers** are primarily used on medical instruments for infection control. Examples include the use of steam, dry heat ovens (autoclaves), and liquid chemicals. Since sterilizers are more commonly used on professional medical equipment, further discussion in this bulletin is not merited.

Sterilizing Jars

Sterilization done in the home typically involves food-preservation techniques, such as canning, fermentation, pickling, etc. To sterilize jars or utensils in the home, boil them for 10 minutes at altitudes of less than 1,000 feet. At higher elevations, boil 1 additional minute for each additional 1,000 feet of elevation. Drain hot sterilized items when ready to use (National Center for Home Food Preservation 2017).

- **Cleaners** do not kill germs and they are not antimicrobials. They remove germs and dirt from surfaces and objects via the use of soap/detergent, water, and friction. Scrubbing physically removes germs and dirt from objects and surfaces, but does not disinfect or sanitize surfaces. Cleaning is recommended before a disinfectant is used on hard surfaces because dirt and grime reduce the effectiveness of a disinfectant (University of Washington Department of Environmental and Occupational Health Sciences 2022).

Product Regulation and Registration

Disinfectants and sanitizers are regulated in the United States to ensure they are safe and effective for the consumer. The US Environmental Protection Agency (EPA) regulates all disinfectants and some sanitizers as pesticides (any substance used to prevent, control, or reduce any type of pest, including bacteria and viruses). Sanitizers intended for use on hard surfaces and nonliving items are considered pesticides.

Idaho's Definition of "Pesticide"

Any substance or mixture of substances intended to prevent, destroy, control, repel, or mitigate any insect, rodent, nematode, snail, slug, fungus, virus, weed, and any other form of plant or animal life, except those on or in living man or animals, which is considered to be a pest (Idaho State Department of Agriculture 2023).

Check the Label!

Disinfectants and sanitizers that are regulated as pesticides by the EPA have an EPA registration number on their labels. They must only be used on hard surfaces and nonliving items.

When sanitizers are intended for use on humans or animals, they are regulated as drugs by the US Food and Drug Administration (FDA). They must demonstrate effectiveness at controlling or reducing the microbial organisms identified on their product labels. The FDA regulates any antimicrobial product that is used as a drug or antiseptic. It reviews these types of antimicrobial products as drugs. Manufacturers are required to submit data to support their effectiveness and safety (US FDA 2022). These products are labeled and used to treat or prevent diseases on people and pets. Examples include alcohol-based hand sanitizers and antibiotic creams. Some of the products may also be used to control microbes in or on processed food, such as food-packaging materials, food additives, and food-processing activities.

Companies that manufacture EPA-regulated sanitizer and disinfectant pesticide products are required to submit scientific data to the US EPA regarding their

toxicity and effectiveness, plus the potential risk to those exposed to the product while using it. Products that meet the EPA requirements for pesticide registration in the United States are assigned an EPA Registration Number. EPA registration numbers (Reg. No.) for products of the primary registrants consist of two blocks of numbers separated by a hyphen (for example, EPA Reg. No. XXXX-XXX). The first number grouping identifies the company that has registered the product with EPA; the second refers to the product. Hence, each product has a unique EPA Reg. No.

Sometimes, distributors register products with the same ingredients, but under different brand names. These are **distributor products**. The EPA classifies them with three blocks of numbers separated by hyphens (for example, EPA Reg. No. XXXX-XXX-XXXX). The third number grouping identifies the distributor that relabeled the primary product under its own company and trade name.

Disinfectant and sanitizer labels contain all the information consumers need to safely use the product. Some products recommend the use of gloves and other personal protective equipment (PPE) during use. In some cases, specific glove types are listed on the label. Follow the correct PPE requirements: they will protect you and your family. See Figure 1 to familiarize yourself with reading disinfectant labels and to better identify the information you need before using the product.

Importance of Appropriate Product Use

Disinfectants and sanitizers all have product labels on the containers. Be sure to read and understand those labels. These are registered pesticides. According to the US EPA and the American Association of Poison Control Centers, many disinfectants and sanitizers were misused during the coronavirus pandemic, which led to the potential for poisoning, unsafe use, and a lack of product effectiveness (Chang et al. 2020). All of these product labels contain directions for use; provide information on the types of microbes killed or reduced; identify the required concentrations; and explain their application, including the necessary contact time.

Some of the label information is fairly detailed, but it is important to read all of the directions for use before using these products. “Contact time” refers to the time a product needs to be left on a surface to effectively disinfect or sanitize. Depending on the product, their duration can vary from a few minutes to more than ten minutes. A contact time ensures the disinfectant’s or sanitizer’s application is adequate to kill the germs. Because viruses are harder to kill, use the full contact time listed on a product label when cleaning for viruses. See Table 1 for contact time differences between disinfectants and sanitizers and other quality differences between the two.

In addition to carefully reading a label, check out industry resources for information about appropriate product use. The US EPA’s website lists disinfectants that are registered and labeled for the control of COVID-19 and other viruses. The list, named List N (US EPA 2023a, click “Launch”), contains disinfectant product names, EPA Registration Numbers, contact times, and identifies additional viruses that a product can control.

It is illegal and not effective or safe to use any homemade substance for the control of viruses and bacteria. Homemade products are not tested for control of viruses and bacteria and may cause more harm.

Table 1. Comparison of sanitizers and disinfectants.

Characteristics	Sanitizers	Disinfectants
Controls	99.9% bacteria	100% bacteria, fungi, certain viruses
Contact Time for Effective Control	30 seconds–5 minutes	Average of 10 minutes; depends on the product
Locations for Use	Household surfaces; food-contact surfaces	Household surfaces Medical settings
Effectiveness	Limited control of certain microbes	Control of certain microbes; stops microbial growth/does not kill microbes
Formulations	Sprays, liquids, gels, granules	Sprays, liquids, gels, granules

Adapted from National Pesticide Information Center n.d.

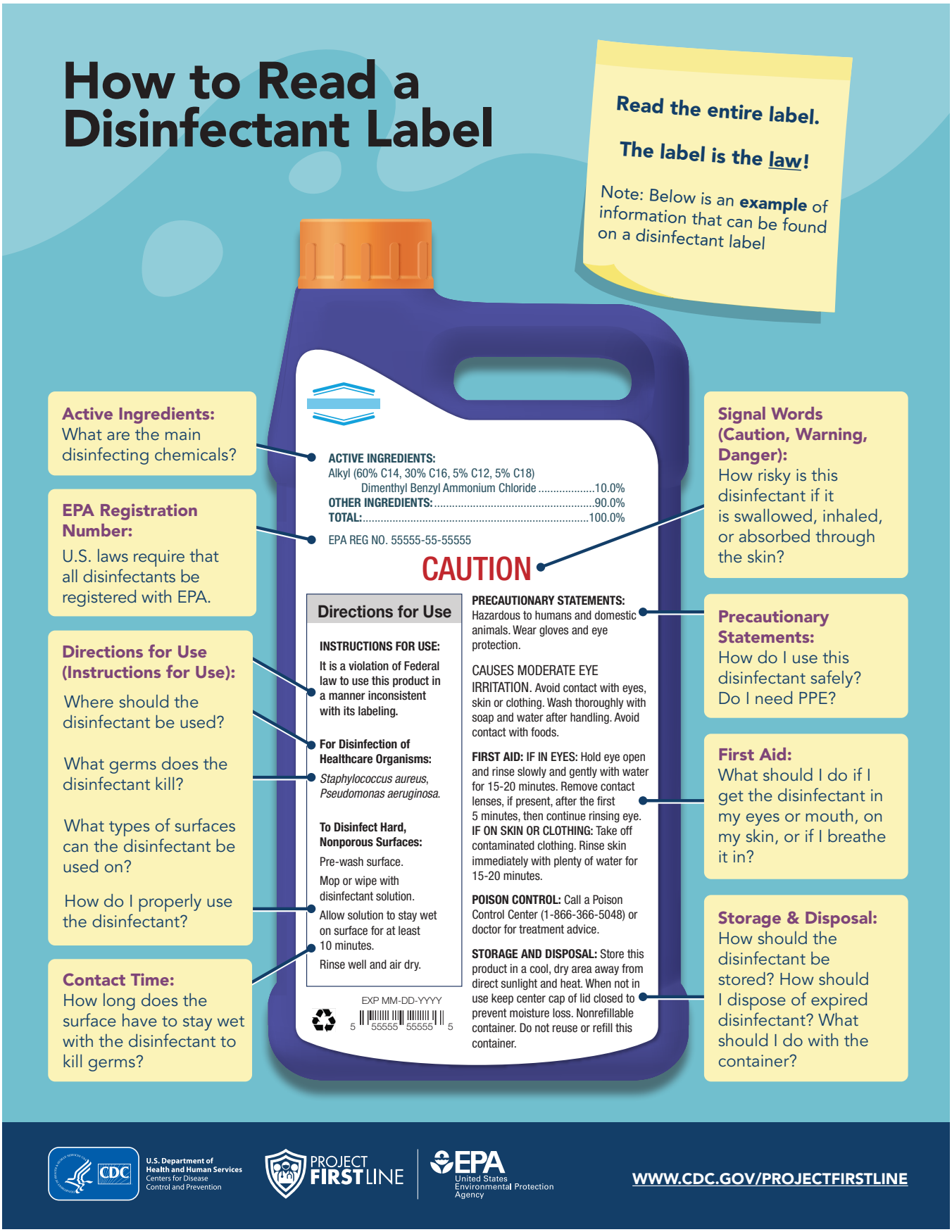

Figure 1. How to read a disinfectant label (United States Environmental Protection Agency 2022). Courtesy of the US EPA.

Disinfectant and Sanitizer Checklist

Tip:

Always clean hard surfaces before using a disinfectant because leaving the dirt/grime reduces the antimicrobial's effectiveness.

To recap, for safe and effective results, do the following:

- ✓ Follow all of a product label's directions for use. They are product-specific for the most effective use.
- ✓ Use the right product for a surface. Check the product label to determine what surfaces the product can be used for.
- ✓ Determine the correct "contact time" from the label to ensure you get the most effective control of the germs and viruses you are targeting.
- ✓ Clean all affected surfaces before applying a disinfectant or sanitizer. The presence of dirt, food, and/or other organic material may reduce the effectiveness of the products.
- ✓ Wear the required PPE based on label directions. PPE such as gloves may be required to reduce human exposure to disinfectant or sanitizer pesticides.

Further Reading

Chang A., A. H. Schnall, R. Law, A. C. Bronstein, J. M. Marraffa, H. A. Spiller, H. L. Hays, A. R. Funk, M. Mercurio-Zappala, D. P. Calello, A. Aleguas, D. J. Borys, T. Boehmer, and E. Svendsen. 2020. "Cleaning and Disinfectant Chemical Exposures and Temporal Associations with COVID-19—National Poison Data System, United States, January 1, 2020–March 31, 2020." *Morbidity and Mortality Weekly Report* 69(16): 496–98. DOI: http://dx.doi.org/10.15585/mmwr.mm6916e1.

Idaho State Department of Agriculture. 2023. Title 22-3401. https://legislature.idaho.gov/statutesrules/idstat/Title22/T22CH34/SECT22-3401/.

National Center for Home Food Preservation. 2017. "Home Canning: Jars and Lids. Sterilization of Empty Jars." https://nchfp.uga.edu/how/can_01/sterile_jars.html.

National Pesticide Information Center. n.d. "Disinfectants, Sanitizers, and Antimicrobial Products." http://npic.orst.edu/ingred/ptype/amicrob/index.html.

United States Environmental Protection Agency. 2022. "How to Read a Disinfectant Label." https://www.epa.gov/system/files/images/2022-09/HowToReadALabel-508c-Final-2022-08-30 %28005%29_1.png.

United States Environmental Protection Agency. 2023a. "Things to Know:" "the tool" hyperlink. In "About List N: Disinfectants for Coronavirus (COVID-19)." https://www.epa.gov/coronavirus/about-list-n-disinfectants-coronavirus-covid-19-0.

United States Environmental Protection Agency. 2023b. "What Are Antimicrobial Pesticides?" https://www.epa.gov/pesticide-registration/what-are-antimicrobial-pesticides.

United States Food and Drug Administration. 2022. Development and Approval Process—Drugs. https://www.fda.gov/drugs/development-approval-process-drugs.

University of Washington Department of Environmental and Occupational Health Sciences. 2022. "Safer Cleaning, Sanitizing and Disinfecting Strategies to Prevent Infection Transmission." https://oshce.uw.edu/resources/transitioning-safer-chemical-alternatives/green-cleaning/fact-sheet.

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