

## Proper Use of Alcohol or Bleach for Disinfecting Coronavirus

### Introduction

Many households, institutions and businesses are using, or considering using, alcohol or bleach to disinfect surfaces on which the SARS-CoV-2 virus may be present.

However, many people are misinformed about the safe and proper use of these fluids as disinfectants. For example, a common misconception is that wiping a door handle or countertop with a product like **Clorox Disinfecting Wipes** will disinfect those surfaces. However, the instructions on the label for this product clearly state:

“To disinfect: Use to disinfect hard, nonporous surfaces. Wipe surface to be disinfected. *Use enough wipes for treated surface to remain visibly wet for 4 minutes.* Let surface dry. For highly soiled surfaces, clean excess dirt first.”

Before reviewing the following, be aware of the difference between “Disinfect” and “Sanitize.”

**Disinfection** describes a process that eliminates or renders nonviable, all or very close to all, pathogenic microorganisms (except bacterial spores) on inanimate objects

Disinfection generally involves chemicals that kill bacteria or destroy the viability of virus particles. Complete disinfection, or **decontamination**, results in a surface that has no detectable pathogenic microorganisms of the target type(s) of pathogen (e.g., coronavirus).

**Sanitizing** is not well defined, but generally means eliminating most, but not necessarily all, pathogenic microorganisms on a surface.

One reference describes the difference thusly:

*“The minimum level of effectiveness in a modern-day disinfectant is 100 percent kill of 6 log<sub>10</sub> of an organism. A sanitizer is only required to reduce that 6 log<sub>10</sub> down to 3 Log<sub>10</sub>. We can put that into real numbers. If we start with 1 million organisms on a surface then a disinfectant must kill 100 percent of them; zero left. A sanitizer only reduces the number of organisms down to 1,000 and does nothing about virus and fungus.”* - John B. Everitt, President, Stearns Packaging Corp.

[Note: “6 Log 10” or “Log6” means that 99.999% of the pathogen present is killed. “Log3” would be 99.9%. Thus, a “Log3” sanitization would kill 990,000 out of a million, leaving 1,000 organisms; whereas a “Log6” disinfection (decontamination) would kill 999,999 out of a million leaving only one organism, which would be practically undetectable.]

When dealing with a pathogen as deadly and contagious as SARS-CoV-2, the standard must be **decontamination**.

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### Alcohol and Bleach Disinfectants

Start by reviewing the following information from the **National Center for Biotechnology Information**.

**Infection Prevention and Control of Epidemic- and Pandemic-Prone Acute Respiratory Infections in Health Care.**

**Use of disinfectants: alcohol and bleach**

### Alcohol

Alcohol is a better disinfectant than "bleach," and ethyl alcohol (aka ethanol) is a stronger than isopropyl alcohol (aka "isopropanol" or "rubbing" alcohol).

Concentration requirements: At least 70% to 80%.

Downsides:

- Flammable
- Can react and deteriorate some materials, e.g., rubber and some plastics

The easiest way to get household volumes of ethyl alcohol is to buy 190 proof grain alcohol at the liquor store.

### Bleach

"Bleach" isn't one thing; it's any product that will reduce or remove stains, including sodium hypochlorite, sodium percarbonate ("oxygen bleach"), and even lemon juice. Sodium hypochlorite is the active ingredient in common (Clorox) laundry bleach, which is effective in killing bacteria, fungi and viruses, including influenza virus - *but it is easily inactivated by organic material*.

Downsides:

- Irritates mucous membranes, the skin and the airways
- Can create deadly gas if mixed with some other cleaning products - NEVER mix
- Sodium hypochlorite deteriorates over time - use recently manufactured.
- Inactivated by organic material; is not an effective decontaminant on bare wood, cloth, etc.
- Long contact time required: For decontamination - At least 10 minutes after spraying on. Don't just wipe! 30 minutes for immersion.
- Requires care to mix to proper strength to be safe and effective

You must be VERY attentive when purchasing bleach and diluting it to a concentration that is safe and effective. Be sure you are getting a "bleach" product with sodium hypochlorite as the active ingredient.

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Review the full CDC recommendation at:

<https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/cleaning-disinfection.html>

### *Sanitizing*

This document recommends the following for *sanitizing*, but stronger for *decontamination* (see below):

“[D]iluted household bleach solutions (at least 1,000 ppm sodium hypochlorite) can be used if appropriate for the surface. Follow manufacturer’s instructions for application, ensuring a contact time of at least 1 minute, and allowing proper ventilation during and after application. Check to ensure the product is not past its expiration date.”

Note that with this weaker solution, the recommendation is 10 minutes contact time.

Typical household bleach contains 5% sodium hypochlorite, so a 1:50 dilution with water will yield 0.1% or 1,000 ppm available chlorine.

### *Decontamination / Disinfecting*

The manufacturer of **Prime Source Germicidal Ultra Bleach** (6% sodium hypochlorite) recommends 2,500 ppm for use as a *disinfectant*. Use 1:20 to produce a 2,500 ppm concentration. With this stronger solution, the recommended time for being wet is 5 minutes.

Clorox also makes a more concentrated product: **Clorox Germicidal Bleach** (8.25% sodium hypochlorite). Be sure to read the specific instructions for use:

<https://www.cloroxpro.com/products/clorox/germicidal-bleach/>

The label recommends a 1:32 concentration (1/2 cup per gallon) for general "Hospital Disinfection." This concentration results in about 2,580 ppm. The recommended time for being wet is also 5 minutes.

Summing up for use of bleach:

- Never mix bleach with anything other than water.
- Dilute to produce a solution that us 0.25% (2,500 ppm) sodium hypochlorite.
- Let the diluted bleach stay on the surface for at least 5 minutes to kill the virus

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