



Cleaning & Disinfecting Amid COVID-19 – Health & Indoor Air Quality Implications

SARS-CoV-2 is the virus that becomes the disease known as COVID-19. The virus has been found living on surfaces and in moisture droplets expelled from our bodies. With the increasing number of confirmed cases of COVID-19, cleaning and disinfecting commonly contacted surfaces in homes and businesses can be extremely important to prevent the spread of the virus and for better peace of mind. However, the use of cleaners and disinfectants can come with unintended risks to health through airborne and/or dermal exposures to irritating and toxic chemicals found in these products and from their residuals left in the air and on surfaces.

The CDC recommends that surfaces should be cleaned before they are disinfected with a biocide. *Cleaning* refers to the removal of dirt and impurities, including germs, from surfaces. Cleaning alone does not kill germs or viruses, but it removes and decreases their numbers; therefore, reducing the risk of spreading infection. *Disinfecting* works by using chemicals to actually kill germs and viruses that remain on surfaces. See below guidelines from the CDC for cleaning and disinfection.

<https://www.cdc.gov/coronavirus/2019-ncov/community/organizations/cleaning-disinfection.html>

Guidelines for Cleaning & Disinfecting Surfaces After Illness

For homes or commercial work places, the CDC recommends closing off areas, workspaces or rooms that were used by those with suspected or confirmed illness, and wait for as long as is practical (24 hours is suggested) after the ill individual has left the area and the closure of the space before beginning your cleaning and disinfection process. This delay is intended to minimize the potential for exposure to any remaining aerosolized respiratory droplets that may contain the live virus. All of the areas used by a suspected or confirmed infected person (offices, workspace, bathrooms, common areas) and equipment (desk chair, desktop, printer, keyboard, mouse) should be cleaned and disinfected. Frequently touched surfaces (door knobs, lamps, light switches, temperature controls) should be focused on. Surfaces should be cleaned first using a detergent or soap and water prior to disinfection so as to not dilute the disinfectant. Open doors and windows prior to beginning and during the cleaning and disinfection process to increase air circulation in the area to be cleaned and disinfected.

For disinfection, diluted bleach solutions, alcohol solutions with at least 70% alcohol, and EPA-registered disinfectants have been shown to be effective. Products that carry an EPA-approved label for emerging viral pathogens claims are expected to be effective against COVID-19 based on data for harder to kill viruses (<https://www.epa.gov/pesticide-registration/list-n-disinfectants-use-against-sars-cov-2>). Follow the manufacturer's instructions for all cleaning and disinfection products (e.g., concentration, application method and contact time, etc.). It is important to note the recommended surface contact time for each cleaning solution and to follow those guidelines. There is some indication that microfiber clothes are better than other clothes and towels for cleaning surfaces.



For soft (porous) surfaces such as carpeted floor, rugs, upholstered furniture, shades and drapes, remove visible contamination if present and clean with appropriate cleaners indicated for use on these surfaces. After cleaning, if the items can be laundered, launder in accordance with the manufacturer's instructions using the warmest appropriate water setting for the items and then dry items completely. For linens, clothing, and other items that typically are laundered, do not shake dirty laundry to minimize the possibility of dispersing possible contaminants through the air. Soiled laundry that has been in contact with confirmed or suspected ill individuals can be washed with other laundry items as the washing process will destroy any live virus that remains. Clean and disinfect hampers or other carts and surfaces that are used to transport, store or hold laundry in accordance with guidance above for hard or soft surfaces.

Personal Protective Equipment (PPE) and Hand Hygiene (General):

Whether in your home or workplace, the use of personal protective equipment during cleaning and disinfecting are essential due to the harsh nature of the chemicals contained in cleaning and disinfecting products, and also due to the risk of exposure to live virus that may still be present on surfaces. **Wear disposable gloves for all tasks during the cleaning process, including handling trash.** Masks and goggles maybe useful where ventilation is limited and where vapors can result in irritation or neurological effects, such as dizziness. There are a wide variety of masks so check the product recommendations or mask product information. Disposable gowns, where available, could be used to protect clothing from contamination or damage from splashed chemical products during cleaning and disinfecting. If gowns are not available, wash clothes worn during cleaning and disinfecting by follow the laundering procedures above. Gloves should be compatible with the disinfectant products being used, e.g. some caustic chemicals as some gloves provide only limited protection. Additional PPE might be required based on the cleaning/disinfectant products used and whether there is a risk of splash or inhalation. Gloves, masks, goggles, gowns, and contaminated clothing should be removed carefully to avoid cross-contamination of the wearer and the surrounding area. Be sure to wash your hands after removing PPE. See guidance by the CDC at <https://www.cdc.gov/handwashing/when-how-handwashing.html>

Commonly Used Disinfectant Products

The following disinfectant products are commonly used in both commercial and residential spaces. Important health and personal precaution information is provided for each chemical. As with any chemical product, read and follow all manufacturer's instructions and safety data sheets (SDSs) for instructions for application, proper ventilation, personal protection (PPE), and precautions. All of the products listed below recommend using "adequate ventilation" during application. Adequate ventilation means open windows, doors, or turn on fans, if possible. For all products, it is important to check the expiration date of the product to ensure it will work most effectively.

Bleach/Sodium Hypochlorite Solutions: Diluted bleach/sodium hypochlorite solutions (8.25%) can be used if appropriate for the surface. **Never mix household bleach with ammonia or any other cleanser as dangerous chlorine gas may be produced and could cause serious injury or death.** Unexpired household bleach will be effective against coronaviruses when properly diluted. After applying the bleach solution, allow the solution to remain on the surface for at least ten minutes before wiping down.

Bleach leaves behind a corrosive residue (particularly on stainless steel surfaces) which must be removed after the 10-minute contact time has elapsed. Since these residues are ionic in nature, wiping with deionized water will be most effective for removal. A final wipe down with a 70% Isopropyl alcohol (IPA) - 30% deionized water mixture is recommended to hasten drying of the surfaces. (<https://www.berkshire.com/learning-center/disinfection-bleach/>)

When working with bleach, avoid contact with eyes, skin, and clothing. Ensure adequate ventilation. Use personal protective equipment, including disposable chemical gloves, and eye and face protection. Use respiratory protection if irritation is experienced. A NIOSH approved respirator equipped with filters designed for chlorine vapors is the most effective. Wash hands and any contacted skin thoroughly after using.

Hydrogen Peroxide/Peracetic Acid Solutions: There are several commercially available disinfectant/biocide products that contain diluted solutions of <3% hydrogen peroxide or a combination of hydrogen peroxide/peracetic acid that have been shown to be effective against coronavirus. As with bleach solutions, these products can be very irritating to the eyes, nasal passages, throat from the vapors emitted. These solutions are also very irritating to skin. Use with adequate ventilation. Use personal protective equipment, including disposable chemical gloves, and eye and face protection. Use respiratory protection if irritation is experienced. A NIOSH approved respirator equipped with filters designed for acid/organic vapors is the most effective. Wash hands and any contacted skin thoroughly after using.

These solutions will fully volatilize, meaning they do not leave a residue as chlorine bleach does and do not require rinsing surfaces after use.

Isopropyl Alcohol (70%): Isopropyl alcohol (IPA) is a very effective disinfectant against COVID-19. It is very important that a 70% IPA concentration is used. IPA is a flammable volatile organic compound (VOC), so it is very important to use with adequate ventilation. Wear eye protection, face protection, protective clothing, and protective gloves. IPA is not as strong an irritant as the previous chemical products described, but has been shown to have increased effects to the central nervous system. If a respirator is used, it should be NIOSH approved and be equipped with an organic vapor filter. Wash hands and any contacted skin thoroughly after using.

IPA will not leave a residue and does not require rinsing surfaces after use.

Quaternary Disinfect Cleaners (ammonia solutions): Quaternary ammonia disinfectant products can also be used to disinfect surfaces from COVID-19. **Never mix household bleach with ammonia or any other cleanser as dangerous chlorine gas may be produced and could cause serious injury or death.** As with bleach and hydrogen peroxide/peracetic acid solutions, these products can be very irritating to eyes, respiratory passages, and skin. As with ALL of these products, use with adequate ventilation. Wear eye protection, face protection, protective clothing, and protective gloves. If a respirator is used, it should be NIOSH approved and be equipped with an ammonia vapor filter. Wash skin thoroughly after handling.

IAQ Considerations Post Cleaning / Disinfecting

All of the chemical products listed above can produce chemical vapors and residues that may cause irritations to the skin and respiratory system, produce central nervous system effects (dizziness, confusion), and may cause severe respiratory and other health symptoms to those working with and in the vicinity of others working with these products, particularly in sensitive populations who may have underlying respiratory illnesses such as asthma, allergies, COPD, etc. It is important to notify any family, staff or workers who have underlying health conditions or are sensitive to chemicals prior to using cleaning and disinfecting products so they may request protective measures and/or avoid the area being cleaned and disinfected.

After the use of these products, leave open windows and doors if possible, use a fan to direct fresh air into the area; and, if possible, turn on or increase the speed of exhaust ventilation to the space. By continued use of ventilation as recommended above, the cleaned and disinfected area should continue to “air out”, or dilute the chemical vapors that may continue to volatilize. Homes can prove challenging to remove chemical odors as residential HVAC systems are not designed to provide fresh air. Residential HVAC systems are designed to recirculate and filter air for heating and cooling efficiency. Some systems may have fresh air dampers, but generally fresh air comes into our homes through windows, doors, or infiltration through cracks or other means. If chemical odors persist, charcoal filters can be effectively used with the HVAC system to eliminate chemical odors.

Jason Lang, CIH, CSP
Senior Manager
jlang@rhprisk.com
(773) 867-6002

At RHP Risk Management, we help our clients characterize the uncertainties associated with environmental and occupational hazards and risks to contextualize meaning that can be understood by their decision-making audiences be they the public, employees, consumers, regulators, or shareholders.

For more resources concerning COVID-19, visit www.rhprisk.com/coronavirus/