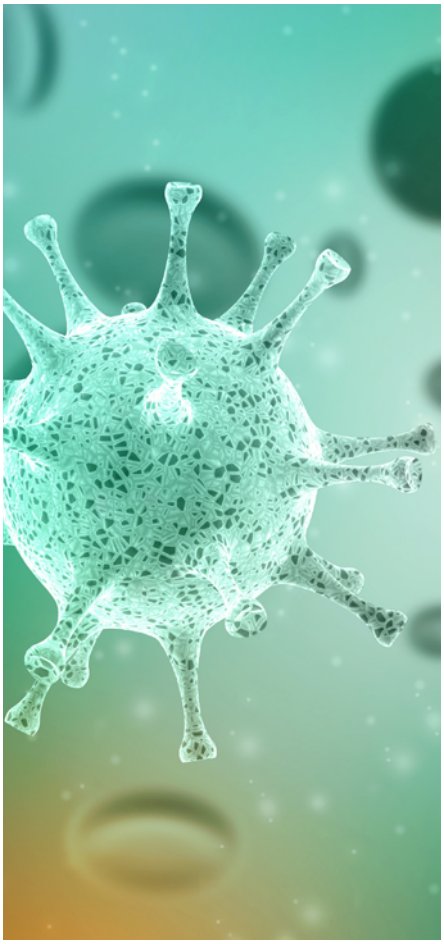
Workers Health & Safety Centre

COVID-19

Evaluating disinfectants for use against the COVID-19 virus

When it comes to choosing a disinfectant to combat the COVID-19 virus, research and health authorities suggest not all disinfectants are equally effective. The difference is in their active ingredient(s), some of which are also more toxic than others. Wherever possible, workplaces should consider disinfectants that are effective and reduce worker exposures to toxins.



HEALTH CANADA AND U.S. EPA ASSESSMENTS

The work to evaluate disinfectants perhaps best starts with lists of approved disinfectants compiled by government health authorities. These lists are updated on a regular basis.

Health Canada has compiled a list of hard surface disinfectant products that meet their requirements for disinfection of emerging pathogens, including the virus that causes COVID-19. It can be accessed on the Health Canada website. There you can wade through the entire list. But if you locate the Drug Identification Number (DIN) on the product label or safety data sheet (SDS) for the disinfectant you are considering, then you can use the search function to quickly see if the product meets Health Canada requirements.

A notable second list contains products that meet the U.S. Environmental Protection Agency's (EPA) criteria for use against SARS-CoV-2, the novel coronavirus that causes the disease COVID-19. Products that claim to kill and/or be effective against viruses are considered pesticides and must be accepted and registered with the U.S. EPA prior to distribution or sale. To make best use of the EPA list locate the U.S. EPA registration number on the disinfectant product label or SDS, and use that number to search the list. The U.S. EPA registration number of a product consists of two sets of numbers separated by a hyphen. The first set of numbers refers to the company identification number, and the second set of numbers following the hyphen represents the product number.

OTHER RESEARCH ASSESSMENTS

For both of the Canadian and U.S. lists though, the absence of a disinfecting product does not necessarily constitute its lack of effectiveness. As the situation evolves, additional disinfectants that meet the criteria for use against the virus that causes COVID-19 may be included in future.

For instance, published assessments of disinfection of surfaces contaminated with similar viruses are summarized in a review paper from two German universities.[1] This review paper concluded in 22 studies human coronaviruses such as Severe Acute Respiratory Syndrome (SARS) coronavirus, Middle East Respiratory Syndrome (MERS) coronavirus, or endemic human coronaviruses (HCoV) can be efficiently inactivated by surface disinfection procedures with 62-71% ethanol, 0.5% hydrogen peroxide or 0.1% sodium hypochlorite (bleach) within one minute.

Other chemical agents such as 0.05-0.2% benzalkonium chloride (ammonia-based mixture) or 0.02% chlorhexidine digluconate (antiseptic agent with antibacterial properties) were found to be less effective, but not ineffective. Specifically, while ethyl alcohol-and hydrogen peroxide-containing disinfectants appeared to inactivate coronaviruses in as short a time as 30 seconds, the benzalkonium chloride containing products required up to 10 minutes to generate similar levels of disinfection.

Until very recently, no specific work has been done with the virus that causes COVID-19, generalizations have been made as the viral structures appear chemically and structurally very similar. The researchers behind the review paper thus conclude, the tested disinfectants should have a "similar effect" against the virus that causes COVID-19.

CHOOSING SAFER PRODUCTS

With increased cleaning and disinfecting to prevent COVID-19 infections come growing concerns that widespread use of disinfectants may contribute to unintended consequences, such as the growth of antibiotic resistant organisms and a recent spike in accidental poisonings.[2]

[1] Kampf, G. et al. 2020 Persistence of coronaviruses on inanimate surfaces and their inactivation with biocidal agents. Journal of Hospital Infection, Volume 104, Issue 3, 246 - 251

[2] Chang A, Schnall AH, Law R, et al. Cleaning and Disinfectant Chemical Exposures and Temporal Associations with COVID-19-National Poison Data System, United States, January 1, 2020-March 31, 2020. *MMWR Morb Mortal Wkly Rep.* 2020;69(16):496-498. Published 2020 Apr 24.

Workers whose job involves cleaning and disinfecting can also suffer a range of acute and chronic health effects from skin and lung irritation, to reproductive harm and even cancer. Cleaning and disinfecting products are the most common exposure causing work-related asthma in healthcare and education workers.[3] The most frequent exposures were surfactants, alcohols, disinfectants and acids. Some agents can cause allergic responses in both the skin and respiratory systems. Another study[4] found nurses who regularly used disinfectants were at higher risk of developing chronic obstructive pulmonary disease (COPD). Specifically, disinfectants such as glutaraldehyde, hypochlorite bleach and quaternary ammonium compounds were associated with excess risk for developing COPD.

Workplace protocols for cleaning and disinfecting should assess a host of issues and also identify products that are effective for the prevention of both infection and occupational disease.[5] One approach is to promote the use of products which contain fewer toxic ingredients. The University of Washington Department of Environmental & Occupational Health Sciences offers an excellent resource on **safer cleaners and disinfectants**. They recommend looking for approved disinfectants whose active ingredients include **ethanol, isopropanol (isopropal alcohol), hydrogen peroxide, L-Lactic acid, or citric acid.**

Others have also done the legwork to make choosing safer products easier. The San Francisco Environment Department's strict criteria recommends avoiding disinfectants that contain quaternary ammonium compounds and offers an **up-to-date list** of safer disinfectants that are approved for use on COVID-19 by the U.S. EPA.

While there is no standardized criteria for "green" products, the U.S. EPA Safer Choice program (formerly **Design for Environment (DfE)**) compiles a **Safer Chemicals Ingredient List**. Before a product can carry the Safer Choice label, EPA reviews all chemical ingredients, regardless of their percentage in the product. Every ingredient must meet strict safety criteria for both human health and the environment, including carcinogenicity, reproductive/developmental toxicity, toxicity to aquatic life, and persistence in the environment. You may also look for safer alternatives through programs such as **Green Seal** and **EcoLogo** which also offer third-party certification with strict requirements.

PLEASE NOTE:

Never mix chlorine bleach with ammonia containing products. The combination of ammonia and bleach produces dangerous chlorine gas, which in small doses can cause irritation to the eyes, skin and respiratory tract. In large doses, it can kill.

Need more help with this issue?

Be sure to check out our related document, entitled, ***Cleaning and Disinfecting: Confronting COVID-19***. Send us an email at **contactus@whsc.on.ca** or leave a message in our general telephone mailbox at 1-888-869-7950. We will get back as soon as possible.

[3] Li RWH, Lipszyc JC, Prasad S, Tarlo SM. Work-related asthma from cleaning agents versus other agents. *Occup Med (Lond).* 2018;68(9):587-592.

[4] Dumas O, Varraso R, Boggs KM, et al. Association of Occupational Exposure to Disinfectants With Incidence of Chronic Obstructive Pulmonary Disease Among US Female Nurses. *JAMA Netw Open.* 2019;2(10):e1913563.

[5] Quinn, Margaret M. Quinn, Henneberger, Paul K and members of the National Institute for Occupational Safety and Health (NIOSH), National Occupational Research Agenda (NORA) Cleaning and Disinfecting in Healthcare Working Group. *Cleaning and disinfecting environmental surfaces in health care: Toward an integrated framework for infection and occupational illness prevention,* American Journal of Infection Control, Volume 43, Issue 5, 2015, Pages 424-434.