



BEYOND PESTICIDES

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Protecting Yourself from COVID-19 (coronavirus) without Toxic Sanitizers and Disinfectants

Fight the coronavirus with common sense prevention and safer disinfection products. Avoid products that increase vulnerability to respiratory problems.

WHY THE CONCERN ABOUT TOXIC SANITIZERS AND DISINFECTION PRODUCTS

We have learned through the COVID-19 crisis that there are people who are more vulnerable to the effects of the virus. These are generally people who have a pre-existing condition or are of advanced age, who may have a weakened immune or respiratory system. With the management of viral and bacterial infections, it is always important that we do not exacerbate the risk to individuals in the process of avoiding or controlling the threat. In the case of COVID-19, we have measures of protection—both practices and products—that can protect us without using toxic products that increase risk factors.

PREVENTION

The good news is that toxic chemicals are not necessary to prevent exposure to COVID-19 and eliminate the virus. The Centers for Disease Control and Prevention (CDC) urges simple measures to prevent exposure:

- Avoid close contact with people who are sick.
- Avoid touching your eyes, nose, and mouth.
- Stay home when you are sick.
- Cover your cough or sneeze with a tissue, then throw the tissue in the trash.

How it works: The best way to prevent any infectious disease transmission is to stay out of contact with those who have already contracted the disease.

HAND CLEANING AND SANITIZING Eliminating the Virus on Hands

- Wash your hands often with soap and water for at least 20 seconds. If soap and water are not readily available, use an alcohol-based hand sanitizer with at least 60% alcohol. (See list of products below.) Always wash hands with soap and water if hands are visibly dirty.

How it works: Soap breaks down the virus's fat membrane—and the infectious material falls apart—as long as you rub the soap on your hands for at least 20 seconds. Alcohol wipes with 60% alcohol do the same thing. These chemicals break down the virus by a similar process, by breaking down the lipid covering of the virus.¹



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Only products with active ingredients ethanol, isopropanol, or benzalkonium chloride can qualify as "hand sanitizers" according to the Food and Drug Administration (FDA). An alcohol-based hand sanitizer should contain at least 60% alcohol in order to be effective.² Glycerol or aloe as part of the remainder can help counter the drying effects of alcohol on the skin.

The Bad: Toxic Sanitizers

Avoid hand sanitizers containing benzalkonium chloride (BAC), which is a quaternary ammonium compound (or "quat"). It is an irritant that can cause asthmatic reactions and adversely affect the respiratory system.^{3,4} BAC is also associated with changes in neurodevelopment,⁵ selection for antibiotic resistance,⁶ and provoking irritant and/or contact dermatitis.⁷

DISINFECTING SURFACES

Eliminating the Virus on Surfaces

- Clean and disinfect frequently touched objects and surfaces using regular household cleaning sprays or wipes that contain 70% alcohol. (See list of products below.)

Like handwashing with soap or wipes with 60% alcohol, the virus on surfaces can be detached and broken down with soap and alcohol.⁸

The Good: Natural-based substances tend to be safer, while still effective at eliminating the virus on surfaces. Look for products with the following active ingredients (* indicates listed by EPA's Design for the Environment Program (DfE)⁹):

- | | |
|------------------|----------------------|
| ✓ Citric acid* | ✓ Hydrogen peroxide* |
| ✓ Ethanol* | ✓ Sodium bisulfate* |
| ✓ Isopropanol* | ✓ Thymol |
| ✓ L-lactic acid* | |

The Bad: EPA has approved a long list of products¹⁰ that will eliminate the COVID-19 virus on surfaces. The list includes products containing toxic chemicals, such as chlorine bleach, peroxyacetic acid, quaternary ammonium compounds or "quats," sodium dichloro-s-triazinetrione, and hydrochloric acid. Exposure to these chemicals are associated with a long list of adverse effects, from asthma to cancer.^{11,12} Avoid products containing:

- | | |
|---|---|
| ⊗ Peroxyacetic acid (peracetic acid) ¹³ | ⊗ Phenolic compounds |
| ⊗ Chlorine compounds (sodium hypochlorite, hypochlorous acid, sodium chlorite, sodium chloride) ¹⁴ | ⊗ Glycolic acid |
| ⊗ Sodium Dichloro-S-Triazinetrione | ⊗ Octanoic acid ¹⁶ |
| ⊗ Quaternary Ammonium compounds (quats) | ⊗ Potassium peroxymonosulfate ¹⁷ |
| ⊗ Iodine ¹⁵ | ⊗ Ammonium carbonate ¹⁸ |
| | ⊗ Ammonium bicarbonate ¹⁸ |
| | ⊗ Silver ¹⁹ |



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All of these ingredients are associated with harm to the respiratory system.^{20,21,22,23,24,25} In addition, some quats have been shown to cause mutations, lower fertility, and increase antibiotic resistance.²⁶ Phenolic compounds include a wide range of toxic chemicals, including cresols, hexachlorobenzene, and chlorophenols. Health effects from breathing or exposure to the skin include headaches, burning eyes, muscle tremors, skin burns, irregular heartbeat, severe injury to heart, liver, kidneys, and lungs, cancer, and death.^{27,28}

STAY SAFE

It is important during public health emergencies involving infectious diseases to scrutinize practices and products very carefully so that hazards presented by the crisis are not elevated because of the unnecessary threat introduced with toxic chemical use.

¹ Pall Thordarson, 2020. The science of soap – here’s how it kills the coronavirus.

<https://www.theguardian.com/commentisfree/2020/mar/12/science-soap-kills-coronavirus-alcohol-based-disinfectants>. See also: <https://www.youtube.com/watch?v=K2pMViml2bw&feature=youtu.be>.

² CDC Statement for Healthcare Personnel on Hand Hygiene during the Response to the International Emergence of COVID-19. <https://www.cdc.gov/coronavirus/2019-ncov/infection-control/hcp-hand-sanitizer.html>.

³ [https://prhe.ucsf.edu/sites/g/files/tksra341/f/Fact%20Sheet Information%20for%20Workers.pdf](https://prhe.ucsf.edu/sites/g/files/tksra341/f/Fact%20Sheet%20Information%20for%20Workers.pdf).

⁴ Choi, H.Y., Lee, Y.H., Lim, C.H., Kim, Y.S., Lee, I.S., Jo, J.M., Lee, H.Y., Cha, H.G., Woo, H.J. and Seo, D.S., 2020. Assessment of respiratory and systemic toxicity of Benzalkonium chloride following a 14-day inhalation study in rats. *Particle and Fibre Toxicology*, 17(1), p.5. <https://link.springer.com/article/10.1186/s12989-020-0339-8>

⁵ Herron, J.M., 2019. The Effects of Benzalkonium Chloride Disinfectants on Lipid Homeostasis and Neurodevelopment (Doctoral dissertation).

⁶ Kim, M., Weigand, M.R., Oh, S., Hatt, J.K., Krishnan, R., Tezel, U., Pavlostathis, S.G. and Konstantinidis, K.T., 2018. Widely used benzalkonium chloride disinfectants can promote antibiotic resistance. *Applied and environmental microbiology*, 84(17), pp.e01201-18.

⁷ Lachenmeier, D.W., 2016. Antiseptic Drugs and Disinfectants. In *Side Effects of Drugs Annual* (Vol. 38, pp. 211-216). Elsevier.

⁸ Kampf, G., Todt, D., Pfaender, S. and Steinmann, E., 2020. Persistence of coronaviruses on inanimate surfaces and its inactivation with biocidal agents. *Journal of Hospital Infection*.

⁹ <https://www.epa.gov/pesticide-labels/design-environment-logo-antimicrobial-pesticide-products>.

¹⁰ <https://www.epa.gov/pesticide-registration/list-n-disinfectants-use-against-sars-cov-2>.

¹¹ [https://prhe.ucsf.edu/sites/g/files/tksra341/f/Fact%20Sheet Information%20for%20Workers.pdf](https://prhe.ucsf.edu/sites/g/files/tksra341/f/Fact%20Sheet%20Information%20for%20Workers.pdf).

¹² Agency on Toxic Substances and Disease Registry, 2008. ToxFAQs for Chlorophenol. <https://www.atsdr.cdc.gov/toxprofiles/tp107-c1.pdf>.

¹³ Peracetic acid is on EPA’s DfE list, but is considered to pose an asthma risk.

¹⁴ Sodium chloride as listed by EPA is actually hypochlorous acid

¹⁵ ZZZ Disinfectant SDS https://cleaningsolutions.delaval.com/wp-content/uploads/2018/07/ZZZ-Disinfectant-2056-SDS_EN.pdf; ZZZ Disinfectant Label https://www3.epa.gov/pesticides/chem_search/ppls/004959-00016-20170614.pdf.

¹⁶ Octanoic acid is listed on EPA’s Safer Chemical Ingredients List under surfactants, which are listed based on environmental toxicity and biodegradation. But it is corrosive to skin <https://echa.europa.eu/registration-dossier/-/registered-dossier/15370/7/3/1>.

¹⁷ SDS: Potassium peroxydisulfate, Santa Cruz Biotechnology, Inc. <http://datasheets.scbt.com/sc-253223.pdf>.

¹⁸ Actually Didecyl dimethyl ammonium carbonate, a quaternary ammonium compound. Label: https://www3.epa.gov/pesticides/chem_search/ppls/009402-00014-20141020.pdf, Didecyl Dimethyl Ammonium Carbonate and Didecyl Dimethyl Ammonium Bicarbonate; Exemption From the Requirement of a Tolerance



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<https://www.federalregister.gov/documents/2012/08/22/2012-20663/didecyl-dimethyl-ammonium-carbonate-and-didecyl-dimethyl-ammonium-bicarbonate-exemption-from-the>

¹⁹ Spray products. Nowack, B., Krug, H.F. and Height, M., 2011. 120 years of nanosilver history: implications for policy makers. <https://pubs.acs.org/doi/pdf/10.1021/es103316g>; Seiffert, J., Buckley, A., Leo, B., Martin, N.G., Zhu, J., Dai, R., Hussain, F., Guo, C., Warren, J., Hodgson, A. and Gong, J., 2016. Pulmonary effects of inhalation of spark-generated silver nanoparticles in Brown-Norway and Sprague–Dawley rats. *Respiratory research*, 17(1), p.85. <https://respiratory-research.biomedcentral.com/articles/10.1186/s12931-016-0407-7>.

²⁰ [https://prhe.ucsf.edu/sites/g/files/tkssra341/f/Fact%20Sheet Information%20for%20Workers.pdf](https://prhe.ucsf.edu/sites/g/files/tkssra341/f/Fact%20Sheet%20Information%20for%20Workers.pdf).

²¹ Holm, S.M., Leonard, V., Durrani, T. and Miller, M.D., 2019. Do we know how best to disinfect child care sites in the United States? A review of available disinfectant efficacy data and health risks of the major disinfectant classes. *American journal of infection control*, 47(1), pp.82-91.

²² Agency on Toxic Substances and Disease Registry, 2008. ToxFAQs for Phenol.

<https://www.atsdr.cdc.gov/toxfaqs/TF.asp?id=147&tid=27>.

²³ Weiselberg, R. and Nelson, L.S., 2011. A Toxic Swimming Pool Hazard. *EMERGENCY MEDICINE*.

<https://mdedge-files-live.s3.us-east-2.amazonaws.com/files/s3fs-public/Document/September-2017/043040019.pdf>.

²⁴ Glycolic acid MSDS.

https://www.cdhfinechemical.com/images/product/msds/18_352140617_GlycolicAcid-CASNO-79-14-1-MSDS.pdf.

²⁵ European Chemicals Agency (ECHA), Octanoic Acid Registration Dossier.

<https://echa.europa.eu/registration-dossier/-/registered-dossier/15370/7/3/1>

²⁶ Holm, S.M., Leonard, V., Durrani, T. and Miller, M.D., 2019. Do we know how best to disinfect child care sites in the United States? A review of available disinfectant efficacy data and health risks of the major disinfectant classes. *American journal of infection control*, 47(1), pp.82-91. [https://www.ajicjournal.org/article/S0196-6553\(18\)30731-4/fulltext#sec0018](https://www.ajicjournal.org/article/S0196-6553(18)30731-4/fulltext#sec0018).

²⁷ Agency on Toxic Substances and Disease Registry, 2008. ToxFAQs for Phenol.

<https://www.atsdr.cdc.gov/toxfaqs/TF.asp?id=147&tid=27>

²⁸ Agency on Toxic Substances and Disease Registry, 2008. ToxFAQs for Chlorophenol.

<https://www.atsdr.cdc.gov/toxprofiles/tp107-c1.pdf>.