About Decontamination and Decontaminants

CC DECON is a 4.0% Hydrogen peroxide solution used for disinfection and sanitation in the medical field, residential, healthcare, and household chemicals. Much research has been conducted using the Hydrogen peroxide solution to reduce the coronavirus. Kampf, 2020[1] studied the protentional of inanimate surfaces for spread coronaviruses and their inactivation with disinfectant agents such as Hydrogen peroxide. The published data shows that on inanimate surface human coronaviruses can remain infectious for up to 9 days. Using 0.5% of Hydrogen peroxide as surface disinfection can be regarded as effective against the coronavirus within 1 minute. Various types of biocidal agents such as hydrogen peroxide, alcohols, sodium hypochlorite, or benzalkonium chloride are used worldwide for disinfection, mainly in healthcare settings. Omidbakhsh and Satta introduced a new generation of accelerated hydrogen peroxide-based environmental surface disinfectant and their study found that 0.5% accelerated H2O2(AHP)-based, ready-to-use formulation (pH 3.0) designed for the disinfection of hard environmental surfaces for the contact time was 1 minute at 20°C.

Disinfectants are antimicrobial agents designed to inactivate or destroy microorganisms on inert surfaces. Disinfectants work by destroying the cell wall of microbes or interfering with their metabolism. They are rigorously tested and approved (certified) by the EPA for the claims made on the product label. The Key is what it's effective against (what types of bacteria, viruses, and fungi) and how long it takes (dwell time) to kill them to achieve a 6-Log reduction (99.9999%). The final consideration needs to be what areas need to be cleaned. Frequently contacted surfaces should be the first cleaned. The CDC recommends they be cleaned daily. They are:

- Doors – push plates, knobs, locks, keys, glass and wood surfaces
- Light switches
- Faucet and flush handles
- Countertops
- Railings and handles
- Tables, chairs
- Supplies brought into the house or facility
- Electronics: Phones, tablets, remotes, keyboards

The effectiveness of hydrogen peroxide depended on concentration, with household strength (3%) scoring kind of low on the speed of disinfection. The spectrum of the kill was also concentration-dependent, but 3% hydrogen peroxide performing well as a surface disinfectant. Since it is an oxidizer and formed bubbles and foam, it performed acceptably as a cleaning agent and had a good safety profile since at lower concentrations it is non-irritating and non-toxic. The environmental profile was great since it degrades into water and oxygen, and so was its cost-effectiveness [2].

Spraying or fumigation of outdoor spaces, such as streets or marketplaces, is also not recommended to kill the COVID-19 virus or other pathogens because disinfectant is inactivated by dirt and debris and it is not feasible to manually clean and remove all organic matter from such spaces. Moreover, spraying porous surfaces, such as sidewalks and unpaved walkways, would be even less effective. Furthermore, streets and sidewalks are not considered to be reservoirs of infection for COVID-19. In addition, spraying disinfectants, even outdoors, can be harmful to human health. After cleaning, the following disinfectants and defined concentrations (e.g. Hydrogen peroxide >0.5%) can be used on environmental surfaces to

achieve a >3 log10 reduction of human coronavirus Contact time of a minimum of 1 minute are recommended for these disinfectants [4, 5, 6].

The hydrogen peroxide product is noted to illustrate that commercially available disinfectants can have beneficial properties, such as safety, are faster-acting, and greater efficacy. There are many other types of disinfectants available. Check out the EPA's "List N" which details recommended disinfectants effective against Covid-19.

EPA Registered Disinfectants Contact Time Histograms

A histogram for EPA registered disinfectants contact time was generated in this report. Figure 1 shows the histogram for disinfectants contact time. The highest contact time-frequency was found around 10 minutes. This is mainly due to the hydrogen peroxide becoming a common product that can safely kill different types of viruses due to its capability to enhance the removal of organic matter and organisms, and its lower cost and higher applications compared to biocidal agents used as a chemical sterilant or as high-level disinfectants. The highest frequency contact time range was found to be between 5 – 10 minutes.

EPA Registered Disinfectants Contact Time Boxplot

The maximum contact time used was 20 minutes, which is considered extremely high. This time was used for disinfecting the Hard Nonporous (HN) while the minimum was 0.5 minutes. The median value is much closer to the third quartile range which is 5 minutes since many of the data points were within this range.

The Center for Disease and Control and Prevention explains below:

The literature contains several accounts of the properties, germicidal effectiveness, and potential uses for stabilized hydrogen peroxide in the health-care setting. Published reports ascribe good germicidal activity to hydrogen peroxide and attest to its bactericidal, virucidal, sporicidal, and fungicidal properties [7-8]. The FDA website lists cleared liquid chemical sterilant and high-level disinfectants containing hydrogen peroxide and their cleared contact conditions.

Mode of Action

Hydrogen peroxide works by producing destructive hydroxyl free radicals that can attack membrane lipids, DNA, and other essential cell components. Catalase, produced by aerobic organisms and facultative anaerobes that possess cytochrome systems, can protect cells from metabolically produced hydrogen peroxide by degrading hydrogen peroxide to water and oxygen. This defense is overwhelmed by the concentrations used for disinfection [7-8].

References

Günter Kampf, Potential role of inanimate surfaces for the spread of coronaviruses and their inactivation with disinfectant agents, Infection Prevention in Practice, Volume 2, Issue 2, 2020, 100044, ISSN 2590-0889, https://doi.org/10.1016/j.infpip.2020.100044

https://cleaningbusinesstoday.com/blog/hydrogen-peroxide-vinegar-a-disinfecting-duo/

Source: Neeltje van Doremalen, 2020, www.fip.org/coronavirus

Risk Communication and Community Engagement (RCCE) Action Plan Guidance COVID-19 Preparedness and Response; Geneva: World Health Organization; 2020 (https://www.who.int/publications-detail/risk-communication-and-communityengagement-(rcce)-action-plan-guidance, accessed 14 May 2020)

Rutala, W.A., Weber, D.J., 2019. Best practices for disinfection of noncritical environmental surfaces and equipment in health care facilities: A bundle approach. Am J Infect Control 47, A96–A105. (https://doi.org/10.1016/j.ajic.2019.01.014, accessed 6 May 2020)

Kampf, G., Todt, D., Pfaender, S., Steinmann, E., 2020. Persistence of coronaviruses on inanimate surfaces and their inactivation with biocidal agents. J Hosp Infect 104, 246–251. (https://doi.org/10.1016/j.jhin.2020.01.022, accessed 6 May 2020)

Centers for Disease Control. Acquired immune deficiency syndrome (AIDS): precautions for clinical and laboratory staffs. MMWR 1982; 31:577-80.

Van Bueren J, Simpson RA, Salman H, Farrelly HD, Cookson BD. Inactivation of HIV-1 by chemical disinfectants: sodium hypochlorite. Epidemiol. Infect. 1995; 115:567-79.