

Stability time of COVID-19 on non-living surfaces and potential modalities of disinfection

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Considering the magnitude effect and pace of SARS-CoV-2 transmission, its important to understand the spreading trends of the virus. Apart from respiratory droplets, it is known that SARS-CoV-2 is also transmitted through contact of infected non-living surfaces and it is expected to survive there for significant amount of time. Recently a first report studying stability of SARS-CoV-2 in aerosol and non-living surfaces has been published and its findings are summarized below:

Stability time of SARS-CoV-2 on various non-living surfaces and aerosol¹

Non-living surfaces	Number of hours
Copper	4
Cardboard	24
Steel	48
Plastic	>72
Air	3

This report provided some critical information regarding how long the virus can survive outside human body. Though it did not studied all the non-living surfaces, it covered majority of it's classes where observations for one type of surface can act as a reference for similar class of surfaces, i.e., SARS-CoV-2 is stable for 24 hours on cardboard, so other porous surfaces like fabric and paper may also exhibit similar stability. It showed longest viability on hard surfaces like steel and plastic, that includes some of the high-touch surfaces such as table tops, door handles, light switches, remote control, public transport facilities, elevators, toilet accessories, mobile phones and other electronic gadgets. One more study from hospital set up suggested that the virus can survive up to nine days on glass and metals.² This clearly indicates that adequate measures should be taken for periodic disinfection of these surfaces with appropriate disinfectants.

Measures to prevent spread of SARS-CoV-2 infections through non-living surfaces

Unlike awareness regarding proper hand hygiene practices that have reached to each and every household, spreads of information regarding time, frequency, type of disinfectants and methods of disinfecting the non-living surfaces is very limited.

It is recommended that until unless a family member is exposed to the virus or have any illness, routine practices of cleaning and disinfection using common chemicals such as soap, water and bleach are sufficient to provide protection against COVID. This may involve cleaning of visibly dirty surfaces, followed by disinfection of high-touch and food preparation surfaces using bleach (sodium hypochlorite), hydrogen peroxide (hydrogen peroxide expires six months after opening but can last up to three years unopened), and alcohol (ethanol, isopropyl alcohol- $\geq 60\%$ of alcohol). EPA has provided entire list of disinfectants that can be used for disinfecting

the non-living surfaces and any new product purchased should be checked for its registration with EPA.³

Commonly recommended disinfectants for various surfaces

Surfaces	Disinfectant
Hand	Soap and water. Every two hours hands should be washed. 70% alcohol based sanitizers should be used in case of unavailability of water.
Hard surfaces e.g. metal surfaces, door handles, elevators.	Acid detergent solution or bleach. Use it to scrub or wipe down table tops, pipework, gates and latches – for high touch surfaces. Gloves should be worn.
Other non-porous surfaces (e.g. floors)	Visible dirt should be cleaned first. Products registered for sanitising walls and floors should be used and label instructions should be followed. Dilutions of 100 - 200 ppm hypochlorite solution (chlorine) and 5 minutes contact time are sufficient to kill the virus.
Laundry	Normal routine using washing detergent and warm/hot water is sufficient. Daily washing is recommended.
Electronics, porous materials e.g. mobile phones, laptops etc.	70% alcohol-based solutions using the wipes. Air drying of the disinfectant is recommended.
Plastics, corrosive, soft materials e.g. light switches, door handles, fridge handle, toilet flush button, etc.	Dilute hypochlorite solution. Make up a dilute mix e.g. 100 to 200 ppm chlorine or 0.01% to 0.02% active chlorine in a spray bottle. Spray on a cloth to wipe down frequently touched surfaces.

Guidelines for Preparation of 1% sodium hypochlorite solution (most commonly disinfectant)⁴

Product	Available chlorine	1percent
Sodium hypochlorite – liquid bleach	3.5%	1 part bleach to 2.5 parts water
Sodium hypochlorite – liquid	5%	1 part bleach to 4 parts water
NaDCC (sodium dichloro-isocyanurate) powder	60%	17 grams to 1 litre water
NaDCC (1.5 g/ tablet) – tablets	60%	11 tablets to 1 litre water
Chloramine – powder	25%	80 g to 1 litre water
Bleaching powder	70%	7g g to 1 litre water
Any other	As per manufacturer's Instructions	

Common tips for effective disinfection

- The instruction provided on the labels must be followed for disinfectant to be effective. It is also advised not to mix any two products as it may cause formation of toxic gases having serious health hazards. It may also make the product simply ineffective.
- Though for every disinfectant agent the time required for effective action, methods of disinfecting and optimum concentration are mentioned on product details labels, it is recommended to wait for 30 seconds to several minutes (5-10 minutes) for the product to effectively kill a virus.
- Products with EPA-approved emerging viral pathogens are expected to be effective against COVID-19. The product label should be checked for mentioning of “anti-viral activity”.
- Different cleaning and disinfecting materials should be used for different surfaces such as non-porous and porous surfaces. The disinfectant recommended for hard surfaces may end up damaging the porous surfaces. Surfaces used for food preparations should be rinsed with clean water after drying of the disinfectant.
- Grocery bags and reusable shopping bags also should be disinfected from outside with appropriate disinfecting product as they must have received reasonably high exposure to the virus.
- For cleaning of electronic devices such as mobile phones, remotes, laptops and computer keyboards alcohol (>70% isopropyl alcohol) based spray are recommended. However, no disinfectant should be applied directly to the device, instead a cloth, wipe or paper should be moist with the disinfectant and gently used to clean the surfaces. Essentially, before applying the solutions, batteries should be removed and should only be replaced after the drying of the solution. For, hard to reach surfaces a cotton bud moistened with disinfectant should be used.
- It is a myth that wiping of the surfaces in circular fashion spread the virus. The fact is that whichever method is used for disinfection as long as the chemical stays on the surface for required amount of the time and the surface is allowed to dry the virus will be killed.
- It is reported that, 0.5% hydrogen peroxide effectively reduces viral load of COVID on a toothbrush. Hydrogen peroxide can be mixed with water (1 teaspoon of hydrogen peroxide with 1 cup of water) to dilute it. A brush can be soaked for 1 minute, followed by rinsing it under running water.⁵
- One key observation is that good ventilation is critical for achieving optimum disinfection.
- After cleaning of the surfaces, it is extremely important to follow recommended hand hygiene practices. Frequent hand washing leads to dryness and forms cracks in skin that may provide potential entry for viruses. So, it is important to moisturize the hands after each hand wash using products containing water and glycerine.
- In case of quarantining of a family member due to exposure to positive cases a special care should be taken. Separate room should be allotted to the member and the surfaces (bathrooms, personal hygiene products, and utensils) and reusable products should be disinfected more frequently. However, the same disinfect products (listed in EPA registered disinfectants) can be used. Separate garbage bags should be allotted to this members and handling, disposition and removal of these bags should be done using disposable gloves only. Proper hand washing should be done after that.

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²<https://www.chemistryworld.com/news/explainer-how-do-disinfectants-tackle-covid-19/4011546.article>

³<https://www.epa.gov/pesticide-registration/list-n-disinfectants-use-against-sars-cov-2>

⁴<https://www.mohfw.gov.in/pdf/StandardOperatingProcedureSOPfortransportingasuspectorconfirmedcaseofCOVID19.pdf>

⁵Sources: Centers for Disease Control and Prevention, SCS Cleaning, BBC, Michigan State University

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