Different sanitizing and cleaning alternatives for businesses

By Wouter Banning

Terms and notes

Cleaning removes germs, dirt, and impurities from surfaces or objects. This process does not necessarily kill germs, but by removing them, it lowers their numbers and the risk of spreading infection.
Disinfecting kills germs on surfaces or objects by using chemicals. This process does not necessarily clean dirty surfaces or remove germs, but by killing germs on a surface *after cleaning*, it can further lower the risk of spreading infection.
Sanitizing lowers the number of germs on surfaces or objects to a safe level, as judged by public health standards or requirements.

Cleaning chemicals and sanitizing chemicals are often not the same.

Cleaning and sanitizing chemicals can only be used on hard non-porous surfaces.

Prior to sanitizing or disinfecting, surfaces need to be cleaned.

Main types of sanitizers for commercial businesses

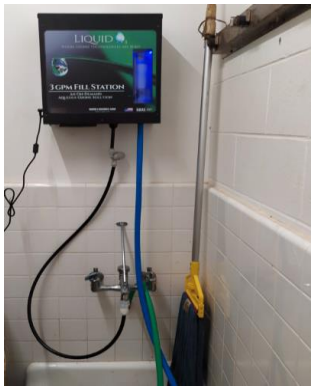
There are 4 main types of sanitizing methods for commercial businesses

- Chemical sanitizers
- Aqueous Ozone
- Ultraviolet C-bandwidth light (some can also generate ozone gas)
- Ozone gas

Chemical sanitizing

Ozone gas sanitizer

Ultra Violet sanitizing



Aqueous ozone sanitizer

What sanitizer to use in what area.

		Non-chemical sanitizing options				Chemical sanitizing options						
		Aqueous Ozone	UVC light	UVC + Ozone gas	Ozone Gas	Chemcial Sanitizer		Chemical Multi purpose Cleaner	Chemical Shampoo cleaner	Chemical Bathroom cleaner	Chemical mirror cleaner	Chemcial Food Sanitizer
Location		Spray and wipe				Spray and wipe	Fogger	Spray and wipe	Spray and wipe	Spray and wipe	Spray and wipe	Spray and wipe
(Hotel) Rooms	Cleaning	Y				Maybe		Y				
	Sanitizing	Y		Y	Y	Y	Maybe	Maybe				
Bathrooms / lavatories	Cleaning	Y				Maybe		Maybe		Y		
	Sanitizing	Y		Y	Y	Y	Maybe	Maybe				
Windows and Mirrors	Cleaning	Y									Y	
	Sanitizing	Y	Y	Y	Y							
Balconies	Cleaning	Y				Maybe		Y				
	Sanitizing	Y		Y	Y	Y		Maybe				
Hallways hard surface	Cleaning	Y				Maybe		Y				
	Sanitizing	Y	Y	Y	Y	Y	Maybe	Maybe				
Carpets	Cleaning	Y							Y			
	Sanitizing	Y		Y	Y							
Upholstery / porous	Cleaning	Y										
	Sanitizing	Y		Y	Y							
Elevators	Cleaning	Y				Maybe		Y			Y	
	Sanitizing	Y	Y	Y	Y	Y	Maybe	Maybe				
Lobby	Cleaning	Y				Maybe		Y				
	Sanitizing	Y				Y	Maybe	Maybe				
Luggage storage	Cleaning	Y				Maybe		Y				
	Sanitizing	Y		Y	Y	Y	Maybe	Maybe				
Restaurant / Bar	Cleaning	Y				Maybe		Y				
	Sanitizing	Yes*		Y	Y	Y	Maybe	Maybe*				Y
Kitchens	Cleaning	Y				Maybe		Y				
	Sanitizing	Yes*		Y	Y	Y	Maybe	Maybe*				Y
Office	Cleaning	Y				Maybe		Y				
	Sanitizing	Y		Y	Y	Y	Maybe	Maybe*				Y
Gym	Cleaning	Y				Maybe		Y				
	Sanitizing	Y	Y	Y	Y	Y	Maybe	Maybe				Y

* food contact surfaces need to be sanitized with government regulated methods and products.
After that aqueous ozone can be used to remove the chemical residues / films left on the surfaces.
Y = Yes
Maybe = some can perform this task to varying degrees

Comparing the different sanitizers

Chemical Sanitizers

1. Efficiency: chemical sanitizers often need the surface to be cleaned before sanitizing product is applied.
   Chemical sanitizers leave a chemical residue that can be hazardous to staff / guests.
2. Storage – chemical sanitizers can be easily stored in closed containers.
3. Expense – Costs depend on the sanitizer and concentration delivered. Sanitizing solutions will need to be continuously purchased.
4. Health concerns – As sold, most chemical sanitizers have a 3 or 4 health hazard indication on the SDS (safety data sheet). This means that they are hazardous or potentially lethal to users unless stringent precautions are taken.
   PPE needs to be worn in compliance with manufacturers guidelines.

Chemical traces can endanger the staff, customers, environment.
End users must read the SDS carefully and ensure with the manufacturer that the chemicals are applied correctly, in the correct dilution, that staff and guests are protected against the medium to long term effects of the chemicals.

5. Environmental toxicity – when we look at the ecotoxicity for the majority of chemical sanitizing agents on the SDS (safety data sheets) it often reads 'toxic to aquatic life' or ' very toxic to aquatic life with long lasting effects' (**Ecolab product 'No rinse food contact cleaner sanitizer'**) or words to that effect. This means any runoff or contact with the environment needs to be prevented.
   The SDS also reads 'do not allow contact with soil, surface or groundwater' even in diluted state.
6. Liability –should a company allow its staff to use the product in a manner not according to the SDS, then the liability falls to the company.
7. Contact / dwell time – dwell time for many of the sanitizing agents is 5-10 minutes.

Aqueous Ozone

1. Efficiency.

- aqueous ozone is 50 x stronger than chlorine in terms of disinfecting and ozone is works 3000 x fast. So dwell time does not need to be as long.
- One liquid cleans and disinfects all area's
- Operational ease, depending on the type of aqueous ozone producing machine, the liquid will last from 10 minutes to 2-4 hours (latter for systems utilizing nanobubble technology). Some types claim longer periods, but those systems add resins or acids to the water.

2. Storage – Aqueous ozone is made on demand, onsite using water and air. There is no storage necessary.
3. Expense – Once the machine has been purchased, the operating costs are very low as the raw materials for aqueous ozone are water and air. Some companies sell machines that add acids or other chemicals, which can increase the operating costs.
4. Health concerns. Exposure to ozone gas in concentrations higher than 0.08 ppm for more than 8 hours per day is not recommended. Aqueous ozone has ozone gas injected into water. If this is in the form of nanobubbles, the ozone will stay in solution rather than seek to escape. Ensure that the aqueous ozone machine is in a ventilated room and has a destruct chamber for excess ozone gas produced. The characteristic sharp odour of ozone is already detectable at very low concentrations of 0.005 – 0.002 ppm.
5. Environmental toxicity. Aqueous ozone is not dangerous to the environment. It is used to clean fish tanks while the fish are still swimming. It is used in agriculture to tackle bacteria, spores, moulds and viruses. After use, it reverts to water and oxygen.
6. Liability – Check the system to ensure that ozone levels in solution and around the machine stay within OSHA recommended levels and that there is a destruct chamber present.
7. Contact dwell time. Aqueous ozone works about 3000 x faster than chlorine. Normal operational dwell times are 30 seconds viral dwell times are 2 minutes.

Ultraviolet light (C bandwidth) + ozone gas generating wavelength (185 nm)

1. Efficiency – UVC lamps can be left in an unoccupied room to sanitize.
   A UVC lamp (55W) needs around 40 mins to sanitize a room of around 30m2. It only sanitizes area's where the light hits the surface or air. So 'shadows' are an issue. To cover all the area's in a room, it will need to be moved around several times and remain there for 40 mins per time. If the unit uses a 254nm and 185nm wavelength producing lamp, the

shadows will not be an issue as they will be covered by the ozone gas that is produced simultaneously.
2. Storage – UVC cleans with the UV light so once a unit is purchased, there is no storage required.
3. Expense – The system/machine needs to be purchased and the lamp will need to be replaced as per the specifications. Only operating cost is electricity.
4. Health concerns – UVC can burn your skin and retina very quickly. It is important that there is a safeguard / motion detector that can immediately switch off the unit when a guest or staff enters the room. Ozone gas can cause problems to lungs. It is recommended not to enter the room for at least 15 minutes after the system has finished its 40 minute cycle.
5. Environmental toxicity. No environmental problems.
6. Liability – businesses need to ensure that warning systems for guests and staff are in place and enforced.
7. Contact time. The unit needs to be in a room for a certain amount of time relating to the power of the lamp and the size of the room

Ozone gas

1. Efficiency
   Ozone gas machines can be left in an unoccupied room to sanitize.
   Needs to be moved from room to room depending on size of the room and ozone producing capacity.
2. Storage – sanitizing gas is produced on site, no need for storage
3. Expense – there is a large variety of machines producing different levels of ozone. Once the machine is purchased the only cost is electricity.
4. Health concerns – ozone gas should only be used in a closed / sealed environment. Prior to staff / guests entering a room sanitized by ozone it should be vented.
5. Environmental toxicity. None
6. Liability – businesses need to ensure that warning systems for guests and staff are in place and enforced.
7. Contact time. The unit needs to be in a room for a certain amount of time relating to the power of machine and the size of the room

Fogging / spraying

Fogging uses a fine mist to kill microorganisms and generates micro and possibly nano particles of disinfectant. Spraying is aimed at wetting a surface long enough for the chemicals to kill bacteria / viruses (usually 5-10 mins based on EPA and manufacturers recommendations).

When we look at fogging as a method of sanitizing there are several caveats. Chief caveat is that fogging is not an effective method of application according to the American EPA.

The reasons that the EPA believes that fogging/misting/spraying methods of application may not be adequately effective include the following:

- The absence of pre-cleaning in the presence of soil contamination, potential reaction with or absorption of the active ingredient for different surfaces, and humidity/temperature fluctuations can also impact distribution and efficacy of the product.
- Application by fogging/misting/spraying results in much smaller particle sizes, different surface coverage characteristics, and potentially reduced efficacy when compared to sanitization or disinfection product applications by spraying, sponging, wiping or mopping.

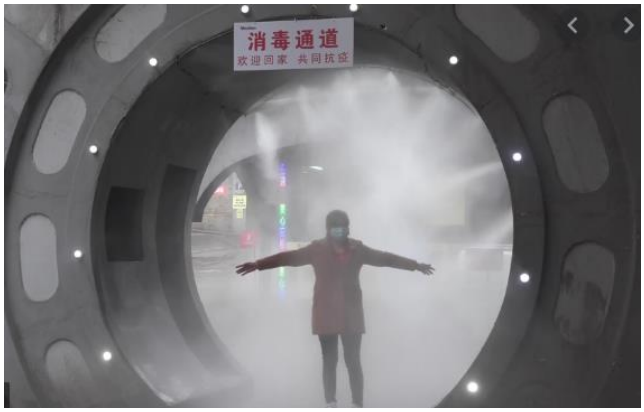
- A surface treated by fogging/misting/spraying does not receive the same amount of active ingredient per unit area as the standard methods of application (spray and wipe) and, as a result, the level of efficacy actually achieved may not be the same level claimed on the label.

In terms of sanitizing agents that can be used in fogging machines, the US EPA has only recognised one, namely Hydrogen Peroxide.

If fogging is going to be used as a sanitizing method, the NJ Department of Health recommends;

- Not to fog on a daily basis but only for maintenance as a supplemental measure
- Continue the normal cleaning / sanitizing routine (spray and wipe) along with fogging
- Wear the correct PPE and close the area to ensure others are not exposed to the fogged area for least a period of 4 hours

Sanitizing booths



A person in China getting sprayed with an unknown sanitizing agent

There is an explosion of sanitizing booths being offered and requested across the internet.

Using disinfection chambers or spraying disinfectant directly on human bodies is not recommended as it can harm the skin, eyes and mouth and could lead to irritation," according to many experts.

Questions need to be asked as to what sanitizing liquids are being sprayed onto people.

Sanitizing booth in the Philippines. What is being sprayed?

As in the section on fogging, hydrogen peroxide is the only sanitizing agent recommended by the US EPA for fogging / spraying, but not recommended for human contact.

Hydrogen peroxide is flammable and harmful to skin, lungs, eyes with contact. Protective measures to be taken include protective gloves, protective clothing, eye protection, face protection.

Other chemicals that I have heard mentioned are;

Sodium Hypochlorite- this is commonly known as bleach. Even diluted, it should not be applied to skin, eyes or misted to be inhaled.

Isoprophyl alcohol (used in a lot of hand sanitizers) according to the label is a laboratory chemical. According to the SDS if it is in contact with skin, the person is to remove/take off immediately all contaminated clothing. rinse skin with water/shower.

Hypochlorous acid – is a liquid that needs to be continuously tested before application as it can move between hypochlorous acid and hypochlorite (bleach) depending on changes in batch pH. Too much acid and there is a release of Chlorine gas, too little and you can spray bleach. On site production also needs to ensure safety with the release of hydrogen gas.

In choosing what type of sanitizer to use, further thought needs to be given to;

1. The products used to disinfect are more toxic and/or more expensive than products used just to clean.

2. Overusing antimicrobial products like sanitizers and disinfectants may also lead to the spread of "superbugs." Superbugs are germs that are not easily killed by disinfectants and/or antibiotics.

3. Incorrectly using a disinfectant may kill the weaker germs, but the more resistant germs survive. Incorrect use includes
- disinfecting a dirty surface;
- wiping or rinsing the disinfectant off the surface before the recommended dwell (contact) time is over;
- not using the recommended dilution ratio (not concentrated enough);
- using a combination disinfectant/cleaner without first removing visible dirt from the surface.

4. Using the least hazardous and most effective products available will protect the health of the staff and customers as well as being better for the environment

5. A “hospital grade” disinfectant sounds like it kills all sorts of germs, but it is only required to kill two target organisms: *Staphylococcus aureus* and *Pseudomonas aeruginosa.*

Conclusion

We need to sanitize to keep our guests, staff, families safe and be able to provide a livelihood. Keeping safe does not mean that we can accept every type of chemical that is being pushed to market. There are dangerous consequences to using sanitizing agents. I think non-chemical alternatives need to get a preference before we do serious damage to ourselves and environment.

More information

For more information about the information above or non-chemical cleaning products please contact info@aq-o3.com

Sources

Green Cleaning, Sanitizing, and Disinfecting Toolkit for Early Care and Education was developed by the University of California, San Francisco School of Nursing's Institute for Health & Aging, University of California, Berkeley's Center for Environmental Research and Children's Health, and Informed Green Solutions, with support from the California Department of Pesticide Regulation.

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