

COVID-19 Briefing - Chlorine Solutions for Surface and Hand Disinfection

Practising hand hygiene and disinfection of high touch surfaces are two of the precautionary measures recommended for the public to adopt in order to help control the spread of COVID-19. Chlorine based disinfectant solutions can be easily made by diluting household bleach and other chlorine products.

- 0.1% chlorine solution is [recommended for disinfection of hard surfaces](#).
- 0.05% chlorine solution has been [widely used](#) for disinfection of hands in previous [disease outbreak](#) situations. Chlorine can be harsh on the skin so other options for hand hygiene like soap and water or alcohol sanitizers (if available) may be preferred.
- 0.05% chlorine solution can also be used for disinfecting laundry after washing with soap.

Household Bleach and Point of Use (POU) Water Disinfection Products

Household bleach and liquid Point of Use (POU) water disinfection products contain solutions of sodium hypochlorite. Household bleach is readily available around the world and can be easily diluted to create these solutions. POU water disinfection products are available in many countries and can also be used to make disinfectant solutions. To make the disinfectant solutions you need to know the strength of the bleach or POU product you have available in order to work out the correct dilution. The percentage strength is usually marked on the bottle.

The strength of household bleach [varies widely from country to country](#), commonly between 2.5% and 9.5%.

The strength of point of use water disinfection products also varies but is commonly between 0.5% and 1.25%.

The actual percentage content of chlorine may be more or less than that marked on the bottle. Quality control in manufacturing can be an issue, also chlorine strength decreases over time. It is important to buy products that are made by a reputable producer, that are recently manufactured (within 6 months), and to use them within 1 year of production.

Preparing Solutions

- Use plastic or glass containers to mix and store chlorine solutions.
- Measure quantities accurately; too little chlorine may be ineffective, too much chlorine may damage materials.
- The chlorine disinfecting solutions lose strength quite quickly. It is advised to [discard and replace the solutions every day](#).

Safety Considerations when [Working with Household \(Chlorine\) Bleach](#)

- Household bleach and POU products contain sodium hypochlorite which is a powerful oxidiser.
- Sodium hypochlorite is corrosive and very reactive. It can burn skin, it can cause permanent damage to the eyes, and fumes can irritate the lungs.
- Wear eye protection, rubber gloves, and clothing and shoes that cover the skin in case of a spill.
- Never mix bleach or other chlorine solutions with other chemicals or cleaning products.
- When mixing, add the bleach/chlorine to the water not the other way around.
- Mix in a well ventilated area.
- Do not drink, eat or smoke when handling or mixing
- Store chlorine products in a secure, cool, dry place, and protect from direct sunlight and heat.

Calculating Dilutions of Household Bleach

The following tables can be used to determine the quantities necessary to make 1 litre of the 0.1% and 0.05% chlorine solutions depending on the strength of the household bleach or POU product available.

Surface Disinfection 0.1% Solution

				To make 1 litre of 0.1% solution						
	% Strength of product	Parts / volumes of bleach	Parts / volumes of water	ml	OR	# 5ml tea spoon	OR	# 15ml table spoon	IN	ml of water
POU Products										
<i>Piyush</i>	0.50%	1	4	200		40		13.3		800
<i>Gadyen Dlo</i>	0.70%	1	6	143		29		9.5		857
<i>Piyush, Kouzin Dlo</i>	0.75%	1	6.5	133		27		8.9		867
<i>Piyush</i>	1.00%	1	9	100		20		6.7		900
<i>WaterGuard</i>	1.25%	1	11.5	80		16		5.3		920
Bleach Products										
	2.5%	1	24	40		8		2.7		960
	3%	1	29	33		7		2.2		967
	4%	1	39	25		5		1.7		975
	5%	1	49	20		4		1.3		980
	6%	1	59	17		3		1.1		983
	7%	1	69	14		3		1.0		986
	8%	1	79	13		3		0.8		988
	9%	1	89	11		2		0.7		989
	10%	1	99	10		2		0.7		990

Example 0.1% solution

You have household bleach with a strength of 2.5% and you want to make 1 litre of 0.1% solution to disinfect hard surfaces.

From the table, you can make the solution by:

1. adding 40ml of bleach to a 1L container containing 960ml of water
OR
2. adding 8 teaspoons of bleach to a 1l container containing 960ml of water
OR
3. adding 2¾ tablespoons of bleach to a 1l container containing 960ml of water

Hands Disinfection 0.05% Solution

				To make 1 litre of 0.1% solution						
	% Strength of product	Parts / volumes of bleach	Parts / volumes of water	ml	OR	# 5ml tea spoon	OR	# 15ml table spoon	IN	ml of water
POU Products										
<i>Piyush</i>	0.50%	1	9	100		20.0		6.7		900
<i>Gadyen Dlo</i>	0.70%	1	13	71		14.3		4.8		929
<i>Piyush, Kouzin Dlo</i>	0.75%	1	14	67		13.3		4.4		933
<i>Piyush</i>	1.00%	1	19	50		10.0		3.3		950
<i>WaterGuard</i>	1.25%	1	24	40		8.0		2.7		960
Bleach Products										
	2.5%	1	49	20		4.0		1.3		980
	3%	1	59	17		3.3		1.1		983
	4%	1	79	13		2.5		0.8		988
	5%	1	99	10		2.0		0.7		990
	6%	1	119	8		1.7		0.6		992
	7%	1	139	7		1.4		0.5		993
	8%	1	159	6		1.3		0.4		994
	9%	1	179	6		1.1		0.4		994
	10%	1	199	5		1.0		0.3		995

Example 0.05% solution

You have household bleach with a strength of 5% and you want to make 1 litre of 0.05% solution to disinfect hard surfaces.

From the table, you can make the solution by:

- adding 10ml of bleach to a 1L container containing 990ml of water
OR
- adding 2 teaspoons of bleach to a 1l container containing 990ml of water
OR
- adding $\frac{2}{3}$ tablespoons of bleach to a 1l container containing 990ml of water

Formula Used

$$\frac{\% \text{ chlorine in bleach product}}{\% \text{ chlorine desired}} - 1 = \text{Total parts of water for each part of bleach}$$

Online Calculators

There are chlorine dilution calculators available online. These are a good option particularly if you want to make larger quantities of chlorine solution or you are using high strength chlorine products. The link below is to a calculator provided by the Public Health Department of Ontario.

Chlorine Dilution Calculator

This easy-to-use calculator tells you how much bleach product to dilute with water to get your desired concentration (ppm) of chlorine solution. It is intended for use by public health units, health care facilities, child care centres, swimming pool operators, and the general public (e.g., for disinfection of wells and homes).

Important: Always add the bleach solution to the water when preparing the solution, not vice versa.

If you are a well contractor, please make sure to use the [Well Disinfection Tool](#).

Concentration of bleach product % sodium hypochlorite

Desired concentration of chlorine solution ppm or mg/L

Desired volume of chlorine solution litres

Your results will appear here.

[Chlorine Dilution Calculator](#)