

Water purification and rehydration solutions

Water is essential for life. High glucose levels, hot environments or fever increase the need for fluids. Water is also needed for cooking, bathing and cleaning. As water supplies, including that in rivers, streams, springs, wells and lakes can become limited or contaminated during many disasters, a store of bottled water or water purifier devices (filters) (such as from bush walking/hiking stores) or water purification tablets are desirable.

Water purification by boiling

Disinfect clear water (sourced from a freshwater river, stream or lake) by keeping it at a rolling boil for at least 1 minute.

Recipe for water purification using bleach

For 1 litre clear water add unscented liquid household bleach (sodium hypochlorite) to each quart or litre of water. The amount of bleach to be added per litre of water depends on the strength of the bleach.

For 1% sodium hypochlorite add 10 drops per litre of water

For 4–6% sodium hypochlorite add 2 drops per litre of water

For 7–10 % sodium hypochlorite add 1 drop per litre of water

Mix well and let stand for 30 minutes before drinking.

Double the amount of bleach for cloudy or coloured water, or water that is extremely cold. The water should have a slight chlorine odour after purification. If not, repeat dosage of bleach and let stand for an additional 15 minutes.

If the chlorine taste is too strong, try pouring the treated water back and forth from one clean container to another several times.¹

Following this method, a single bottle of bleach would purify all the water you need to shelter in place for 12 weeks or more.

Never mix bleach with any other cleaners as this can generate toxic gases. Bleach reacts with ammonia, which is common in many glass cleaners and also with acids like vinegar (and some toilet bowl, drain, and automatic dishwashing detergents).²

Water purification filters or tablets

A range of water purification filter systems of various sizes are available, often from camping or army surplus stores or online. Examples include a personal use straw-like system to a pump for larger volumes.

For a review of some models: <https://bestreviews.com/best-water-filter-straws>

There are many brands of water purification tablets, often available at chemists, travel or hiking stores; e.g., Aquatabs Water Purification 50 Tablets, each of which contains 3.5mg trocloses sodium. Always follow the instructions for the brand in use. In



general, each tablet treats 1 litre of water. If water is clear add 1 tablet and leave for 30 minutes before use. If the water is dirty, allow the sediment to settle or filter it through a fine cloth, then add 2 tablets per litre of water and wait 30 minutes.

Home-made rehydration solution

Rehydration fluid, water with added 'salts' or electrolytes, may be preferable to clean water alone if a person is dehydrated, such as due to fever, high glucose levels, vomiting or diarrhoea, perspiration due to hot weather and/or prolonged exercise or if they are not eating well.

Commercial (but bulky) bottles of rehydration fluids, including those with sugar and no added sugar versions are available. There are also sachets or tablet forms of salts which are mixed with the recommended amount of water. These are often available from chemists or sports stores or included in some first aid kits. A recipe for a home-made version is below:

- 1 litre of clean drinking water
- 2 tablespoons sugar
- $\frac{1}{4}$ teaspoon salt
- $\frac{1}{4}$ teaspoon baking soda; if baking soda is unavailable, substitute another $\frac{1}{4}$ teaspoon of salt.³

Mix

Optional: Additional potassium can be added by including a half cup of orange juice, coconut water, or a mashed ripe banana.

If a person is too weak to drink or is repeatedly vomiting and medical care, such as for intravenous fluids, is not available, drip-feeding the person fluid drop by drop is recommended. This can be life-saving.



Home-made hand sanitisers and surface disinfectants

Home-made hand sanitisers

Soap and water, even with cold water, is very effective at killing micro-organisms if done properly. Washing all hand surfaces for at least 20 seconds is required. Solid or liquid soaps are suitable, though soap is more effective. Using hot water is no more effective than cold water and can dry out the skin more and may not be readily available in a disaster. Soap and water is recommended if there is visible soiling. As an added precaution and for use when soap, water and towels are not available, alcohol-based hand sanitisers are a good option.

Alcohol-based hand sanitisers

Alcohol based sanitisers are usually not very costly, but during pandemics and other disasters costs of commercially available sanitisers can increase greatly and their availability decline. There are several versions of proven effective home-made sanitisers and cleansers. It is recommended that the ingredients, such as concentrated alcohol for the sanitiser or the concentrated bleach for the cleanser, be acquired prior to a disaster, kept securely (out of reach of children) at home and the solutions for use made up just prior to or during a disaster.

Often the strength of a solution or liquid is given as a percent. This refers to the number of mls of the ingredient per each 100 mls of the liquid (usually water) is required. For example, a 10% alcohol solution is 10 mls of the concentrated alcohol and 90 mls of water.

Alcohol is the active ingredient in most hand sanitisers

Many microbes are killed by 30% alcohol, but others, such as COVID-19, need a higher alcohol concentration, with recommended alcohol concentrations being at least 70% (for example 70 mls of alcohol and 30 mls of water).

In the WHO 2862 guidelines for home-made hand sanitisers, alcohol is the usual active ingredient. To prevent skin drying some glycerin (also known as glycerine or glycerol) and a preservative such as hydrogen peroxide to prevent bacterial growth may be added but are not essential. The addition of hydrogen peroxide though will prolong the shelf-life of the sanitiser.

The addition of aloe vera (as a moisturiser) is not recommended as it may reduce antiviral efficacy.⁴ Some people consider adding essential oils, such as tea tree, lemon or lavender, but these are not essential, can be costly and reduce the strength of the alcohol solution.

A usually widely available concentrated form of alcohol recommended is that of 95% ethanol, also known as ethyl alcohol, grain alcohol or rectified spirit. Another alternate is 99% isopropyl alcohol or 75% rubbing alcohol (often available at a chemist or supermarket).

One can use rubbing alcohols, (usually 70–75%) or even high proof alcohol (for drinking) neat, without further dilution with water, just adding small volumes of glycerin and/or hydrogen peroxide if desired.

Concentrated alcohol solutions, including the sanitisers ready for and in use, are highly flammable and are also toxic if ingested, so seal and label them accordingly and store them in a safe place away from flames and from children.

See below for recipes for an approximately 70–75% alcohol sanitiser based on various strengths of concentrated alcohol based on the WHO recipe:

Volumes are given in mls and also in brackets in household cooking measures.

Starting Strength Alcohol	99%	95%	70%
Volume of alcohol	250 ml (1 cup)	275 mls (1 cup+1 tbs+1 tsp)	300 mls (1 cub+2.5 tbsp)
Volume 3% hydrogen peroxide	20 ml (1 tbsp)	20 (1 tbsp)	20
Volume glycerine	5 ml (1 tsp)	5 (1 tsp)	(1 tbsp)
Distilled water	55 ml (2.5 tbsp+1 tsp)	45 ml (2 tbsp+1 tsp)	No water needed

- tbsp = tablespoon; tsp = teaspoon
- Add all ingredients to a clean container and gently mix.
- Label including warning that it is flammable and poison if ingested and store away from flames and young children
- Preparation time: 5 minutes

References

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Home-made household disinfectants

Bleach-based disinfectants

On inanimate surfaces, such as tables, cupboards or kitchen benches, a 1 in 50 dilution (1 ml of bleach and 49 mls of water) of household bleach; that is, a 5% sodium hypochlorite solution is recommended. For larger volumes (250 ml), this is 5 ml 5% bleach and 245 ml water, or approximately 1 teaspoon of bleach per cup of water.

Household bleach is sold in different strengths so a table to make up about 50 ml of a household disinfectant from different strength bleach solutions is below:

Starting Strength Bleach	2.5%	5%	10%
Volume of bleach	2 ml	1 ml	0.5 ml
Volume of water	48 ml	49 ml	49.5 ml

Fresh solutions work best. Store the diluted bleach in a dark closed container at room temperature for up to one month.¹

To disinfect a surface, e.g., a table, wet the surface and leave it for at least 10 minutes.

If a surface is very dirty, such as contaminated by the body fluids of an ill person a stronger bleach solution, left on the surface for 10 minutes, is recommended. For example, a 1 in 10 solution of 5% bleach (e.g., 10 mls of 5% bleach and 90 mls of water).^{2,3}

Non-bleach-based disinfectants

Alcohol can be used on surfaces that aren't suitable for bleach, such as metal, which bleach can stain or even corrode.⁴

Dishwashing detergent or hand soap (1 ml soap, 49 ml water)—which can take 5–15 minutes to kill infectious agents.^{2,5}

Wine vinegar (6% acid).

Commercial disinfectants

- Povidone-iodine (7.5 percent)
- Chloroxylenol (0.05 percent), chlorhexidine (0.05 percent)
- Benzalkonium chloride (0.1 percent)
- Lysol disinfectant spray
- Pine-Sol (1:64 dilution).⁶

These disinfectants are usually left on a surface for 5–10 minutes. Follow the specific instructions for the detergent of choice.

DO NOT MIX DISINFECTANTS OR BLEACH AS THIS CAN GENERATE TOXIC GASES and it will not increase effectiveness.

References

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