

Water Purification Methods

By Gemie Martin

The Church website suggests a two-step process for treating water. It must first be clarified (the debris must be filtered out) before it can be disinfected. See:

<https://www.churchofjesuschrist.org/topics/food-storage/drinking-water-guidelines?lang=eng>.

There are several products that can be used to purify water. The best will kill bacteria, viruses, protozoa, and cysts in contaminated water. Read the packaging. Keep in mind that only reverse osmosis filter types can remove all chemicals. In our day and age where many water sources have been contaminated by industrial wastes, this is an important consideration. These types of filters are expensive.

Boiling may not be your best option for purifying your water. (It may not be an option at all.) Bring water to rolling boil for 3-5 minutes. In higher elevations where water boils at a lower temperature, boil for a longer time. NOTE: These heating methods are not sufficient to kill *Cryptosporidium*, a harmful microorganism which causes diarrhea. Boiling or heating water does not remove toxins.

Pasteurization is now also being suggested. A WAPI (WATER Pasteurization Indicator) is a tiny device to let you know when water has reached the 149° F. (a temperature necessary to kill most organisms). Keep it at or above 149°F. for at least 20 minutes before drinking to render *Cryptosporidium* oocysts non-infectious. A WAPI can be obtained through www.sunoven.com or www.amazon.com. These devices can be reused. You will need a source of heat (like a Sunoven, or regular oven) to heat your water. Pasteurization does not remove toxins.

Chlorine Dioxide kills nearly all organisms including *Cryptosporidium*. It takes four hours to work. It comes in different forms. Katadyn makes Micropur tablets. Aquamira (chlorine dioxide drops or liquid can also be purchased. Chlorine Dioxide is very toxic if ingested so care must be taken to keep it (and the water as it is being treated) away from children.

Chlorine (sodium hypochlorite—household bleach) kills most organisms. The downside to chlorine is that it will bleach your clothing if it comes in contact. It also weakens over time. Check expiration dates. Mix it with cold water to dilute. Hot water may inactivate it. My research tells me that it is not effective at killing *Giardia* or *Cryptosporidium*. Only unscented household bleach without thickeners, scents or other additives should be used. Check to make sure the strength is at least 5.25% sodium hypochlorite. Some brands may be weaker.

Calcium Hypochlorite (also called pool shock). It stores indefinitely whereas Chlorine will weaken over time. Make sure there are no other pool chemical additives in the pool shock you purchase.

Store in glass or plastic, NOT metal (even a metal lid WILL corrode). A heaping ¼ teaspoon dry will treat 55 gallons of water. To make a concentrated solution: mix a heaping ½ teaspoon dry with 1-gallon water. To use this concentrate: mix 2 ½ Tablespoons of the concentrated solution to 1 gallon of clear water. Use ¾ cup of solution in a 5-gallon jug of water and mix. Make sure to store the pool shock and the solution out of reach of children. Here is a link to an article that will help convince you of the benefits of this chemical over chlorine bleach:

<http://survivaltopics.com/better-than-bleach-use-calcium-hypochlorite-to-disinfect-water/>

UV Light can be used to inactivate organisms. The SteriPEN is such a device. It will inactivate all organisms including Giardia and Cryptosporidium. The downside is that the water needs to be very clear or the light will not be able to get to all the microorganisms. The upside is that it is very small and can easily fit into your 72-hour emergency kit. Does not remove toxins.

Filters can be the most comprehensive method for purifying water. They can reduce some harmful chemicals as well as organisms. You should look for one that can filter to 0.1 microns in order to filter out harmful bacteria and protozoa. A 0.2 filter will filter out nearly everything a 0.1 filter will. The Katadyn Combi uses two types of filters. The 0.2-micron ceramic filter removes bacteria and protozoa including Giardia and Cryptosporidium. The carbon filter reduces chemicals and bad taste. Filters can be costly to purchase and maintain, so do some research to make sure you are getting what you need for your situation.

The Church distribution store sells an Aquamira water filtration bottle (a sport-type bottle that provides filtration and drinking from the same bottle). Find it at: <https://store.churchofjesuschrist.org/search?q=water+filter+bottle>. Katadyn also makes a similar one that can also be purchased at sporting goods stores or online. Sawyer makes a number of portable personal water filters that filter down to 0.1 microns. These can be found at sporting goods stores or online.

The LifeStraw Personal Water Filter can filter down to 0.2 microns. These would work well for each individual backpack. They do not remove chemical contaminants. Once again, the water source must have debris filtered out before drinking from the LifeStraw or it will clog up, allowing no water through for you to drink.

Solar Sterilization of Water. Clear water must be used. Put water in a clear 2-liter bottle (empty soda bottle works). Leave laying down in the sun against a reflective surface for 6 hours (if sunny) or 2 days (if cloudy). Does not remove toxins.

Note: If your water has been sitting undisturbed for a time it will taste “flat.” This means that some oxygen has escaped from it. It is easy to re-oxygenate by pouring it from one container to another before drinking.