

Safe Drinking on The Trail

While it's not very likely that this information would apply to anyone other than the adventure crew, it's still necessary to know how to get a safe drink from mother nature.

Imagine you're walking on a trail during the middle of a hot summer day. Your backpack weighs 60 pounds; sweat is dripping down your face. You come to a small stream filled with small rocks that are barely covered by the water. It looks so crisp and fresh and you are very thirsty.

Think twice about drinking from that water source!

The water might look perfectly fine, especially with the water flowing gently over the smooth, glossy rocks, but beware! Tiny organisms which are invisible to the naked eye are abundant in this water. Unfortunately, there is no longer ground water any ground water that you can safely drink without purifying it first.

The water may seem palatable, but it can be home to many things you do not want to swallow. Water is only potable if it has been disinfected by means of boiling, filtration, the use of UV light, or by the use of halogenations.

Boiling is probably one of the best and easiest means of making water potable. When water boils, it gets rid of all the micro-organisms and other bacteria that can make you sick. All you need to boil water is a metal container (example: a pot), something to make a small campfire, a fire ring, and something to suspend the pot from (a tri-pot works great).

To use halogenations means adding chemicals to kill germs and other bacteria. Iodine and chlorine are safe and work the best. They are very easy to carry. If you use them, follow the directions word for word to ensure your water is potable. Sometimes, Halogens can make your water taste less than what you may consider palatable. So, just add some kind of sweet drink powder after the chemicals have done their job. Something like iced tea, hot chocolate, or even cool-aid mix works just fine.

Filtration speaks for itself. All you need is a filter and some biceps. Filters come in a few different ways - some require you to pump a handle while others filter the water via you squeezing hard in order to force water through wherever it has to go. And it must be remembered that not all water leaves you with 100% safe water. It is recommended that if you have to purify water this way that you also boil it, just as a precaution.

Ultra-Violet light isn't exactly the #1 way of making water safe for your drinking pleasure. It does not affect taste nor does it remove the sediments in the water, like sand, which you probably won't want to drink. Furthermore, the light requires batteries, so when your batteries die, so does your supply of filtered water.

But what if you don't have any way to filter water? Don't drink it, unless you are in a drink-or-die situation! Here are some DOs and DON'Ts about using water without filtration.

DOs

DO drink water as far as possible offshore.

DO drink from pools of water surrounded by healthy vegetation.

DO drink from tributaries running out

DON'Ts

DON'T drink water flowing over rocks. It just stirs up sickening germs.

DON'T drink water by barren grounds or any kind of garbage/animal carcass.

DON'T drink from the main stream of

of high uninhabited areas that are at a right angle to the main stream.

DO drink water that has been collected from a recent rain, such as cavities in rocks.

DON'T eat wild ice as the water that was needed to make the ice may have been infected. There may also be sediment deposits in the ice, such as dirt and sand and even insect remains.

DO collect falling rain in whatever you can, including pots, cups, or tarps.

DO hold snow in your mouth until it melts before swallowing.

DO collect dew that forms on leaves and metal surfaces before sunrise.

As we've said before, you probably won't ever use this information, but it's good to know. To ensure you won't have to go through any of the procedures above, here are a few tips on conserving your water:

- Cover your skin as much as you can. This prevents the water from within your body from perspiring and evaporating off you, which contributes to loss of water.
- Do as little moving and talking as possible. Moving requires water from within your body to be burned off if you sweat, as was discussed in the first bullet-point. Talking will eventually make your mouth dry and only make your thirst worse. Also, breathe through your nose so that air your body takes in via your mouth doesn't dry it up.
- Stay out of the sun as much as possible to avoid sweating.
- Avoid any salty foods.

If you can't immediately find a source of water, here's what to remember:

- Carry maps of the area you are hiking in. They can help you to some degree when it comes to finding survival water.
- Follow dry riverbeds downhill. Water seeks the lowest level, so it may also be a good idea to follow animal tracks downhill.
- Vegetation grows near water, so look for abundant vegetation in your search for water.
- Water springs can be found near rock piles or cliffs, and even in low, forested country.
- If you find snow or ice, melt it and then purify it with one of the methods discussed above.

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Cloth filter

From Wikipedia, the free encyclopedia

Developed for use in Bangladesh, the **cloth filter** is a simple and cost-effective appropriate technology method for reducing the contamination of drinking water. Water collected in this way has a greatly reduced pathogen count - though it will not necessarily be perfectly safe, it is an improvement for poor people with limited options.

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Method

The method used in Bangladesh is as follows: an old sari is folded to make four or eight layers. The folded cloth is placed over a wide-mouthed container used to collect surface water. It is usually sufficient to rinse the cloth and dry it in the sun for a couple of hours. In the monsoon seasons, it may be advisable to use a cheap disinfectant to decontaminate the material.

The preferred cloth is used cotton sari cloth. Other types of clean, used cloth can be used with some effect, though the effectiveness will vary significantly. Used cloth is more effective than new cloth, as the repeated washing reduces the space between the fibres [1] (http://www.manythings.org/voa/03/030127dr_t.htm).

Effectiveness

The cloth is effective because most pathogens are attached to particles and plankton, particularly a type of zooplankton called copepods, within the water. By passing the water through an effective filter, most cholera bacteria and other pathogens are removed. It has been demonstrated to greatly reduce cholera infections in poor villages where disinfectants and fuel for boiling are difficult to get.

In sub-Saharan Africa where guinea worm *dracunculiasis* infections are endemic, infection is prevented by use of a nylon mesh with pore size of approximately 150 μm to filter out the copepods that host the parasite.^[1]

An old cotton sari, folded, creates a smaller effective mesh size (approximately 20- μm). This should be small enough to remove all zooplankton, most phytoplankton, and thus a large proportion of the cholera in the water (99%, according to laboratory studies). However, the nylon net with the larger mesh size was found to be "almost equally effective."^[1]

The cloth filter provides less than ideal purification on its own - usually filtering is an initial step, to be followed by further disinfection. However, where there are no other options, water professionals may consider that it is "of course, better than nothing" [2]

Background

Media filter

From Wikipedia, the free encyclopedia

A **media filter** is a type of filter utilizing a bed of sand, crushed granite or other material to filter water for drinking, swimming pools, aquaculture, irrigation, and other applications.

One design brings the water in the top of a container through a "header" which distributes the water evenly. The filter "media" start with fine sand on the top and then graduatingly coarser sand in a number of layers followed by gravel on the bottom, in gradually larger sizes. The top sand physically removes particles from the water. The job of the subsequent layers is to support the finer layer above and provide efficient drainage.

Retrieved from "http://en.wikipedia.org/wiki/Media_filter"

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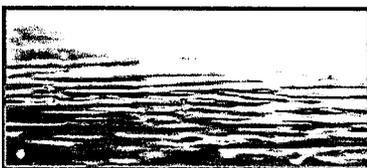
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How to Purify Water



☞ Mosquito infested water - a good sign it needs purifying

Pure water is essential. If you are traveling in a country or backpacking in the mountains you need to know how to purify water.

Steps [\[edit\]](#)

Bleach Treatment [\[edit\]](#)

Bleach is a widely accepted method of emergency water disinfection, and is recommended by many agencies. The dosages and instructions vary somewhat though. I am a physician and outdoorsperson and I think that using 2 drops of unscented household bleach per quart or per liter for clean looking water and 4 drops per quart or per liter for dirty water is reasonable. One then waits 30 minutes and repeats the dosages if there is NOT a slight chlorine odor (you should smell a slight amount of chlorine). This odor can be lessened by pouring the water between two containers a couple of times.

Before adding the bleach, you should filter the water if it looks particularly dirty or filled with particles. Pouring the water through a coffee filter or even a bandana, or a pile of sand or similar, will make it clearer and more drinkable (but won't remove organisms--the bleach is needed for this).

See the official, but varying recommendations below.

According to the **American Red Cross Website**, accessed on 6/4/07:

"You can use household liquid bleach to kill microorganisms. Use only regular household liquid bleach that contains 5.25 percent sodium hypochlorite. Do not use scented bleaches, color safe bleaches or bleaches with added cleaners.

Add 16 drops of bleach per gallon of water, stir and let stand for 30 minutes. If the water does not have a slight bleach odor, repeat the dosage and let stand another 15 minutes.

The only agent used to treat water should be household liquid bleach. Other chemicals, such as iodine or water treatment products sold in camping or surplus stores that do not contain 5.25 percent sodium hypochlorite as the only active ingredient, are not recommended and should not be used."

According to the **Environmental Protection Agency Website**, accessed on 6/4/07:

"If the water is cloudy, filter it through clean cloths or allow it to settle, and draw off the clear water for disinfection. Add 1/8 teaspoon (or 8 drops) of

regular, unscented, liquid household bleach for each gallon of water, stir it well and let it stand for 30 minutes before you use it."

According to the **Clorox Company Website**, accessed 6/4/07:

"Decant the clarified contaminated water to a clean container and add 8 drops of Clorox® Regular-Bleach to one gallon of water (2 drops to 1 quart). Allow the treated water to stand for 30 minutes. Properly treated water should have a slight chlorine odor. If not, repeat dosage and allow water to stand an additional 15 minutes. The treated water can then be made palatable by pouring it between clean containers for several times. For cloudy water, use 16 drops of Clorox® Regular-Bleach per gallon of water (4 drops to 1 quart). If no chlorine odor is apparent after 30 minutes, repeat dosage and wait an additional 15 minutes. Do not use scented or Splash-less Clorox® Bleaches for this purpose."

Iodine Tablet Treatment [\[edit\]](#)

Use the purchased iodine tablets from a camping or adventure store. Follow the directions.

Aquamira Treatment [\[edit\]](#)

Use the purchased liquid (that is bleach based) Aquamira Water Treatment. You may purchase it from a camping or adventure store. Follow the directions. Since this is similar to bleach, use the same precautions.

Boiling Water Treatment [\[edit\]](#)

Bring water to a rolling boil and held at a rolling boil for a specific amount of time to be safe. At sea level, water must boil for 5 minutes to be safe. Roughly, for every 500 feet increase in altitude drops the temperature of boiling one degree Fahrenheit so you must boil it one minute longer to achieve the safe level of heat. Use the chart below.

Distillation Treatment [\[edit\]](#)

You can buy a still at a store but this is primarily for survival type scenarios and distills water from the ground. This method can be altered in obvious ways to distill water when the ground is not moist. Dig a hole in the ground about 6in. to 12in deep and just as wide. Place a small or container in the bottom to catch the water and cover the hole with plastic, black if possible but any color will work. Place stones on the edges to hold the plastic semi-tight. Then place a small stone so that the center is lower than the rest and it is over the cup. Over a period of time, water will evaporate from the ground and condense on the plastic. This purified water will drip into the collection container in the center. This water may taste bad but will be safe to drink.

Tips [\[edit\]](#)

- Always wash the container that will hold your water first. If you are using unpurified water to wash the container wash it with strong bleach water or at least rinse it with the purified water.
- Read the directions on iodine tablets before purchasing, it takes more than you think it will!
- Iodine water tastes terrible, use a drink mix to cover the flavor.
- A rolling boil cannot be stirred down.
- In the most recent Popular Science Issue there is a new thing called a life straw, search it on Google. It is priced at about \$5 and purifies over 300 gallons of water.
- You may want to filter the water before you purify it. There are two ways to do this:
 - Use a piece of cotton cloth, such as a clean handkerchief or clean white sock. Pour the water through the cloth several times until the water is clear to the eye.
 - Cut the bottom off of a water or coke bottle. Roll a clean sock up on itself and stuff it down to the neck of the bottle. Add an inch and a half of sand. If possible, add an inch and a half of wood charcoal (not charcoal briquettes like you grill with) from a fire (rinse all the ashes off first!). If not, add an inch and a half of grass and leaves. Add another layer of sand, then roll up a second sock and stuff it into the bottle. Pour your water through the filter until it is clear to the eye.
- You'll have to gather the water first. One of the best natural sources is a stream (the higher you get, the purer the water). If the stream by chance looks muddy, take some sort of cloth (like shirt or sock or any

part of your clothes) and collect the water, then wring it out in a container. The mud will stay in the cloth while the clean water goes into the container.

- Make a container to hold the water from dew or rain by taking hot coals and putting them on a tree stump. You can make a 16oz cup from a stump in one hour. Once done, just scrape the coals out of the stump (make sure you do not use a yew or any locust trees because those are poisonous and could make you sick).

Warnings [\[edit\]](#)

- Brita or PUR do not purify water but filter it to taste better!
- People with thyroid problems should check with their doctors before using water treated with iodine.
- Do not use too much or the bleach will burn your throat and stomach! Bleach can be toxic at high levels. Be sure to leave the top off while letting water sit so that the bleach vapors can dissipate.

Table [\[edit\]](#)

Altitude	Degrees	Boiling time
Sea level	212	5 minutes rolling boil
500 feet	211	6 minutes rolling boil
1000 feet	210	7 minutes rolling boil
1500 feet	209	8 minutes rolling boil
2500 feet	207	10 minutes rolling boil
5000 feet	202	15 minutes rolling boil
6000 feet	200	17 minutes rolling boil
7000 feet	198	20 minutes rolling boil

Related wikiHows [\[edit\]](#)

- [How to Turn Salt Water Into Drinking Water](#)

Make Your Own Water Filter

You can turn muddy water into clear water by putting it through a number of layers that filter out the impurities. This is similar to the first step that our tap water goes through at a treatment station.

What You Need:

- 2-Liter plastic pop bottle & lid
- Straw
- Cotton Batting
- Gravel (large and small)
- Sand (large grain and fine)
- Coffee filter
- jar
- Muddy Water

What To Do:

1. Cut the bottom off the pop bottle. Poke a hole in the bottle's lid, just large enough to fit the straw. Put the straw through the hole. Turn the bottle upside down and rest it in the mouth of the jar.
2. In the bottle, place a layer of cotton batting followed by layers of fine-grain sand, large-grain sand, small gravel and large gravel. Cut the coffee filter so it fits across the top of the bottle and place it on top of the gravel.
3. Pour muddy water into the open end of the bottle and let the water seep down through the filter layers.

It is strongly recommended that you still add 4-8 drops of chlorine to every gallon of water filtered just to make sure the water is purified.

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Hiking Water Treatment

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Water Purification

Mountain streams may look pristine and pure. Unfortunately from a biological standpoint they may not be. Years ago the rule of thumb was if the water source was suspect, treat it by boiling or adding chlorine or iodine. Now the general consensus seems to be that all water sources should be treated or purified. Have the streams and rivers we encounter in the mountains become more infected with biological contaminants? I'm not sure any one knows the answer, but people's awareness of the potential problems has certainly increased.

Individuals have different tolerances to water contaminants, and individual tolerances may vary over time. So the safest and surest practice is to treat all outdoor water, and in our increasingly protective society that has become the general recommendation.

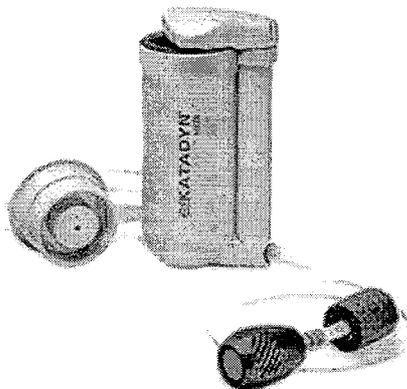
Bacteria, viruses, and microorganisms that can cause a variety of unpleasant reactions in our bodies may contaminate water sources. Though most water-based problems are treatable, prevention is definitely more desirable.

The most common forms of purification are: boiling, filtering, and chemical additives.

Boiling

Boiling is the simplest and the most effective, but not the most widely practiced method used by hikers because it requires building a fire or using a stove and leaves the water unpleasantly warm for immediate drinking. Boiling also does nothing to remove any particulate matter suspended in the water or chemical contamination.

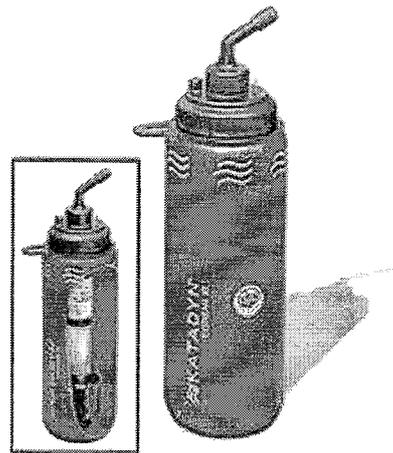
Filtering



Filters are effective at removing most biological contaminants, particulate matter, and some chemical contaminants. Filtering has the advantage of treating water for immediate consumption, but has the disadvantages of extra weight and the possibility of failure or clogging. It is a good idea when using filtering as the primary method of water treatment to carry a backup chemical treatment.

Bottle Filters

A variation on the traditional hiker's water filter is the bottle filter. They are lightweight and easy to use. There is no pump. Water is forced through the filter by squeezing the bottle as you drink. They probably aren't the best tool to purify a quantity of water for meal preparation, but work quite well to satisfy your thirst while hiking. Find a water source, fill the bottle, put the top back and you are ready to drink.



Chemicals



Chemical treatments have the advantages of being very light weight and very effective at treating bacteria and viruses, but they will not remove particulate matter, may not destroy all the microorganisms present in the water, and require a time delay usually anywhere from 20 to 30 minutes or more before the water is ready to drink. The most common chemical water treatments are: chlorine, iodine, and oxidizing agents. With all chemical treatments the amount to add and the time to wait should be increased as the water temperature decreases and/or contamination levels increase. Also remember to loosen the cap on your water container and slosh some of the treated water onto the threads of the cap to eliminate contaminants that may be trapped there.

What I Do

I carry some form of water treatment with me when I'm hiking, but I don't always use one. If I believe the water source to be reasonably pure I will drink the water untreated. But if the water source is suspect I use either a bottle filter or some form of chemical treatment, and when using chemical treatments I adjust the dosage based on my best guess as to the potential for contamination. For cooked meals I treat the water by boiling only. Usually I take my bottle filter and a few water treatment tablets as a backup. So far this method has worked well for me, but it may not work for you. Use your own judgment based on your own experience. When in doubt treatment of some type is the safest choice.

Related Information:

[Water Impurities](#)

[Chemical Purification](#)

Water Purification Supplies:

Chemical Purification - [CampSaver](#)

Hiker's Water Filters - [AltreC](#), [CampSaver](#)

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