

# Backpacking Water Treatment Basics

You can rack up quite a thirst while hiking, but you don't want to be drinking water out in the woods without doctoring it up some. Yes, the good old boys in the old Westerns used to sip from the creek when thirsty (unless of course there was a skull nearby), but like a lot of movie stuff, don't try that at home – or at camp. Instead of bringing gallons of water with you on a trip, a backpacking water treatment method allows you to safely use water available to you on the trail. This is really helpful because staying hydrated is vital. And carrying all your water for more than a day trip would be heavy and cumbersome.

Today's natural water sources are nearly always home to such invisible characters like *Giardia lamblia*, *Cryptosporidium*, and other nasty "bugs". Generally, these protozoa and bacteria and viruses won't kill you, but just make you wish you were dead before they run their course – run being the operative word here. Where did these nasties come from? The worst come from mostly other people, or rather their feces to be more exact, but animal feces cause problems too – so sipping from the creek 100 years ago was still a risky proposition. Since you can't tell if water is safe to drink just by looking at it, the best idea is to use something that will eliminate harmful or undesired pollutants. You really don't want to spend your backpacking trip battling diarrhea, nausea, cramping or worse, all because you drank untreated water.

## There are four main ways to treat water: chemicals, heat, UV radiation and filtration.

**Chemicals** – Iodine and chlorine are two common chemicals used to treat water. Referred to as halogens, they are able to kill bacteria and viruses, but are not able to kill all protozoa. This type of backpacking water treatment is inexpensive, light and easy to pack. On the downside, the chemicals can make water taste bad unless a neutralizer or flavoring agent is used. Furthermore, chemicals can take a while before they have effectively treated the water. Chlorine usually takes longer, which is why iodine is a more popular choice. However, some people are allergic to iodine and it is not recommended for use by pregnant women or people with thyroid issues.

**Heat** – Boiling water is a highly effective way to kill protozoa, bacteria and viruses. Boiling water renders all organisms ineffective. However, you don't necessarily need to bring water to a complete boil to treat it. Heating water to 149°F (65°C) for 5 minutes will kill 99.99% of all harmful organisms. While you need a thermometer to gauge this, it allows you to use less fuel and time in order to prepare your water than if you brought it to a complete boil. Drawbacks include needing a stove, fuel and time. Boiling water also doesn't remove sediment, so you may want to run the water through a coffee filter if it's dirty.

**UV Radiation** – The use of ultraviolet rays to fight bacteria, protozoa and viruses, is a more recent backpacking water treatment. The UV rays damage the microbes DNA, rendering them unable to replicate and multiply. These devices are simple, effective and fairly quick to operate. Downsides include the fact that they are battery operated, expensive, and less effective on cloudy or murky water and require additional filtration to remove sediment. However, some do come with their own filtration attachment.

**Filtration** – Using a filtration system forces water through a finely porous internal element within a filtering unit. They can be a speedy way to filter water compared to other options and, depending on how the filter is designed, can eliminate bacteria, protozoa, viruses and sediment. This is the most commonly used backpacking water treatment method.

However, not all filters are created equal and therefore do not all eliminate the same contaminants. Unless it has a purifying system included, which adds to the cost, it will not kill viruses. Drawbacks include the cost, weight, maintenance and sometimes they can be difficult or tiresome to operate.

## The Backpacking Water Filter Explained

Picking out a backpacking water filter can be a bit daunting. Here is a helpful overview about water filters, how they work and what to look for when buying one. It is important to clarify some terminology you might come across in your research. There is a difference between a water filter and a water purifier. In simple terms, a filter does not remove or destroy viruses, while a purifier does. A filter allows water to pass through an internal device that has many, many tiny holes. And we're talking tiny. These holes are measured in microns. As the water passes through these holes, the filtration system catches and removes organisms and debris from the water. If the water filter is also a purifier, there will be an additional chemical or electrostatic process that renders viruses inactive.

## **What to Look For:**

**Filter Type** – This is referred to as the cartridge. It is the internal device that filters out organisms and debris. There are different types of filter cartridges, such as ceramic or fiberglass. Their construction can affect the quality and price of the filter. Some can be cleaned and reused, while others must be replaced. Although the initial cost might be more, a filter that can be cleaned easily and reused is much more efficient in the long run.

This is also where the purification system will be if your filter also purifies water. Pay attention to the internal components of a filter. Some purification systems use an iodine resin. If you are pregnant, have thyroid issues or are allergic to iodine, such a system should be avoided.

**Pore Size** – The pores that allow water to pass through and filter out organisms vary in size. When looking at a backpacking water filter, you will see the terms “absolute pore size”, “nominal pore size” and “average pore size.” You want to pay attention to the absolute pore size. Absolute pore size is the size of the largest particle that can pass through. Pick a filter that has an absolute pore size of at most 0.2 microns, as this is the standard for the smallest of microorganisms.

**Cleanability** – As a filter is used, the organisms and particles it removes remain in the filter. This can cause clogging and make the filter work slower. A filter that allows you to remove and clean the cartridge in the field is very handy.

**Life Expectancy** – How frequently you backpack will determine your needs, but the longer a backpacking water filter can last between cleanings or replacements the better. Usually manufacturers will list approximately how many liters of water can be filtered before maintenance is required. Remember that this number can change depending on the quality of water you’re filtering.

**Pump Force/Pump Strokes** – If you are looking at a hand pump operated filter, pay attention to the pump force and pump strokes. Pump force tells you how many pounds of force are needed per stroke. The higher the number, the more of a workout you’ll get when filtering your water. Pump strokes tell you how many pump strokes are required per liter of water. This gives you an idea of how effective each pump action is and will also give you an idea of how hard you’ll have to work to filter your water.

**Output** – This number tells you how many liters of water can be filtered per minute. This is an estimate of course, but it gives you a good idea of how long it will take to filter your water. This number will change with each use as the filter becomes increasingly clogged.

**Weight** – It’s good to pay attention to how much a backpacking water filter weighs. They can easily weigh over a pound and you don’t want to get one that will add too much weight to your pack.

## **Tips On Treatment**

Water filters are like a vacuum cleaner – they get clogged if you don’t clean them. Most filters have a replaceable element. Unless you’re pumping many, many gallons of water you should not have to worry about clogging a filter under normal water conditions. But, muddy water will reduce the cartridge life span. To extend cartridge life, always use the best water source available. In heavy sediment conditions, wrap a coffee filter or bandana around the intake bulb with a rubber band. Where possible, place untreated water in a container and wait for sediment to settle out and the water appears clear; then filter from water above the sediment. If the handle becomes very hard to pump, the filter cartridge may have become clogged. As a temporary solution in the field, remove the cartridge and swish it around in water. Do not allow contaminated water to enter the cartridge output barb. This will usually provide enough additional cartridge life to complete your trip.

Another tip may seem counterintuitive – pump your water from still, rather than running sources. Sure, the running creek water looks cool, clear and inviting, but the churning water leaves various nasties suspended within it. Pooled water, on the other hand, gives the chemicals and heavier particles a chance to settle to the bottom – that further reduces the likelihood of something bad getting through to your stomach.

As you pump water, or storing the filter in its bag between loading sessions, be careful not to let the intake filter or water dripping from it contaminate the outlet hose or cap that goes into your water bottle or bladder. If it does, be sure to rinse it off with filtered water before using again. Take a small baggie to wrap around the outlet cap with a rubber band when not in use.

Finally, watch for contamination potential within your water bladder or container between uses or refills. Various bad things can start to grow with just a few drops of stale water left alone for a few days. Let the container air dry completely between uses. Sanitize by adding a capful or teaspoon of bleach to enough water to fill the reservoir. Allow to bleach for an hour to overnight. Rinse very thoroughly with 4 or more changes of water. This is the best way to kill fungus and bacteria, especially if you see visible growth. To remove the chlorine taste after bleaching the bladder, fill the bladder, add 1 tablespoon of vinegar and shake it, then add 1 tablespoon baking powder then shake it. Now drain and rinse thoroughly.

### **Additional Backpacking Water Tips**

- Avoid using water where there is obvious animal activity. Though they can be cute, animals are carriers for organisms you want to avoid.
- Avoid water near highly trafficked human activity. Move upstream from campsites, trail crossings, outhouses, etc.
- Avoid water that is downstream from factories, plants, mines, largely populated areas, etc. as the water could be contaminated by chemicals.
- Try to draw water from a still, clear source. In still water, many organisms sink to the bottom and can be avoided. Avoid stagnant water however, as harmful algae can reside in it.
- Never collect water from a source that has dead animals in or around it.
- Snow and ice can be used, but remember that freezing does not kill bacteria. A backpacking water treatment is still necessary. Avoid snow with a pink tint to it as it may have algae. And avoid yellow snow for obvious reasons.

### **How Much Have You Had To Drink?**

So if you now have safe water to drink from filtering or other treatment, how much do you need? At home, the average person uses maybe 80 gallons a day, so obviously something has to give when you're out in the woods. OK, so you're not flushing or showering, or watering your lawn, or washing your car, but that still leaves a lot of water to account for.

Heat and elevation gain are the biggest consumption variables. On a sharp uphill climb on a hot summer day, you can suck down an easy quart an hour. That's why you don't want to be boiling water as a treatment method; it would take forever to get very far. That's also why you want to make sure you have some reliable water sources along the way when you hike – choose trails and routes that will take you near water at least every now and then so you can reload your water container(s). Try to camp reasonably close to a water source as well. You can figure going through at least a gallon a day per person in moderate weather and exertion conditions; 2 gallons a day when it's hot.

You can carry water on a hike in 16- to 32-ounce bottles of various shapes and sizes on short day hikes, or on longer trips move up to water bladders that will hold up to a gallon of water with drinking tubes you can sip from as you hike. The water you carry can easily be the heaviest thing on your back, so carry the bag within or on your pack so it is as close as possible to your back and higher up – that helps keep you balanced and puts the heaviest weight where it will cause less strain. If water is reasonably available on your route, a lot of hikers will compromise between frequent refills and weight by carrying around 2 quarts on them at most. But on a long arid trail, you might need to carry 2 gallons when you start out. You also need extra water when hiking at higher elevations to avoid altitude sickness arising from dehydration.

One helpful precaution is to start out your hike fully hydrated. If camping near water, drink a lot before heading out for the day – your body will appreciate it, and it's that much less you'll have to filter or carry during the day. How do you know how much water is enough? As a general rule, drink before you become thirsty; it seems the thirst mechanism is behind the body's actual need for water. It's somewhat like your car's red engine light – by the time it comes on, something has already been wrong for awhile. Drink as you go. Also, check out the color of your urine – if it's clear, you're probably well hydrated. If it's dark yellow, it means you need some more water inside you - drink up!