

BACKCOUNTRY WATER TREATMENT

All backcountry water sources, including fast-flowing, glacier-fed streams can be contaminated by passing birds, animals, or humans. Water treatment is a complex topic and this article is just an overview. For detailed information, read product literature completely, or talk to MEC staff at a store or through our Service Centre.



The less dirty and contaminated water is to start with, the more effective any treatment method will be. If possible, avoid still water, and use the clearest water available. If you must use cloudy or muddy water, let it settle in a pot or bucket, and siphon off the clear water to treat it.

PATHOGENS

The waterborne pathogens (disease-causing micro-organisms) of most concern:

Protozoa include cryptosporidium and giardia (the cause of giardiasis or "beaver fever"). Protozoa are increasingly widespread in North America. They are larger than one micron (one-millionth of a metre.)

Bacteria exist in water all over the world. Most are harmless, but some cause sicknesses such as diarrhea and dysentery. Most bacteria are about 1.0 micron in size, although some, such as the disease-causing campylobacter, can be as small as 0.2 microns.

Viruses cause hepatitis, polio, and other diseases. They can be present in any water contaminated by human waste. Most viruses are in the 0.1 micron size range, but they can be as small as 0.002 microns.

TREATMENT METHOD	PROTOZOA	BACTERIA	VIRUSES	PARTICULATE
Boiling	yes	yes	yes	no
Iodine/chlorine	most	yes	yes	no
Chlorine dioxide/mixed oxidants	yes	yes	yes	no
0.5mi filter and pre-filter	yes	most	no	yes
0.2mi filter and pre-filter	yes	yes	no	yes
0.1mi filter and iodine/chlorine	yes	yes	yes	yes
Ultraviolet (UV) light	yes	yes	yes	no
UV light and pre-filter	yes	yes	yes	yes

TREATMENTS

HEAT

Boiling destroys all pathogens, but it is not a popular treatment method as it consumes time and fuel, tepid water doesn't quench thirst well, and boiled water has a flat taste. So, except for cooking water, most backcountry travellers treat their water with filters, chemicals, or both. Recommended times range from 3 to 10 minutes. Higher elevations require slightly longer boil times.

CHEMICALS

Chemical treatments don't require any pumping to use, but they do require time to act – from a few minutes to several hours, depending on how cold or dirty the water is, and which pathogens you want protection against. Chemicals are effective against bacteria and viruses. But some protozoa, including some forms of cryptosporidium, are resistant. Chemicals are intended for short-term use of a few days or a few weeks. For many people, any health risk associated with small amounts of exposure to chemicals is outweighed by the benefit of protection against pathogens. But for some, those who are pregnant or very young, or who have pre-existing health problems, this may not be true. If you are concerned, consult your doctor before using chemical treatments.

Chlorine (one form includes silver ions which prevent the regrowth of bacteria) can also kill many of the micro-organisms that help you digest food, resulting in digestive trouble. In water, chlorine also forms some by-products that are suspected carcinogens.

Iodine comes in easy-to-use drops or tablets, though many people don't like the taste and odour it adds to the water.

Chlorine dioxide is unstable, so you prepare it in the field by mixing two component chemicals from a kit or by using a battery powered device that acts on ordinary salt to generate mixed oxidants. Since the active ingredients in chlorine dioxide break down quickly, it usually won't kill beneficial micro-organisms in your digestive system. It doesn't leave any unpleasant taste or odour in your treated water.

FILTERS AND PURIFIERS

Filters are designed to strain out pathogens as water is forced through them. An 0.5 micron or smaller filter removes protozoa and some larger bacteria. An 0.2 micron filter also removes smaller bacteria such as campylobacter. Because viruses are many times smaller than bacteria, most filters cannot dependably remove them. Like all mechanical or electronic items, filters can fail or be damaged by impact. Many people carry compact water treatment tablets as a back-up. Suitable for areas where viruses are not a concern, for occasional users, small groups, and shorter trips. For protection against viruses, first treat water with iodine then filter it. If you are concerned about iodine exposure, use a filter with a carbon stage. Carbon stages can remove between 90 to 98% of iodine, but it is crucial not to filter the water before the iodine has had sufficient time to work.

Purifiers consist of one or more filter stages that trap larger pathogens, together with an iodine resin or another element that inactivates viruses. High-end purifiers do not introduce chemicals into the water. Economical over the long term. Suited to frequent users, extended trips, and larger groups.

UV Light Purifiers are portable devices designed to treat small amounts of water, 0.5 or 1L at a time. By beaming UV light through water, they damage the DNA of microbes and pathogens (even viruses), so they cannot reproduce and cause illness. The same technology has been used for decades in commercial bottling plants and municipal water systems. They avoid the taste, health concerns, and waiting times of chemical treatments. Don't require pumping, and don't need to be disassembled and dried when you return home. Require clear water to work properly, so cloudy water must be pre-filtered. Some include pre-filters, but a cloth or coffee filter can also work. If the unit uses small batteries, they may be hard to obtain in remote areas. For extended trips, rechargeable AA batteries that can be used with solar charger may provide better self-sufficiency. To ensure adequate exposure to UV light, they are limited to small batches of water.

WATER FILTER CARE

Filters should be taken apart and left to air-dry to help prevent mildew and bacteria growth. They can be cleaned many times with a brush before needing to be replaced, but clean them only when necessary to prolong their life.

Silty water (associated with glacial regions) clogs filters with debris and makes the pumps more difficult to operate. To make pumping easier, let silt settle for an hour or two before pumping the water.

COST EFFECTIVENESS

Generally speaking, the lower the initial cost for a treatment method, the higher the cost of each litre treated. If you camp occasionally and in a small group, a moderately priced filter with a semi-disposable cartridge, perhaps combined with a small chlorine dioxide kit, may be fine. If you camp frequently, or with a large group, it may be more economical in the long run to buy a more expensive filter. The typical yield of cartridges for inexpensive filters is several dozen to a few hundred litres; the typical yield of high-end filter elements is thousands of litres. UV purifiers do not require replacement cartridges. Batteries life varies, but a UV lamp will treat 3,000-8,000 litres.

Source: MEC Website <https://www.mec.ca/AST/contentprimary/learn/hikingandcamping/foodandwater/choosingawatertreatmentsystem.jsp>