

Water Disinfection Methods

HEAT

Oldest and most reliable form of treating water. However the "5- 10 minute" boil time is often overkill. One minute is more than sufficient to "disinfect" water for drinking purposes. Sterilization occurs in the 5-10 rule and will destroy heat resistant bacterial spores which are NOT generally waterborne enteric pathogens (gangrene, botulism are examples). Save your fuel.

Boiling Points of Water at Altitude	
Altitude	Boiling Point
Sea Level	212 F
5,000 feet	203 F
10,000 feet	194 F
14,000 feet	187 F
19,000 feet	178 F

Thermal Death Points of Pathologic Organisms	
Organism	Death Point
Giardia, Entamoeba	140 F for 2-3 min 212 F for 5-10 seconds
Cryptosporidium	150 F for 2 min
Enteric Viruses	176 -212 F for seconds
Enteric Bacteria	212 F for seconds
Parasitic Eggs/larvae	131 F for 1-2 min

FILTRATION

Theoretically removes organisms by mechanically trapping them. However many organisms can change their shape, especially when under pressure and if considering purchasing a filter, see if there's one that has actual objective data to back this claim. Filters do NOT trap viruses. Some argue that viruses tend to form in clumps or attach to particles that can be filtered. Others argue that even if this the case, the few free viruses can be enough to cause disease. Viruses are more of a concern in water where a high level of fecal contamination may be present (undeveloped countries) and have not usually caused problems in the more pristine backcountry but for those who may be traveling to undeveloped countries or otherwise are concerned about viruses, a filter with an Iodine resin attachment provides a one step process to cover these organisms.

If the water is particularly turbid or cloudy you will be spending more time cleaning your filter than pumping it. It is recommended that you prefilter this water with a coffee filter prior to using your water filter.

Don't try to speed the process by forcing your filter with harder/faster pumps. The build up of pressure can further change the shape of organisms enough to pass and water can leak through threads BEFORE it has been filtered.

Organism	Filter Pore Size Needed
Eggs/Larvae	20 microns
Giardia	5 microns
Cryptosporidium	3 microns
Bacteria	0.4 microns
Viruses	0.01 microns

IODINE (AKA Halogens)

Kills organisms chemically but affected by cold and turbidity. Chemical itself is affected by exposure to air, heat, sunlight. Comes in the form of Iodine tablets (Potable Aqua, Globaline) and crystals commonly but 2% iodine tincture (5-10 drops) and 10% povidone-iodine solution (8-16 drops) provides similar amts. in ½ to 1 tablet. Does NOT cover cryptosporidium, but like viruses it is unclear how much risk this poses in the backcountry. Light, compact, easy to use, and relatively inexpensive but requires time, leaves a bad taste, stains skin/clothing, and you need to be sure to treat the threads of water bottle. Some products have vitamin C or thiosulfate to remove color/taste of Iodine but use ONLY AFTER REQUIRED CONTACT TIME has elapsed (30 minutes for to destroy most organisms in cold water)

Method	Effect Against					Advantages	Disadvantages
	Giardia	Cryptosporidium	Baceteria	Viruses	Larva		
Boiling	Y	Y	Y	Y	Y	Most Reliable Method	Requires Stove/Fuel/Time
Filters	Y	Y	Y	N Y viral guard	Y	Fast, Easy to use, Fairly compact	Ceramic element prone to freezing/cracking
Iodine	Y	N	Y	Y	Y/N	Ultralight/compact/inexpensive	Taste, Time, affected by cold/cloudy, stain lasts an avg of 6 mos. once opened, could pose health problems in pregnancy, iodine allergy, or those with thyroid disease