

water disinfection

Waterborne disease is a risk for international travelers to low resource destinations, as well as for wilderness travelers in any country, even the US. 80% of the world's diseases are linked to inadequate water supply and sanitation. Most of the organisms that cause traveler's diarrhea can be waterborne. Appearance, odor, and taste are not reliable indicators of water safety. Even commercial bottled water may be contaminated in some developing countries, and can create ecological problems.

Preferred Technique for Water Disinfection

Optimal technique depends on personal preference, size of group, water source, fuel availability and style of travel

Boiling is the most reliable single step treatment

A combination of filtration followed by chlorination is the standard for water treatment worldwide

Chlorine dioxide: only single step chemical treatment available

HEAT

Boil water for one minute

Most reliable single step treatment

Does not impart additional taste, but also will not improve taste, smell or appearance of water

Fuel sources may be scarce or expensive

Does not prevent recontamination during storage.

FILTRATION

Filter size is primary determinant of effectiveness

Many do not reliably remove viruses; combine with halogens to remove or kill all pathogens

Simple to use and requires no holding time.

Often improves taste and appearance of water.

Can add weight and bulk to baggage; more expensive than chemical treatments.

CHEMICAL DISINFECTION: Halogens (Chlorine/Iodine)

Similar activity against bacteria and viruses

Not readily effective against *Cryptosporidium* oocysts

Inexpensive and widely available

Increased contact time needed for colder water and for cloudy water

Taste can be removed by simple techniques:

- After required contact time, run water through filter with activated carbon
- Add a 25mg tab of vitamin c or "tiny pinch" of powdered ascorbic acid after contact time completed

Easy to treat large and small volumes; can store water

Iodine is physiologically active with potential adverse effects:

- Limit iodine water disinfection to a few weeks of emergency use.
- Iodine is not recommended for people with unstable thyroid disease, known iodine allergy or in pregnant women.

CHEMICAL DISINFECTION: Chlorine Dioxide

Low doses have no taste or color.

Simple to use and available in liquid or tablet form.

More potent than equivalent doses of chlorine.

Effective against all waterborne pathogens.

Cannot be used to store water.

ULTRAVIOLET LIGHT

Imparts no taste, but does not improve taste or appearance of water.

Portable devices now available.

Effective against all waterborne pathogens.

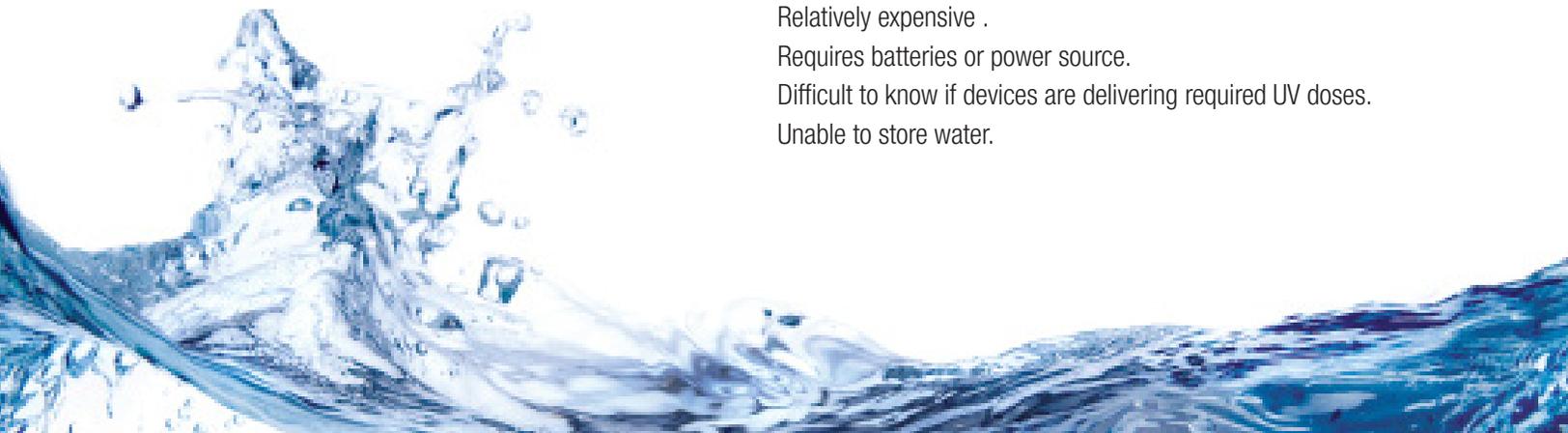
Requires clear water; particles in the water can act as a shield to protect pathogens.

Relatively expensive .

Requires batteries or power source.

Difficult to know if devices are delivering required UV doses.

Unable to store water.



SOLAR IRRADIATION AND HEATING

May be used in austere emergency situations.

Not effective on turbid water which must be clarified before treating.

HOT TAP WATER

When no other means are available, using hot tap water may help to prevent travelers' diarrhea in developing countries.

WATER STORAGE

Heat, filtration, chlorine dioxide, and UV light do not prevent recontamination during storage.

Iodine will work for short periods only (weeks) as it is a poor algaecide.

For prolonged storage, water should be chlorinated and kept in a tightly sealed container to reduce risks of contamination.

WATER QUALITY

Cloudiness of water usually indicates a higher risk of contamination, except in remote wilderness locations, where most sediment is inorganic and clarity is not an indication of microbiologic purity.

Clear, cool fast moving water upstream of human or animal traffic is preferred.

Choose water from a spring or protected well, if possible.

Collect water from just below the surface of a lake, not off the bottom.

