2014

Potable Water

Frederick G. Duerr, Ph.D.

Chemeco

2/14/2014

All drawings and images are by the
author unless marked otherwise

POTABLE WATER

All living organisms are made of proteins, carbohydrates, lipids, salts, and water. Metabolism is the term used to describe changes in the proportions of these ingredients during life processes.

Too often, humans think of water only in terms of their own daily requirements. They tend to forget that a continual input of water is a requirement for all living organisms, including plants, fungi, bacteria, and protozoa. We tend to forget that all animals, trees, gardens, croplands, and lawns all need periodic input of water to survive.

It is estimated that the average human requires 6 – 8 cups of drinking water each day to survive. A human will die in 2 – 6 days if deprived of drinking water. Milk, coffee, tea, kefir, beer, ale, and wines can make up all or part of this water requirement. This average of 6 – 8 cups of drinking water is an average value. Obviously a 50 pound child need less drinking water than a 300 pound adult.

In addition, the humidity of the environment influences the requirement for drinking water. A 300 pound man working in a desert would need more drinking water than if he were resting in a cooler, more humid environment.

The term Potable Water refers to drinkable water that would not make a human ill. One cannot tell by looking at clear and colorless water, that it is potable. Many dissolved substances (salts, etc.) will not affect the clarity of water. Clear water may contain pathogenic bacteria and protozoa, while colored water such as tea or coffee may be potable.

There are several types of contaminants frequently found in drinking water.

1. Quick killing poisons such as cyanide
2. Excess salts such as in sea water
3. Bacteria
4. Protozoa
5. Virus
6. Poisons that accumulate in the body over longer exposure time, such as the heavy metals lead and mercury, and carcinogens

It is obvious that one should avoid consuming any of these contaminants, but types 2 through 5 are of most immediate concern.

Filters, including reverse osmosis filters, can remove large particular containments, but even the smallest pore size filter does not remove dissolved chemicals from the water. A charcoal or ion exchange resin can remove dissolved chemicals, but they require relatively short-lived cartridges, which may not always be readily available.

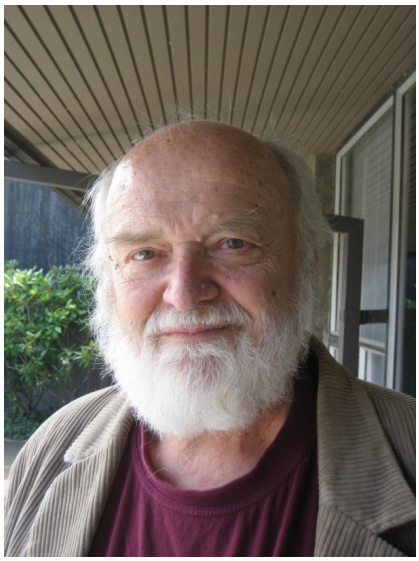
Most humans in the United States get their drinking water from springs, dug wells, of municipal water sources. Even these sources may not provide potable water. A few years ago, the city of Milwaukee, Wisconsin had an outbreak of Cryptosporidium (protozoa) which made several thousand people ill. More recently, The Washington State Penitentiary at Walla Walla, Washington had several cases of Cryptosporidium infection from a guardhouse well. Another common protozoan in pristine mountain streams throughout the United States (Giardia) causes Beaver Fever. Protozoans are relatively resistant to the chlorine treatment used in most city water supplies.

So, what can one do in a short time to ensure that drinking water is potable? Moreover, what can one do to ensure that drinking water is potable over longer periods? In addition, what kinds of water should one avoid at all costs?

How to Find Potable Water

- ✓ My first suggestion is humans should assume that all types of fresh water are UNSAFE to drink until proven otherwise!
- ✓ Never drink water with an oil slick floating on the surface.
- ✓ Never drink highly colored water. Coffee and tea – Yes Manure – No
- ✓ Do not rely on waters that wild animals drink. They get ill too! In general, wild animals can drink water that might make humans ill, and humans can drink some water that would kill a dog or cat (ethylene glycol as in auto-mobile radiator fluid).

- ✓ Be dubious of any filtered water. Read the labels of bottled water. Reverse osmosis is OK. Distilled is OK. Anything else is dubious.
- ✓ Boil water one minute at sea level or up to three minutes at higher elevations before you drink it. Boiling kills most bacteria and protozoa. Do not bother if you are going to drink out of a dirty container.
- ✓ Chlorinate and/or irradiate (UV) your drinking water. Add about 1 oz of laundry bleach to 2 gallons of water. A clear glass gallon jug of clear water placed in sunshine for 1 to 2 days will kill bacteria.
- ✓ Drink distilled water if you can get it. Check out Mother Earth News, Instructables.com, and Google for distillation plans.
- ✓ Acids such as vinegar inhibit growth of bacteria better than alcohol. Beers, wines, vinegars, kefirs, and other fermented foods and drinks are safe because of the acids and alcohols.
- ✓ My most reasonable suggestion is to weigh your available options, and drink the best water you can.



Water is a very important factor in world politics, maybe more so than oil. Consider the ongoing arguments among agricultural California, Colorado, and Mexico over who owns the water in the Colorado River. Should countries with water be forced to share it with countries without enough?

Common water problems that need immediate solutions include:

1. providing drinking water for man
2. providing water for agriculture
3. controlling water pollution
4. controlling harvesting of aquatic organisms
5. controlling water transportation
6. using water resources for recreation
7. Who owns Antarctica & Greenland ice?
8. Do residents of cities own the water that rains on their roofs?

Ignorance of these problems is no solution to them.

Chem-Eco

Frederick G. Duerr, Ph.D.
www.chemeco.com
www.fredduerr.com