Purifying Your Water

If you use a catchment system and maintain it properly, your water should be clean enough for bathing, cooking, cleaning, and watering plants.

Drinking water must be purified.

Techniques for Water Purification

1. Chemicals - chlorine
2. Filtration
3. SODIS

(This list excludes many purification strategies that are too complicated and/or expensive. The techniques listed are simple, inexpensive and reliable.)

Basic Bleach Method

For emergency treating of water of unknown quality, use any household bleach containing sodium hypochlorite (5.25% solution) *without* soap additives or phosphates. By using common household bleach as a chemical treatment method, large amounts of safe drinking water can be provided quite inexpensively. **Clorox has a 12-month shelf life.**

Caution:
Be sure sodium hypochlorite is the only active ingredient in bleach when used for water treatment.

Follow these simple instructions:

- Add bleach to water in container
- Thoroughly mix bleach in water by stirring briskly
- Let mixture stand for at least 30 minutes

Note: Conditions requiring longer exposure to the chlorine are cold water and heavy turbidity. The colder the water and the airier the water, the longer the time required for the chlorine to kill contaminants. Chemicals do not purify water; they merely render the water potable by neutralizing some of the toxic animal and plant life in the water.

Basic Bleach Water Treatment Method

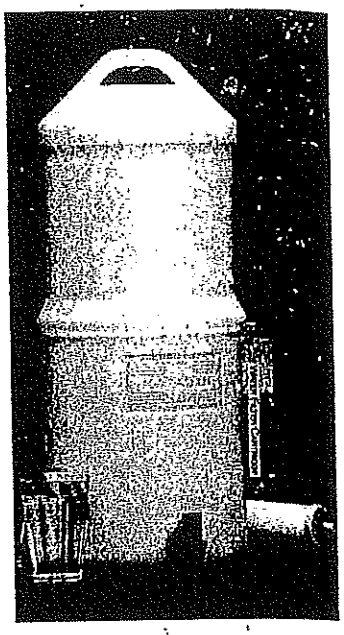
Water Quantity	Water Condition	5.25% Sodium Hypochlorite
1 quart	clear	2 drops
	cloudy	4 drops
½ gallon	clear	4 drops
	cloudy	8 drops
1 gallon	clear	8 drops
	cloudy	16 drops
5 gallons	clear	½ teaspoon
	cloudy	1 teaspoon
120 gallons	clear	2 ounces
	cloudy	4 ounces

Mixture should still have a distinct chlorine taste or smell after waiting period. If chlorine smell is not detected, add same dose of the solution to the water and let mixture stand for an additional 15-20 minutes.

From *Making the Best of Basics* by James Talmage Stevens, Gold Leaf Press, ©1997.

CERAMIC FILTERS

The Katadyn Drip Filter



With no moving parts to break down, superior filtration, and a phenomenal filter life, there is simply no safer choice for potentially pathogen-contaminated water. There are no better filters than Katadyn for removing bacteria, parasites, and cysts. Three 0.2-micron ceramic filters process one gallon per hour. Clean filters by brushing the surface. Ideal for remote homes, RV, camp site, and home emergency use. Food-grade plastic canisters stack to 11" Dia.x 25" H. Weighs 10 lb. One-year manufacturer's warranty, Switzerland.

42-842 Katadyn Drip Filter $289
42-843 Replacement Filter (needs 3) $75 ea

Ceramic filters are simple to use and they require no electricity. Always have extra ceramic candles (the filter part) on hand. Ceramic filters are pricey, but will work for years if properly maintained. If the water to be filtered is muddy, it should be sent through a sand filter before it is sent through the ceramic filter. Muddy water will clog the ceramic candles very quickly. The illustration is from Real Goods. Other brand names you may want to consider are Berkey and Doulghton.

In the past, ceramic filters did little to filter chemical pollutants. A new ceramic filter from Berkey does remove some chemicals. This will be particularly important in areas that are or once were heavy industry areas. Here is information from the Berkey Company about the Black Berkey filter. Cost is $50 each (2009).

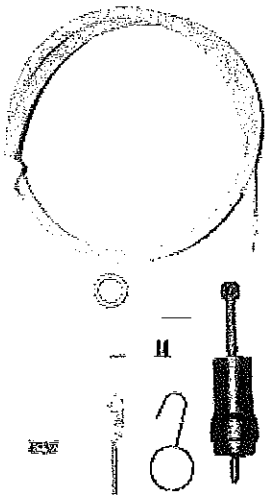
The revolutionary Black Berkey, self-sterilizing and cleanable purification elements purify water by removing pathogenic bacteria, cysts and parasites entirely and by extracting harmful chemical such as herbicides, pesticides, VOCs, organic solvents, radon 222 and trihalomethanes. They also reduce nitrates, nitrites and unhealthy metals such as lead and mercury without removing the healthful and nutritional minerals that your body needs. Black Berkey purification elements are so powerful that they are able to remove microscopic food coloring particles from water without removing the beneficial minerals your body needs. Virtually no other filtration system can duplicate this performance.

Moreover, Bekey systems are ideal for the self-sufficient, because they have the capability of purifying both treated water and untreated raw water from such sources as remote lakes, streams, stagnant ponds and water supplies in foreign countries, where regulations may be substandard at best. Perfect for everyday use and a must in hostile or emergency environments where electricity, water pressure or treated water may not be available. What's more, the Black Berkey elements are cleanable and can be used over and over again. Black Berkey elements will also fit most other major brand gravity filtration systems. www.berkeywater.com

THE SAWYER SP1803 PointOne Filter

Note from Jack: This filter is an excellent choice for those who want the safety and ease of operation of ceramic or catadyne filters without the high costs. The Sawyer filter starts at $60 for the basic filter. For $120 you can get a unit that will even filter out viruses.

This Filter Removes:
Bacteria, Which Cause:
I.E.: Cholera, Botulism (Clostridum botulinum), Typhoid (Salmonella typhi), Amoebic Dysentery, E. Coli, Coliform Bacteria, Streptococcus, Salmonella
Protozoan (Cyst):
I.E.: Giardia, Cryptosporidium, Cyclospora



Using technology taken from kidney dialysis, Sawyer® water filters use Hollow Fiber Membranes. Our filters are comprised of tiny "U" shaped micro tubes that allow water to enter into their core through tiny micro pores. The PointOne Filter's™ pores are so small (0.1 micron absolute) that no bacteria, protozoa, or cysts like E.Coli, Cholera and Typhoid can get through. At 7 log (99.99999%) the filter attains the highest level of filtration available today and yet it has a very high flow rate due to the large amount of tubes. Each filter is certified for ABSOLUTE microns. That means there will be no pore size larger than 0.1 microns in the biological filter Simply put, it is impossible for bacteria to pass through the 0.1 micron filter.

Assembly Kit Includes:

1 - Hole Cutter
1 - Water Filter, adapter & 3 Foot Hose
1 – Backwash Syringe
1 - Filter Hanger
1 – Filter Cap
Detailed Instruction Sheet

Sawyer made it as simple as it gets. No more digging wells if there is a water source, no constructing sand filters and no more purification chemicals. Families are able to construct and adapt their filter in literally minutes to locally found containers. The kit includes everything you need to attach the filter to any plastic bucket or container. (Bucket not included)

1 Obtain a clean bucket or plastic container
2 Use the hole cutter to drill a hole 1.5 inches from the bottom of the bucket (you can do this by hand).
3 Screw the connector, hose and filter onto the bucket.
4 Fill the bucket with water from any source, lower the filter head below the water line, and let gravity do the rest.

CAWST BioSand Filter

Construction: Concrete

Cost: A bag of cement and 3 feet of PVC pipe - $10 -20.

Effectiveness: Removes 98% of contaminants

Capacity: 1 liter per minute

Producer: Center for Affordable Water and Sanitation Technology

Web address: www.CAWST.org

Advantages: Low costs. No power required. Low maintenance.

Note: You must have training and concrete forms to build this filter.
Contact EQUIP for more information.

EQUIP, Inc., P.O. Box 11267, Marion, NC 28752

www.equipinternational.com / 828-738-3891

Plans for another excellent sand filter are available at www.aquaclara.org
Go to the *Purifier Construction Manual* for step by step instructions.

I like this filter because it can be constructed using inexpensive materials that can be found almost anywhere.

Solar Disinfection - SODIS

Materials needed: Clear plastic pop bottles, 1 or 1½ liters
Polyethylene Terephthalate (PET) bottles are preferred.
PVC can have harmful additions.

Solar cooker (optional)
Sand Filter (optional)
Oven thermometer (optional)
WAPI – An excellent addition to the SODIS system is a Water Pasteurization Indicator (WAPI). The reusable, durable WAPI is a simple device containing a special soy wax that helps users determine when water has reached pasteurization temperatures. In 2005 the WAPI could be purchased for $6 from *solarcookers.org*.

Procedure:

1. Fill bottle half way with clear water. Use a sand filter to pre-treat muddy water.
2. Shake vigorously.
3. Fill to the top.
4. Expose to direct sunlight for at least 6 hours (2 days in cloudy weather), or until the water reaches 55° C (135° F).

How it works: Sunlight helps kill micro-organisms as UV-A radiation is directly absorbed by organic material. Sunlight radiation also produces highly reactive forms of oxygen which kill micro-organisms. Heat kills some micro-organisms.

To improve efficiency:

1. Fill bottles completely.
2. Put black paint with no lead from top to bottom on half of the outer surface of the bottle. Lay the bottle horizontally with the blackened side downward.
3. Place bottles on a reflective surface such as aluminum foil.
4. Replace scratched bottles.

Sources: First presented by Professor Aftim Acra, UNICEF,1984. Tested by the Swiss Federal Institute of Environmental Science and Technology (EAWAG) and the Department of Water and Sanitation in Developing Countries (SANDEC).

Recommended Reading

Cottage Water Systems, Max Burns. Cottage Life Books, 1993

The Home Water Supply, Stu Campbell. Garden Way Publications, 1983

Making the Best of Basics, James Talmage Stevens. Gold Leaf Press, 1997.

Handmade Hot Water Systems, Art Sussman and Richard Frazier. Garcia River Press, P.O. Box 527, Point Arena, CA 95468, 1998

Mother Earth News, "The Secrets of Low Tech Plumbing," John Vivian. June/July, 1995, p. 34.

"Rainwater Harvesting" Texas Water Development Board, P. O. Box 13231, 1700 N. Congress Avenue, Austin, TX 78711-3231. (512) 463-7847, Fax (512) 478-2053.

Rainwater Harvesting For Drylands and Beyond, vol. 1 and 2. By Brad Lancaster, 2002. This is a must-read, ground-breaking work.

Build Your Own Solar Water Heater, Stu Campbell. Garden Way Publishing, 1978.

Rain Catcher, Stephen Derynck, Mother Earth News, Feb,/March 2004.

Harvest the Rain, Environmental Building News, Mother Earth News, Aug./Sept. 2003.

Important articles on water purification from *Backwoods Home Magazine Emergency and Backwoods Water Treatment*

Part 1 – *The Theory*, March/April 2010

Part 2 – *The Practice*, July/August 2010

Part 3 – *Taking It To the Field*, September/October 2010