

WATER TREATMENT

From www2.hawaii.edu, www.corrosion-doctors.org, www.gewater.com, and
www.home.howstuffworks.com

Water treatment systems generally use one or a combination of these five basic categories:

1. Disinfection
 - a. chlorination
 - elimination of undesirable matter from the water by oxidation
 - permanent protection of the hygienic and sanitary quality of the water throughout the distribution phase
 - active, immediate disinfection in cases of accidental pollution
 - continuous monitoring (of the chlorine demand) to warn of pollution.
 - b. pasteurization
 - solar cookers
 - flow-through heat exchangers
 - solar puddle
 - c. ultraviolet light
 - d. boiling
2. Filtration
 - a. mechanical filters (or microfiltration)
 - b. activated carbon filters
 - c. oxidizing filters
 - d. neutralizing filters
3. Reverse Osmosis (*hyperfiltration*)
 - a. can reject bacteria, salts, sugars, proteins, particles, dyes
 - b. uses a membrane that is semi-permeable
 - c. usually uses a process known as *crossflow* to allow the membrane to continually clean itself
 - d. requires a driving force (pump) to push the fluid through the membrane
4. Distillation
 - a. separation of substances due to boiling point differences
 - b. uses substantial amount of energy
5. Ion Exchange (water softeners)

The calcium and magnesium ions in the water are replaced with sodium ions. Since sodium does not precipitate out in pipes or react badly with soap, both of the problems of hard water are eliminated. To do the ion replacement, the water in the house runs through a bed of small plastic beads or through a chemical matrix called zeolite. The beads or zeolite are covered with sodium ions. As the water flows past the sodium ions, they swap places with the calcium and magnesium ions. Eventually, the beads or zeolite contain nothing but calcium and magnesium and no sodium, and at this point they stop softening the water. It is then time to regenerate the beads or zeolite in a brine of salt (sodium chloride).