

Water—What A Wonder!

Water, the most common substance on earth, is truly a wonder. There is no other material that can do all the things water can do. In many ways, water's unique properties are an exception to the laws of behavior for other substances. Without the unique qualities of water, the earth would be nothing like we know it, for there can be no life without water.

Water is everywhere on earth. It's in the air we breathe, the food we eat, the ground below us, and of course, in our oceans, rivers, and lakes. About two-thirds of the human body is made up of water. A chicken is about three-fourths water, and juicy fruits and vegetables can be four-fifths or more water.

Water In Nature

Water shapes the earth in many ways. Rain hammers at rocks and washes soil into rivers. Rivers knife through rock, carve canyons, and build up land where they empty into the sea. Glaciers plow out valleys and cut down mountains.

Water covers 70 percent of the earth's surface. About 97 percent of earth's water is in the oceans. Only three percent is fresh (not salty), and two-thirds of the fresh water is locked in glaciers and ice caps. Of the fresh water available for home and industrial water supply, only three percent exists in inland lakes and streams: 97 percent is underground water within one-half mile of the earth's surface.

No other common substance is liquid at earth's ordinary temperatures. In fact, no other substance appears in all three phases, as a solid, liquid, and gas, within the earth's normal range of temperature. Most substances become more dense as they grow colder, but water expands in going from 39° F to ice at 32° F.

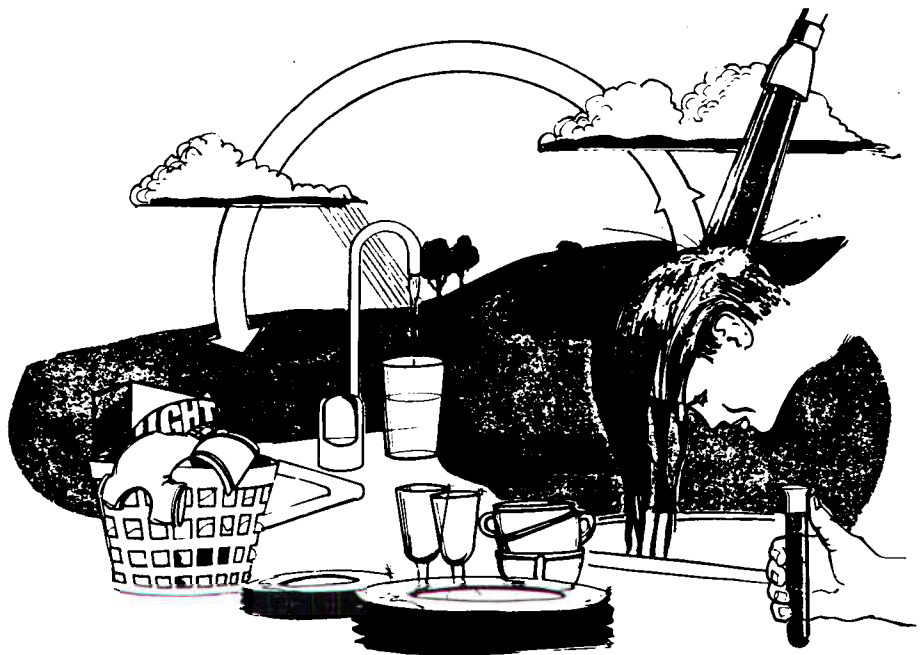
If water didn't have this unique quality, ice would sink, and the earth would become a lifeless arctic desert. Each winter, more and more ice would gather at the bottom of the oceans and lakes. The sun's heat would not penetrate deep enough to melt the ice, even during the summer. All water would eventually turn to solid ice except perhaps a thin layer

on top in the summer months, and life as we know it could not exist.

Another principal function of water is to regulate steady temperatures in our bodies and in our environment. Excluding ammonia, water has the greatest ability of any substance to absorb or give up heat without becoming much warmer or colder itself. This tremendous heat capacity of water enables our body

water molecule in turn consists of the chemical combination of two atoms of hydrogen and one atom of oxygen, thus H₂O.

Every glass of water you drink contains molecules of water used countless times before. Water is never used up: almost every drop we use is eventually evaporated by the sun. This action cleans the water since the evaporation process



WATER

temperature to remain constant at about 98.6° F and keeps the earth's climate from getting too hot or cold.

The Makeup Of A Water Molecule

Every drop of water contains more than one sextillion molecules. Each

effectively separates H₂O from contaminants that are mixed in with it. It then falls back to earth as rain.

There is as much water on earth today as there ever was or ever will be.

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Water

(Continued from other side)

Because of nature's water cycle, it is simply cleansed and used over and over again. Therefore, it's possible that the water you bathed with this morning may have been consumed by dinosaurs or Cleopatra ages ago.

"Pure" water is a relative term whose meaning differs with each user's intentions. Even the purest water contains

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substances besides hydrogen and oxygen. In its more pure states, water can be one of the most aggressive solvents known.

Water can dissolve at least a portion of almost any substance, and for this reason, it is called the "universal solvent." Like everything else in nature, water is constantly driven to reach its equilibrium state relative to its surroundings. It will attempt to dissolve the quantity of material required to reach saturation, which is the point at which no higher level of solids can be dissolved. Contaminants found in water include atmospheric gases, minerals, and organic materials (some naturally occurring and others synthetic or manmade).

Water Treatment Processes

The water treatment processes that are used in the water quality improvement industry are often the same techniques found in nature that serve to cleanse and purify water. Man simply copies and enhances them to make them more effective and efficient.

For example, records of water distillation date back more than 2,000 years ago. Man has probably been using this copy of the hydrologic cycle almost as long as he has been boiling water. Distillation, like nature's evaporation/precipitation water cycle, is highly effective in reducing a myriad of biological, dissolved, and suspended water contaminants.

Sunlight and stream aeration work to naturally disinfect and oxidize con-

tamination in water. Ultraviolet light, chlorination, ozonation, and permanganate equipment serve these same functions in home and business water treatment.

Filtration is the treatment process that water naturally goes through when moving into the ground and flowing to wells, springs, or other ground water discharge points. As water seeps through the ground, much of its suspended matter, color, and bacterial content are filtered out. Today's water filtration technology has selected specific filter media along with carefully engineered designs and flow rates to refine and enhance this natural solids/liquids separation process.

Osmotic membrane filtration is the phenomenon utilized by plant and animal tissue in regulating the passage of materials in and out of living cells. The cell wall is a semipermeable membrane that will reject some substances, allow others to permeate, and encourage or discourage the passage of water depending on the concentration differential of certain dissolved substances on each side of the membrane. These are all terms and principles that are recognized and used in perfecting membrane water treatment processes, such as reverse osmosis and ultrafiltration.

Even the ion exchange process that is used to soften or demineralize water is borrowed and refined from nature. Clay and humus soil particles are electrically active and carry a net negative charge. These soil particles thereby attract, hold, and release positively charged plant nutrients (cations).

Calcium, magnesium, potassium, ammonium, sodium, and hydrogen in the soil solution or adsorbed on the surface of plant roots can exchange positions with those adsorbed on the surface of clays or humus materials. The cation exchange capacity of a soil has a pronounced effect upon the nutrient and moisture availability the soil provides to plant growth. Modern ion exchange ions, however, are designed and manufactured to have exchange capacities 10 or more times greater than those naturally occurring in fertile soils.

Please write to:

Water Quality Association
Post Office Box 606
Lisle, Illinois 60532

for more information about the processes that treat water. □

Consumers Ask...

Q. My doctor has recommended a diet for me that requires drinking eight glasses of water a day. Why is drinking water important?

A. The simple regular intake of water can have a positive effect on your health.

Water plays a major role in the digestion of food. Water is necessary to dissolve food materials and waste products and to pass them into and out of the body tissues. Therefore, the regular intake of water aids in digestion and may help solve digestive problems.

Another principal function of water is to regulate body heat. It enables your body's temperature to remain at approximately 98.6° F whether you're experiencing the heat of summer or the cold of winter.

In addition, water lubricates the joints and soft tissues of your body and keeps your mucous membranes moist.

The benefits of drinking water are not exclusive to individuals who are watching their weight. In fact, medics say that drinking six to eight glasses of water should be a part of every individual's daily routine. □

Water Quality Research Council is a tax exempt research and educational organization. The purpose of the Water Quality Research Council is to conduct or sponsor scientific research and public education in the area of water chemistry as it relates to aesthetics, health, and pollution. The Council publishes or causes to be published articles, pamphlets, books, magazines, papers, and other educational materials relating to water quality.

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