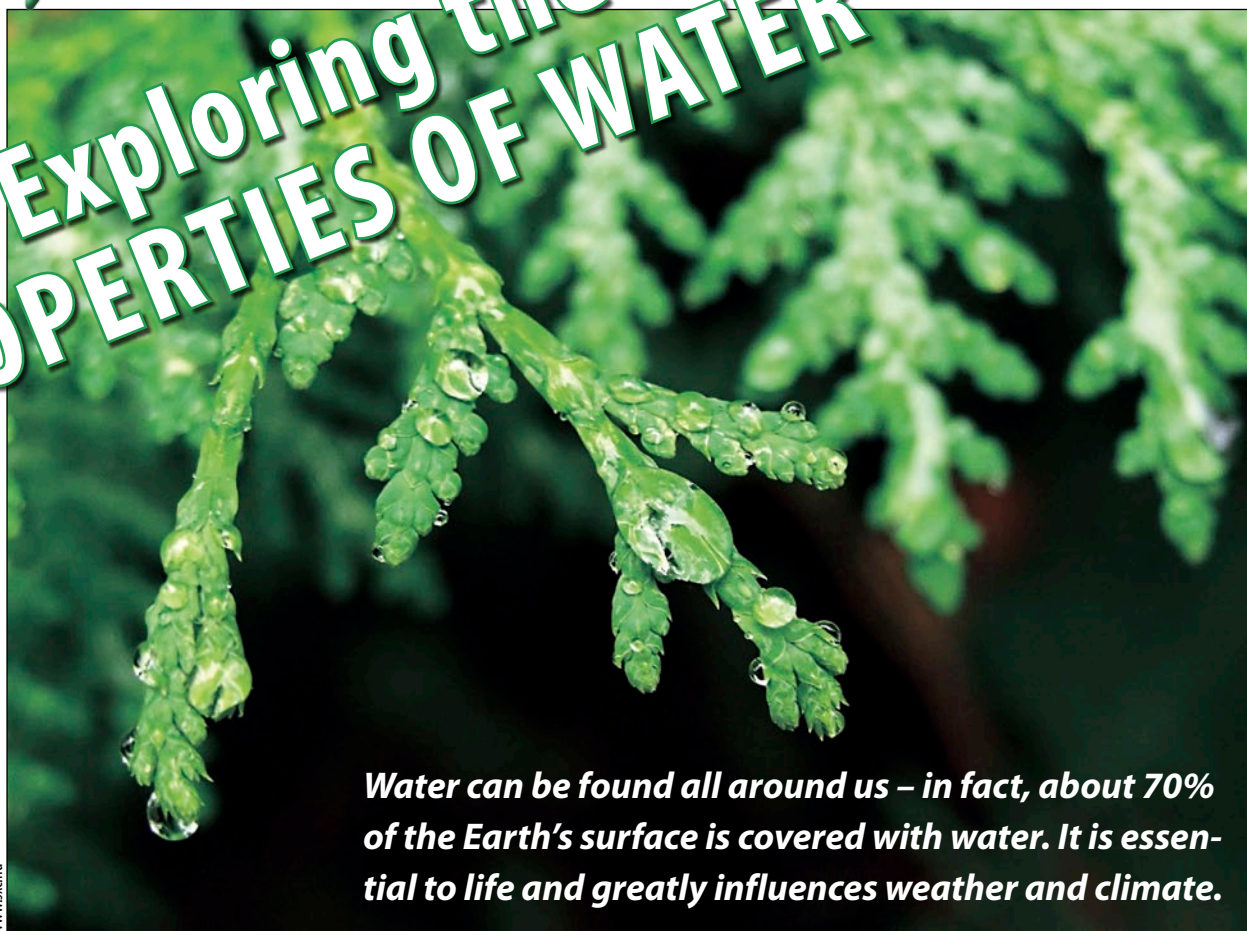


Exploring the PROPERTIES OF WATER



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Water can be found all around us – in fact, about 70% of the Earth's surface is covered with water. It is essential to life and greatly influences weather and climate.

Water is the most common substance on the planet yet it has some very unusual characteristics. Pure water is odourless and tasteless. A drop of water is made up of millions of tiny particles.

Water has a very simple atomic structure. Water is composed of two elements, **Hydrogen** and **Oxygen**, making it a compound. Pure water has a neutral pH of 7, which is neither acidic nor basic.

2 Hydrogen + 1 Oxygen = H₂O

One of the most remarkable things about water is that it can be found in all three states of matter: solid ice, liquid water and gaseous water vapour (or steam). When water is cooled down to about 0°C it will freeze. When it is heated up to about 100°C it boils, changing from a liquid to vapour. Earth's water is constantly interacting, changing and in movement. This perhaps makes water one of the greatest examples of recycling.

Did you know that water expands (gets less dense) by 9% when it freezes? This is very unusual for liquids. Think of the ice blocks in your glass of water on a

hot summer's day. It floats on top rather than sinking to the bottom. This is one of the wonderfully unusual characteristics of water. This characteristic is very helpful in nature. When a lake freezes, for example, ice forms on the surface and the water underneath stays liquid. This helps living things in the water survive cold winters.

If water contracted on changing into a solid, ice would be heavier than an equal volume of water and would sink. The bottoms of lakes and oceans would then fill with ice, out of reach of the sun's warmth. Gradually the Earth would become colder, more and more ice would form, and in time there would be little, if any, life on Earth!

UNIVERSAL SOLVENT

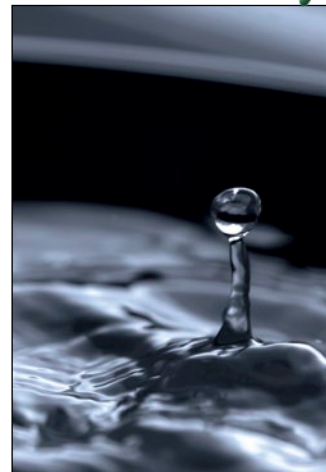
Another remarkable characteristic of water is that it has the capability to

**Water is one of the
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examples of recycling.
We use the same
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Left: Water is one of the greatest natural examples of recycling. We use the same water today than the dinosaurs did millions of years ago.

Right: Water is sticky and elastic, and tends to clump together in drops rather than spread out in a thin film.



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dissolve many things. This means that wherever water flows, either through the ground or through our bodies, it takes along valuable chemicals, minerals and nutrients. This is why pure water is so rare to find in nature. Even rainwater, the purest natural water, contains chemicals dissolved from the air.

Have you ever tasted how salty seawater is? That is because of the dissolved salts in the water. Take a cup of water and add a teaspoon of sugar. Now stir. See how the sugar is dissolved in the water? Now take a cup of warm water and stir in a teaspoon of sugar. Which cup of water dissolved the sugar the fastest?

Minerals dissolved in water help nourish living things. Harmful substances, such as decaying animal and vegetable matter and poisonous chemicals, may also be dissolved, and for this reason it is important that sources of drinking water be tested (and why water has to be treated before we can drink it safely). It is also because water is such a good solvent, and therefore dissolves dirt, that it is used for washing.

EXTRAORDINARY PROPERTIES

Water has a high specific heat index. This means that water can absorb a lot of heat before it begins to get hot. This is why water is valuable to industries and in your dad's car radiator as a coolant. The high specific heat index of water also helps regulate the rate at which air changes temperature, which is why the

temperature change between seasons is gradual rather than sudden, especially near the oceans.

Another interesting characteristic of water is that it has a high surface tension. This means that water is sticky and elastic, and tends to clump together in drops rather than spread out in a thin film. This is why water drops are, in fact, drops. This surface tension is responsible for capillary action, which allows water (and its dissolved substances) to move through the roots of plants and through the tiny blood vessels in our bodies.

You can test the capillary action of water. Place a straw into a glass of water. See how the water 'climbs' up the straw? What is happening is that the water

molecules are attracted to the straw molecules. When one water molecule moves closer to a straw molecule the other water molecules (which are cohesively attracted to that water molecule) also move up into the straw. Capillary action is limited by gravity and the size of the straw. The thinner the straw or tube the higher up capillary action will pull the water.

WEB RESOURCES

- ◆ <http://science.howstuffworks.com/water-info2.htm>
- ◆ http://en.wikipedia.org/wiki/Properties_of_water
- ◆ <http://ga.water.usgs.gov/edu/waterproperties.html>



Water is the only natural substance in all three states – liquid, solid (ice) and gas (steam) – at the temperatures normally found on Earth.

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