

Design your own lab : The Wonders of Water

What is the difference between a pile of water molecules and a water droplet? Is there a difference? Certainly! When five or fewer water molecules group together, they bond tightly in a cluster. However, when a sixth molecule joins in, everything changes. The bonds between molecules break and re-form, causing structures that give a water droplet its round shape. It is the bonds between the water molecules as well as the bonds within a single molecule that give water its unique properties.

Ice Demystified

1. Water is odd when it comes to one particular property freezing. The solid form of most substances is more dense than its liquid form, but not so with water! Have you ever wondered why ice floats in water? Well, between water molecules, there are weak bonds called *hydrogen bonds*. Research these bonds. How do they work? Build a model of water molecules that demonstrates hydrogen bonding in ice, and write your findings as a **newspaper article**.

Another Research Idea

2. What do *fuzzyballs* and *buckyballs* have to do with chemical bonding? Each is a nickname for different forms of fullerenes. Diamonds, graphite, and fullerenes are very different substances, but they are all made of carbon atoms. Find out more about the discovery and use of fullerenes. How are the atoms in diamonds, graphite, and fullerenes arranged? How do the properties of the substances differ? Present your findings as a power point presentation. You must have at least 10 pages of information with graphics.

USEFUL TERM

fullerenes
a class of molecules;
soccer-ball-shaped
forms of carbon with
extraordinary stability

Long-Term Project Idea

3. Does your tap water conduct electricity? Find out by building your own tester! Use scissors to strip 1 cm of insulation from each end of three 10 cm lengths of copper wire. Use one wire to connect one terminal of a small flashlight bulb socket and bulb to one terminal of a dry cell. Attach the second wire to the other terminal of the socket. Attach the third wire to the vacant terminal of the dry cell. Prepare three small beakers of the following solutions: distilled water, sodium chloride, and sugar. Dip the free ends of the wires into each solution. Now use your tester to determine which solutions conduct an electric current. Collect water from a variety of sources: the tap, a pond, a lake, a spring, the ocean, or even collect some rain water. Check each sample with your tester. In which solutions does the bulb glow? Why? Present your results in a **magazine article**.

MATERIALS

- scissors
- metric ruler
- 30 cm insulated copper wire
- flashlight socket
- flashlight bulb
- dry cells
- 3 small beakers
- distilled water
- sugar
- sodium chloride (table salt)

INTERNET KEYWORDS

Buckminster Fuller
fullerenes