

Name: _____ Period: _____ Date: _____

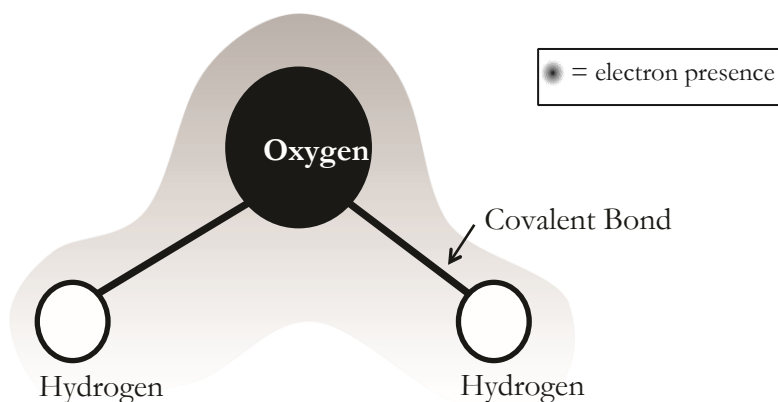
Properties of Water

What Makes Water So Special?

Why?

When you hear that NASA's space probes are looking for "evidence of life" on other planets, do you know what that means? They are looking for evidence of liquid water. Water is fundamental for all life; without it every living thing would die. Water covers about 70% of Earth's surface and it makes up 65–75% of our bodies (82% of our blood is water). Even if water might seem boring to you—no color, taste, or smell—it has amazing properties that make it necessary for supporting life.

Model 1 – The Molecular Structure of Water



Electron density model of H₂O

1. How many hydrogen atoms are in a molecule of water? ____
2. How many oxygen atoms are in a molecule of water? ____

The shading around the molecule represents the relative density of electrons shared by the atoms.

3. Since there is darker shading around the Oxygen, this indicates that the density of electrons is _____ around the oxygen atom as compared to the density of electrons around the hydrogen atoms. (Greater or smaller?)

4. Electrons are negatively charged particles.

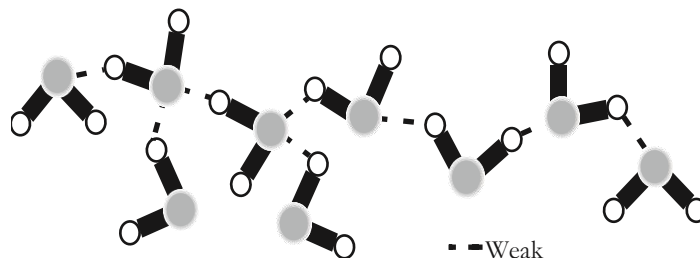
Where is most of the negative charge on the water molecule? _____

Model 2 – Attraction of Water Molecules

Looking at your answers to Questions 1 and 2 from

Model 1, tell what atoms are represented by:

- a. The small, unshaded circles: _____
- b. The larger gray shaded circles: _____
- c. The solid black lines: _____
- d. The dotted lines: _____



- Remember that electrons in a water molecule are more dense around the oxygen atom and less dense around the hydrogen atoms.
 - Which atom is negatively charged? _____
 - Which atom is positively charged? _____
- Describe the cause of the attractions between molecules of water.

Read This!

The bonding electrons in some molecules are not equally shared between the atoms. These neutral molecules with a difference of charge across the molecule are called **polar molecules**. Because of the arrangement of the atoms and electrons in a water molecule, there are two differently charged areas of the molecule even though the molecule is neutral overall. The hydrogen molecules are slightly positive, while the oxygen is slightly negative. The positive area charge (hydrogen) of one water molecule is attracted to the negative area (oxygen) of a different water molecule. This weak attraction is often referred to as **hydrogen bonding**.

- In the space below, draw four more water molecules to create a cluster. Be sure to indicate the hydrogen bonds that link the water molecules.

