Unit Two: Hydrosphere

Chapter Two: Water Properties

Water is the most abundant molecule on the Earth's surface and one of the most important molecules to study. The facts of water chemistry reveal why this is such an incredible molecule.

Water Is A Polar Molecule

Water is a polar molecule. Each molecule is bent, with the negatively charged oxygen on one side and the pair of positive-charged hydrogen molecules on the other side of the molecule.

Cohesion

Cohesion is a key property of water. Because of the polarity of the molecules, water molecules are attracted to each other. Hydrogen bonds form between neighboring molecules. Basically water molecules like to stick together.

Adhesion

Adhesion is another property of water. Adhesiveness is a measure of water's ability to attract other types of molecules. Water is adhesive to molecules capable of forming hydrogen bonds with it. Basically water can make things stick together.

Capillary Action

Adhesion and cohesion lead to capillary action, which is seen when the water rises up a narrow glass tube or within the stems of plants, as if the water is defying gravity.

The Universal Solvent

Water is often known as the universal solvent, which means that many substances dissolve in it. Substances that dissolve in water are hydrophilic. This means that they are as strong or stronger than water's cohesive forces. Salt and sugar are both polar, like water, so they dissolve very well in it. Substances that do not dissolve in water are hydrophobic.

Surface Tension

Water also has a high level of surface tension. This means that the molecules on the surface of the water are not surrounded by similar molecules on all sides, so they're being pulled only by cohesion from other molecules deep inside. These molecules cohere to each other strongly but adhere to the other medium weakly. One example of this is the way that water beads up on waxy surfaces, such as leaves or waxed cars.

Water Strider exhibiting Surface Tension

High Specific Heat & Vaporization

The high specific heat and high heat of vaporization mean a lot of energy is needed to break hydrogen bonds between water molecules. Because of this, water resists extreme temperature changes. This is important for weather and also for species survival. The high heat of vaporization means evaporating water has a significant cooling effect. Many animals use perspiration to keep cool, taking advantage of this effect.