**The Extraordinary Properties of Water**

**Water**

* A water molecule is made up of 3 atoms – one \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and 2 \_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Water is Polar**

* The oxygen atom has a partial \_\_\_\_\_\_\_\_\_\_\_ charge while the hydrogen atom has a partial \_\_\_\_\_\_\_\_\_\_\_ charge.
* The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ end of one water molecule is attracted to the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ end of another water molecule to form a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Cohesion (Water sticks to itself)**

* \_\_\_\_\_\_\_\_\_\_\_\_ tension allows insects to walk on the surface of water.
* Rain forms \_\_\_\_\_\_\_\_\_\_\_

**Adhesion (Water sticks to other substances)**

* Water will make hydrogen bonds with other surfaces such as glass, plastic, soil, animal and plant tissues.
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- water molecules will “tow each other along when in a thin glass tube.

**High Boiling Point (heat of vaporization)**

* Most water on Earth is in the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ state.
* In order for water to evaporate a great deal of heat energy must be added to break the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* Water can absorb or release large amounts of heat energy with little change in actual temperature. This helps organisms maintain \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Water is Less Dense as a Solid**

* Liquid water has hydrogen bonds that are constantly being broken and reformed. Ice forms a \_\_\_\_\_\_\_\_\_\_\_\_\_ whereby molecules are set at a fixed distance.
* This allows ice to \_\_\_\_\_\_\_\_\_\_\_\_\_ on top of liquid water.
* In winter fish can be protected from freezing because \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Universal Solvent**

* Water is usually part of a mixture called a \_\_\_\_\_\_\_\_\_\_\_\_.
* The \_\_\_\_\_\_\_\_\_\_\_\_\_ is the substance that is being dissolved.
* The \_\_\_\_\_\_\_\_\_\_\_\_\_\_ is the substance doing the dissolving, and is usually \_\_\_\_\_\_\_\_\_\_\_ in biological systems.
* Allows \_\_\_\_\_\_\_\_ to form from salts in cells.

**Important in Metabolism**

* The chemical \_\_\_\_\_\_\_\_\_\_\_\_\_ in cells happen in aqueous solutions (with water).
* The chemical reaction that occurs in plants, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, requires water to combine with \_\_\_\_\_\_\_\_\_\_\_ to form glucose.

**Answers**

**Water**

* A water molecule is made up of 3 atoms – one \_oxygen\_\_\_\_ and 2 \_\_hydrogens\_.

**Water is Polar**

* The oxygen atom has a partial \_\_\_negative\_\_\_ charge while the hydrogen atom has a partial \_positive\_\_ charge.
* The \_\_oxygen\_\_\_ end of one water molecule is attracted to the \_\_hydrogen\_\_\_\_ end of another water molecule to form a \_\_\_hydrogen bond\_\_\_\_\_\_.

**Cohesion (Water sticks to itself)**

* \_\_\_surface\_\_\_ tension allows insects to walk on the surface of water.
* Rain forms \_\_drops\_\_

**Adhesion (Water sticks to other substances)**

* Water will make hydrogen bonds with other surfaces such as glass, plastic, soil, animal and plant tissues.
* \_\_\_\_\_capillary action\_\_- water molecules will “tow each other along when in a thin glass tube.

**High Boiling Point (heat of vaporization)**

* Most water on Earth is in the \_liquid\_\_\_ state.
* In order for water to evaporate a great deal of heat energy must be added to break the \_\_\_hydrogen bonds\_\_\_.
* Water can absorb or release large amounts of heat energy with little change in actual temperature. This helps organisms maintain \_\_\_homeostasis\_\_\_\_\_.

**Water is Less Dense as a Solid**

* Liquid water has hydrogen bonds that are constantly being broken and reformed. Ice forms a \_\_crystal\_\_\_ whereby molecules are set at a fixed distance.
* This allows ice to \_\_\_float\_ on top of liquid water.
* In winter fish can be protected from freezing because \_\_they exist at the bottom of a lake where the water is not frozen\_\_\_.

**Universal Solvent**

* Water is usually part of a mixture called a \_\_solution\_\_.
* The \_\_solute\_\_\_\_ is the substance that is being dissolved.
* The \_\_solvent\_\_\_ is the substance doing the dissolving, and is usually \_\_water\_\_ in biological systems.
* Allows \_ions\_\_ to form from salts in cells.

**Important in Metabolism**

* The biochemical \_\_reactions\_\_ in cells happen in aqueous solutions (with water).
* The chemical reaction that occurs in plants, \_\_\_photosynthesis\_\_\_, requires water to combine with \_\_CO2\_ to form glucose.