**Investigating the Properties of Water**

**Introduction:** Water is a simple molecule, yet itʼs most vital to all living things. It has

the highest specific heat of everyday substances. Unique properties of water enable it

to carry out functions that no other substances can. In a neutral aqueous solution, five

molecules of water are bonded together by weak hydrogen bonds. Furthermore, due to

the electronegativity of oxygen, water is a polar molecule. Due to its polarity, water is

classified as the universal solvent. You will investigate the life-sustaining properties of

water throughout this lab.

**Objective:** In this lab, you will explore the properties of water through experimentation to better understand how hydrogen bonds affect polarity and how this affects biological processes necessary for life.

**Part 1:** *Modeling Polarity*

* Use the provided materials to construct 5 water molecules.
* Arrange these models to illustrate how the water molecules would arrange themselves in relation to one another.
* Draw a sketch of the model on your paper. Label the following: *H, O, area of positive and negative charges, hydrogen bonds*.
* Discussion – Explain why hydrogen bonds form between polar molecules.

**Part 2:** *Investigating the Properties of Water*

* Use the provided materials to demonstrate how each of the properties of water function.
* For each demonstration, draw a sketch of what you did *and* explain **WHY** it depicts each property.

Adhesion

*Water sticks to other substances.*

Cohesion

*Water sticks to other water molecules.*

Surface Tension

*Water near the top of the water column sticks to other water molecules.*

Capillary Action

*Water is able to move up through tubes with a small diameter.*

Universal Solvent

*Many molecules are able to dissolve in water.*

High Specific Heat

*A lot of energy is needed for water to change temperature.*

Expands When Frozen

*The distance between water molecules is greater in a solid than in a liquid.*

Polar & Nonpolar Molecules Don’t Mix

*Combining polar and nonpolar substances will not mix together.*