Lab- Investigating the Properties of Water

Part A. Pennies

1. How many drops of water do you think will fit on the head of a penny? Write your hypothesis in the space below.

Hypothesis: _____

2. Using a dropper slowly drop water onto a penny counting each drop.

a. How many drops of water were you able to drop onto the penny before the water spilled?

_____

b. How did this compare to your prediction?

3. In the space to the right, draw what the penny looked like as viewed from the side before the water overflowed.

4. Which property of water is being demonstrated in this activity? How do you know? _____

_____

5. How do you think this applies to marine biology or organisms that live in the ocean?

Part B. Wax Paper

1. Place several drops of water on a piece of wax paper and roll them around on the wax paper.

a. What happens to the water droplets as you roll them around on the wax paper?

2. What does this activity tell you about one of water's properties?

3. Place one drop of water on your piece of wax paper. Draw a diagram of the water droplet from the side perspective in box A to the right.

A

4. Place a toothpick in soap and dip it into the water droplet.

Draw a diagram in box B of the result.

B

5. What effect does soap have on water? Use scientific language you learned in diagrams A and B in your answer.

Explain this effect in molecular terms.

Part C. Floating a paper clip

1. Fill a beaker about ¾ the way full. Float a paper clip on the surface of water. (hint: don't let your fingers touch the water).

a. Touch the paper clip with your finger once it is balanced. What happens?

b. What property of water is this demonstrating? How do you know?

2. Balance the paper clip again (you may need to add fresh water).

a. Using a toothpick, add one drop of detergent (soap) to the water and record what happens.

b. What does this tell you about the properties of water?

Part D. Oil and Water

1. Fill a beaker 1/3 of the way with water and add two drops of food coloring to it. Allow the water to become a uniform color before moving on to the next step.

2. Using a toothpick, add a drop of cooking oil to the beaker of water. Record your observations in the space below.

3. Empty the contents of your beaker into the sink, and clean the interior of the beaker.

4. Using the same beaker (which should now be clean), add a small amount of salt to a beaker filled with water. Record your observations in the space below.

8. Rinse the contents of the beaker in the sink and clean the inside of the beaker.

Part E: Solubility of various solutes in water

1. To observe how water behaves as a solvent, you will attempt to dissolve a variety of substances in liquid water. To do so, measure 50 ml of deionized water into each of four 100 ml beakers and attempt to dissolve each substance by thoroughly stirring or swirling.

a. Beaker #1 – 0.5 grams of NaCl, also known as “table salt”

b. Beaker #2 – 0.5 grams of sucrose, also known as “table sugar”

c. Beaker #3 – 1 squeeze from a transfer pipet of vegetable oil

c. Beaker #4 – 1 squeeze from a transfer pipet of ethanol or isopropyl alcohol

2. Write your observations in the table below.

Beaker	Observations
Beaker 1 (NaCl)	
Beaker 2 (sucrose)	
Beaker 3 (oil)	
Beaker 4 (alcohol)	

3. Which substance(s) did not dissolve completely in water? Why?

4. Compare and contrast terms polar and non-polar.

Analysis

A. When water sticks to something, we call this adhesion. When you step out of the shower and see tiny droplets of water on your skin, that is an example of adhesion. In a plant, cohesion and adhesion help the plant by allowing water to travel upwards away from the roots to deliver water to all parts of the plant.

1. Explain why the penny was able to hold so many drops of water before it overflowed.

2. What caused the water to spill over? _____

3. How did the droplet of water on the surface of the penny demonstrate both adhesive and cohesive properties of water? Explain.

B. Water is a polar molecule, meaning it has one end with a slight positive charge and another end with a slight negative charge. Molecules without positive and negative ends are called nonpolar. As a general rule, water is good at dissolving polar and ionic compounds, but does not dissolve nonpolar compounds.

1. Based on your observations for Part E, which substance was nonpolar, the cooking oil, or the salt?

_____

2. Based on your observations for Part E, which substance was polar or ionic?

_____

C. Water is needed for most chemical reactions that take place within living organisms.

1. What evidence do you have, based on your observations in part II, that water is needed for a chemical reaction to take place?

D. Water molecules are attracted to each other because of their polarity. The positive and negative ends attract one another like magnets. This attraction is called cohesion. They stick together. At the surface, this produces a “film” that covers the surface and holds it. This film is called surface tension.

1. When you placed the paper clip on top of the water, was it floating? If not, then what was holding it up?

2. Why do you think the paper clip sank to the bottom of the beaker when you added a drop of mild detergent (soap) to the beaker?