Name:

**Surface Tension LAB**

**Background**: Surface tension refers to water's ability to "stick to itself". Why do water drops gather on a spider's web? Why are dewdrops found glistening on blades of grass in the bright morning sun? Why don't water striders, a pond insect, break through the water's surface? All of the answers to these questions are in some way related to surface tension.

At the heart of surface tension is the attractive force between the surface molecules and inner/deeper molecules of a liquid. The surface molecules of a liquid are pulled toward the center of a mass of liquid by the inner molecules, causing the surface area of the liquid to contract and become as small as possible. The energy needed to break through the surface of a liquid or disrupt a drop is the liquid's surface tension. Water has a greater surface tension than most other common liquids. That is why water striders don't break the water's surface, dewdrops collect on blades of grass, and water drops collect on spider webs. Surface tension can be measured and observed by dropping water (drop by drop) onto a penny. The number of water drops that can fit on a penny will surprise you.

Different liquids/molecules have different surface tensions.

1. Initial Observation: Observe water’s surface tension by seeing how many drops of water can fit on a penny. Number of Drops \_\_\_\_\_\_\_\_\_\_\_

Question: How does soap affect the water's surface tension?

2. Develop a hypothesis that answers the question. Write your hypothesis below. Use an “If……then……..” sentence.

3. Test your hypothesis by comparing the number of drops of tap water that can fit on a penny to the number of drops of soapy water that can fit on a penny. Because water drops may vary depending on how well you drop the water, it is best to run several trials and take an average. Record your data in the table below. Place the penny on a single sheet of paper towel. REPLACE THE SHEET OF PAPER AS NEEDED. Do all 3 tap water trials first, THOROUGHLY DRY THE PENNY between trials. Then do the soapy water, THOROUGHLY **RINSE** AND THEN DRY THE PENNY between trials.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|   | Trial 1 | Trial 2 | Trial 3 | Average |
| Tap Water |   |   |   |   |
| Soapy Water |   |   |   |   |

4. Analyze the data and draw conclusions. Write a paragraph below (using complete sentences) that explains how soap affects the surface tension of water, using your data to help you answer the question. Suggest a reason for your observations (Why did it happen…..look at end of this handout). Support or reject your hypothesis

Post- Lab Analysis

5. Explain what surface tension is.

6. Why were three trials taken and averaged?

7. In this experiment, what was your “control” group?

 8. Identify the independent variable in the experiment.

 9. Identify the dependent variable in the experiment.

Detergents are a class of chemicals that contain hydrophobic (water hating) hydrocarbon "tails" and a hydrophilic (water loving) "head" group. This general class of molecules are called **surfactants**. Surfactants can interact with water in a variety of ways, each of which disrupts or modifies the hydrogen bonding network of water. Since this reduces the cohesive forces in water, this leads to reduction in the surface tension.

Finally, why do you think we are doing this lab in a HUMAN BIOLOGY class? Why are we doing it in the middle of a unit on the RESPIRATORY SYSTEM? What do you think surface tension and surfactants have to do with the function of the alveolus? Think about it for a minute and write your best idea in paragraph form below: