Surface Tension Lab

Name: _____

Hour: ____

Objective: To draw conclusions about the surface tension and intermolecular forces of liquids based on experimental observations.

Materials: water, 2-propanol, soap water solution, glass plate, wax paper, plastic wrap, penny

Procedure

Part 1: The volume of liquid that a penny can hold

1. **Before beginning**, predict the number of drops of each of the four liquids that a penny can hold. Just *hypothesize*! If you are wrong, who cares? Don't change your predictions later!
2. Rinse off a penny and dry it. Then place it on a flat surface.
3. Obtain a small amount of distilled water (10 mL or so) in a small beaker.
4. Obtain a thin-stem plastic micropipet labeled "water" and use it to transfer drops of water to the penny. Observe the shape of the water drops as they form on the tip of the pipet. To achieve the highest number of drops possible, drop the water slowly and carefully from a height of about 1 cm above the penny. Wipe up the overflow with a paper towel. Record the number of drops in Data Table 1. Dry off the penny.
5. Repeat steps 1-3 with 2-propanol. Make sure you use the same penny and the same side of the penny! Instead of using a beaker, use film canisters. Return the unused portion of 2-propanol after the lab. Make sure that you use a micropipet labeled for 2-propanol. **Do not use the same pipets in different substances.**
6. Repeat steps 1-3 with the 10% soap solution.

	Water	2-propanol	Soap solution
# of drops on penny (predicted **hypothesis**)			
# of drops on penny (actual)			

Part 2: Comparing intermolecular forces versus the attraction to a surface.

1. Obtain a piece of wax paper.
2. Place a puddle of 4 or 5 drops of distilled water on the wax paper. Do the same with 2-propanol and soap solution. Compare the sizes and shapes of the drops. Observe how each substance moves across the surface of wax paper when the paper is tilted or as you blow on the drops. By doing this you can compare how strong a certain substance's intermolecular forces are versus the substance's attraction to the surface. Are the molecules attracted to each other more or to the wax paper more? Based on this, rank them in order from strongest intermolecular forces (1) to weakest intermolecular forces (3) by placing numbers 1-3 in the Data Table.
3. Repeat step 2 with plastic wrap instead of wax paper. Again, based on your observations, rank them in order from strongest to weakest intermolecular forces in the Data Table. Did you get any conflicting rankings based on the surface that you used?

	Water	2-propanol	Soap solution
Rank based on wax paper			
Rank based on plastic wrap			

Part 3: Evaporation

1. Obtain a glass plate.
2. Place a drop of water and a drop of alcohol on the glass plate. Observe them carefully to see if there is a difference in how quickly each drop evaporates.
3. Place a drop of water on the back of your hand and a drop of alcohol on the back of you hand. You should notice that one of the drops feels colder than the other drops. Use your results to answer question 5.

Conclusion Questions

1. What effect, if any, does soap in solution have on the intermolecular forces and surface tension of water? **You must cite data from this lab to support your answer.** From a molecular viewpoint propose an explanation for this.

2. From a molecular viewpoint, why can more water than 2-propanol stay on a penny?

3. *Cohesive* is a term that describes the attraction of a liquid's molecules for themselves. *Adhesive* is a term that describes the attraction of a liquid's molecules for other things.

    a) Which is the most *cohesive* liquid?

    b) Which is the most *adhesive* liquid?

4. If Liquid A evaporates faster than Liquid B, which liquid has the strongest intermolecular forces? Explain.

5. a) In Part 3 step 3, which liquid felt the coldest?

    b) The water and the alcohol were actually BOTH at room temperature. However, one of them felt colder. Offer an explanation for why one of them felt colder?