Observing the Properties of Water Lab

Biology H

Purpose: To observe and describe the properties of water.

Materials: pennies, dropper bottles of water, soapy water, alcohol, oil, cup, paper clips, petri dish, capillary tubes (small, medium and large), filter paper, overhead marker, test tube, water molecule models

Procedure:

Part A. Cohesion: the ability of a molecule to "stick to itself". Cohesion can be observed by adding water drop by drop onto the surface of a penny.

1. Place a clean penny on a paper towel. Using the dropper bottle, slowly add water, drop by drop to the surface of the penny. DO NOT LET THE DROPPER TIP TOUCH THE WATER ALREADY ON THE PENNY. Record the number of drops on your data table. Repeat 2 more times and calculate the average value. Record each trial and the average on your data table.
2. Dry the penny and repeat the above procedure using soapy water. Record your data.
3. Wash and dry the penny and repeat with alcohol. Record your data.
4. Wash and dry the penny and repeat with oil. Record your data.
5. Wash the penny with soap, dry it and return it to your lab tray.

Part B. Surface tension: how difficult it is to stretch or break the surface of a liquid

1. Place a clean cup on a paper towel. Fill to the brim with water.
2. Carefully add 1 paper clip at a time until the water spills over.
3. Record the number of paper clips on your data table.
4. Pour the water into your waste cup. Remove and dry the paper clips and return them to your lab tray.

Part C. Adhesion: the ability of water to stick to polar surfaces/Capillary action: the spontaneous flow of a liquid into a narrow tube or porous material.

1. Put 30 mL of water into your beaker. Add 1-2 drops of food coloring and swirl to mix. Pour into your petri dish.
2. Place the largest diameter capillary tube into the water WITHOUT it touching the bottom. Let stand for 10 seconds. Measure (in mm) the distance the water rises in the tube. Record the diameter of the tube and the distance the water rose on your data table.
3. Repeat with the medium and small diameter capillary tubes. Record the diameter of each and the distance the water rose on your data table.
4. Rinse your petri dish in the sink and dry it. Wick the water out of the capillary tubes. Return all materials

Part D

1. Fill your petri dish ½ full with water.
2. Carefully sprinkle a small amount of pepper into the water. Describe what happens.
3. Add 1 drop of soap to the water. Describe what happens.
4. Empty the petri dish into the sink. Wash and rinse well. Dry and return to your lab tray.

Part E. Biological solvent: “like dissolves like”

1. Add 2mL of each solution in the order given into 3 small test tubes.
    a. Tube 1: oil and water
    b. Alcohol and water
    c. Alcohol and oil
2. Gently swirl each tube and record your observations. Make a labeled sketch of each tube.
3. Empty the tubes into the sink. Add a drop of soap and thoroughly was and rinse each tube. Place them upside down into the rack in your lab tray.

Part F

1. Draw a pencil line at the bottom of the paper where the “V” ends.
2. Place 1 dot of black overhead marker on the pencil line.
3. Places the paper into the test tube of water, making sure the ink dot doesn’t go below the water level.
4. Let sit several minutes until the water has moved 2/3-3/4 of the way up the paper.
5. Remove the paper from the test tube.
6. Immediately draw a pencil line where the solvent stopped.
7. Measure (in mm) from the pencil line to the peak of each individual color on the paper.
8. Draw the pattern you produced and record the measurements for each color.

Part G: High heat of vaporization: the energy required to convert a liquid into a gas (the longer it takes to evaporate, the higher the heat of vaporization)

1. At your station you will find two containers with a cotton swab soaking in water and alcohol.
2. Simultaneously raw a thin line 4 cm long using each of the cotton swabs on your lab table. Record the time it takes for each to evaporate.

Part H: Ice floats: Solid water has a lower density than liquid water

1. Add an ice cube to each of the beakers.
2. Record the results.
3. Draw the ice crystal model that is at your lab station.

Name________________________________ Date______________

Part 5: Specific Heat of Water

For such a small molecule, water has a very high specific heat. This means it takes a lot of energy to raise the temperature of water. Another important property is the range of temperature for which water remains a liquid. When water evaporates, like from sweat, it also removes a lot of heat from our body. Using the data below, create a graph to demonstrate the heating curve of water. The water starts out as ice and is heated until it is all water vapor. **When you are finished with the graph, label the areas on the graph as: ice, water, steam, melting, or evaporating. Don't forget to give it a title and completely label the axes.** Then answer the questions below.

minutes	degrees Celcius	minutes	degrees Celcius	minutes	degrees Celcius	minutes	degrees Celcius
0	-15	9	15	18	60	28	100
1	-10	10	20	19	65	29	100
2	-5	11	25	20	70	30	100
3	0	12	30	21	75	31	100
4	0	13	35	22	80	32	100
5	0	14	40	23	85	33	100
6	0	15	45	24	90	34	105
7	5	16	50	25	95	35	110
8	10	17	55	26	100	36	115
				27	100		

1. At what temperature does ice melt? How do you know?

2. At what temperature does water boil? How do you know?

3. Why doesn't the temperature of the water change while the ice is melting or boiling? (what is happening to the heat energy?)

4. How does water's specific heat relate to its usefulness for life? (give as many examples as possible)