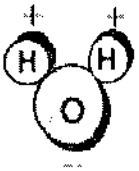
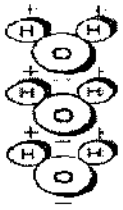
Properties of Water Lab

Introduction:

Water's chemical description is H_2O. As the diagram to the left shows, that is ne atom of oxygen bound to two atoms of hydrogen. The hydrogen atoms are "attached" to one side of the oxygen atom, resulting in a water molecule having a positive charge on the side where the hydrogen atoms are and a negative charge on the other side, where the oxygen atom is. This uneven distribution of charge is called **polarity**. Since opposite electrical charges attract, water molecules tend to attract each other, making water kind of "sticky."

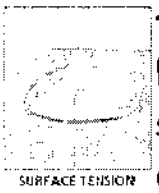


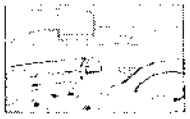
As the right-side diagram shows, the side with the hydrogen atoms (positive charge) attracts the oxygen side (negative charge) of a different water molecule. (If the water molecule here looks familiar, remember that everyone's favorite mouse is mostly water, too). This property of water is known as **cohesion**.



All these water molecules attracting each other mean they tend to clump together. This is why water drops are, in fact, drops! If it wasn't for some of Earth's forces, such as gravity, a drop of water would be ball shaped -- a perfect sphere. Even if it doesn't form a perfect sphere on Earth, we should be happy water is sticky. Water is called the "universal solvent" because it dissolves nore substances than any other liquid. This means that wherever water goes, either through the ground or through our bodies, it takes along valuable chemicals, minerals, and nutrients.

Water, the liquid commonly used for cleaning, has a property called **surface tension**. In the body of the water, each molecule is surrounded and attracted by other water molecules. However, at the surface, those molecules are surrounded by other water molecules only on the water side. A tension is created as the water molecules at the surface are pulled into the body of the water. This tension causes water to bead up on surfaces (glass, fabric), which slows wetting of the surface and inhibits the cleaning process. You can see surface tension at work by placing a drop of water onto a counter top. The drop will hold its shape and will not spread.





In the cleaning process, surface tension must be reduced so water can spread and wet surfaces. Chemicals that are able to do this effectively are called surface active agents, or surfactants. They are said to make ater "wetter." Surfactants perform other important functions in cleaning, such as loosening, emulsifying (dispersing in water) and holding soil in suspension until it can

be rinsed away. Surfactants can also provide alkalinity, which is useful in removing acidic soils.

PRE -LAB QUESTIONS:

1. Explain why water is referred to as the universal solvent.

2. What is the overall charge on a molecule of water?

3. Water is a polar molecule (appears to have a charge). Explain why this is so.

4. Which end of a water molecule "acts negative"? Which "acts positive"?

5. Is water the only molecule that is polar?

6. Explain what occurs whenever several water molecules are near each other in a droplet. Include a sketch of this.

7. The property of water molecules being attracted to other water molecules is called _____.

8. Explain what causes water to have surface tension.

9. Surface tension causes water to _____ on surfaces such as glass.

10. In order to clean a surface, what must happen to surface tension? What type of chemicals can do this? Give an example

Science 8 Name_____

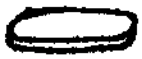
Unit: Forces of Attraction Period_____

Forces of Attraction Lab

tation 1: Penny

1. Place a penny flat on the table near the edge of your lab station.
2. Estimate how many drops of water the penny will hold without spilling over in data table.
3. Using the dropper, count how many drops the penny holds until it spills over. Draw how the water appeared on the penny right before it spilled off.

Drawing:	4.Record the actual number of drops the penny held below.



Penny -Estimate how many drops	Penny - Actual number of drops

Questions:

1. The forces of attraction between water molecules are _____.

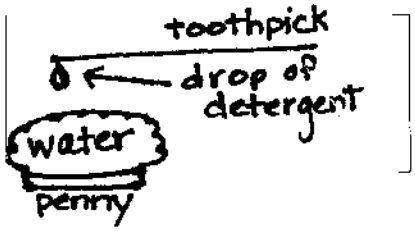
2. Explain why the water molecules do not spill off the penny?

_____

_____

_____

5. Repeat the above experiment, but stop right before the water spills off the penny.
6. Using a toothpick, touch one drop of *detergent* to the water on the penny. Touch only the detergent to the water. See image →



Question:

As you do this, look at the penny from the side and describe what happens and why.

_____

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_____

Station 2: Netting

1. Fill a pan with about 80% of water from the sink. Very gently set the netting on the water.

Question: Describe what happens.

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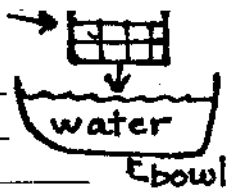

2. Look at the water at the bottom of the netting.
3. Gently lay 3 or 4 paper clips onto the netting.
4. Add soapy water to the water at the BOTTOM of the netting. Watch for changes in the "texture" of the water at the bottom of the netting. Keep adding solution until the "skin" of the water breaks.

Questions:

1. How does soap effect water molecules?

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_____

2. Why do we say soap makes "water wetter?" Explain this.

_____

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5. Empty the pan and rinse off all the soap from the pan, netting, and paper clips.

Station 3: Wax paper

1. Lay a piece of wax paper on a dry section of the table. Place one drop of water on a glass slide and one drop of water on the wax paper.

Question:

1. Explain why the drop of water on the wax paper is "very round" and why the drop of water on the slide is "flat."

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2. Very gently touch the tip of a new dry toothpick to the drop of water on the wax paper.

Question: What do you observe?

_____

_____

_____

3. Soak the end of the toothpick in water. Shake off any excess water. Slowly and gently touch the tip of the soaked toothpick to your water drop on the wax paper.

Question: 1.Write down what you observe.

_____

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_____

2. Do you agree or disagree with this statement " Water molecules are strongly attracted to each other, the have little or no attraction for molecules of certain other substances." Explain.

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