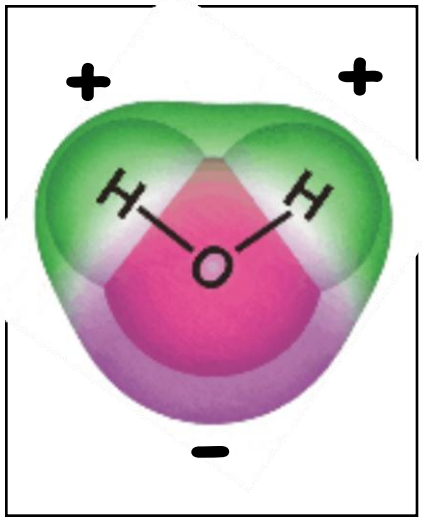
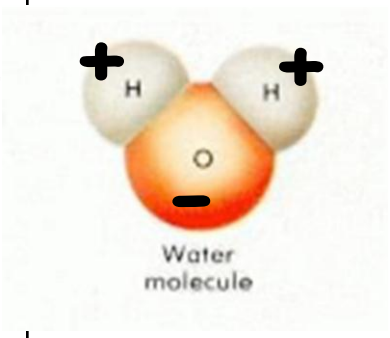
Properties of Water Activity

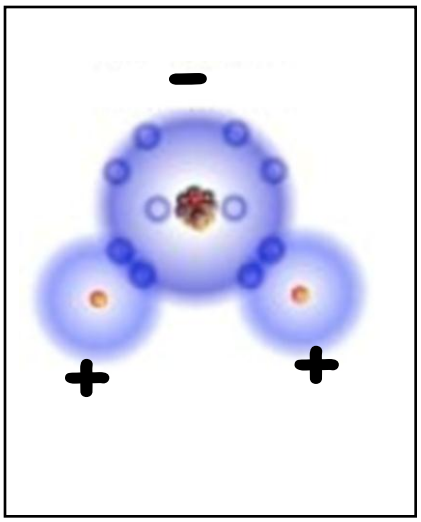
Name_____ Class_____

Water is everywhere. It's in the air we breathe. It's in our sink faucets. It's in every cell of our body. Water is an unusual substance with **many special properties**.

INTRODUCTION: The Water Molecule







What do you observe about the water molecule in these models?

1. _____

2. _____

3. _____

READ: Water is a polar molecule. That is, while a water molecule is neutral as a whole, it has a **slightly positive charge on the oxygen side** and a **slightly negative charge on the hydrogen side**. Water is found on Earth as a solid, liquid, and gas. This is because Earth is a very special planet with just the right range of temperatures and air pressures. Earth is said to be at the **triple point** for water.

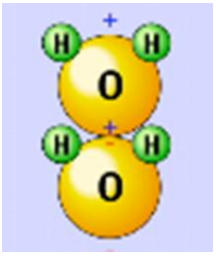
QUESTIONS:

1. How many atoms are in a water molecule? Be specific.

2. Why does a water molecule have **polarity?**

3. Why is Earth said to be at the **triple point** for water?

Activity #1: COHESION



READ: Water molecules are attracted to other water molecules. The molecules of a water droplet are held together by the negative pole (end) of one water molecule attracting the positive pole (end) of another water molecule. This is called **COHESION**.

1. How many drops do you predict you can you add to a penny before it overflows? _____

2. Draw a diagram below showing the shape of the water on the penny after one drop, when the penny is about half full, and just before it overflows.

!

!penny

After one drop

!penny

Half full

!penny

Just before overflowing

3. If the number of drops is very different from your prediction, explain the difference.

4. Explain your results in terms of **COHESION**.

Activity #2: ADHESION

READ: Water molecules are not only attracted to each other (**COHESION**), but to any molecule with positive or negative charges. When a molecule attracts to a different substance, this is called **ADHESION**.

1. What do you predict will be the shape of a drop of water on (a) a piece of wax paper and (b) a glass slide. Draw the shape of the drop you expect on each surface:

_____
wax paper

_____
glass

2. Why did you predict as you did?

3. Perform the experiment. Place several drops of water on each surface and draw one characteristic drop below.

_____
wax paper

_____
glass

4. Compare or contrast your predictions with your observations.

5. Explain the drop behavior in terms of **ADHESION**.

Activity # 3: SURFACE TENSION CAUSED BY COHESION

1. Put about 1 cm of water in a petri dish. (Be sure the water covers the bottom of the dish and rises about 1 cm high.)

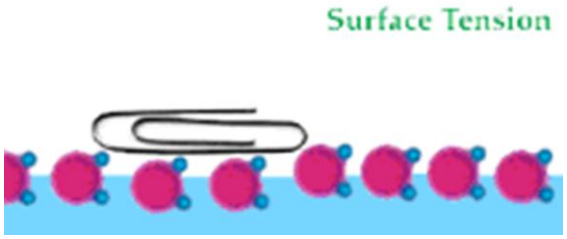
2. Carefully try to float a paperclip on the surface of the water.

3. Draw the floating paperclip:

**Be sure to add water to your drawing.

Petri Dish

READ: If water molecules are more strongly attracted to each other than to the surrounding material, they bead up and try to get as close to each other as possible. They form a strong surface on which the paperclip can float. This is: **SURFACE TENSION CAUSED BY COHESION**.



4. Explain why the paper clip floats on the water in terms of **ADHESION**.

_____

_____

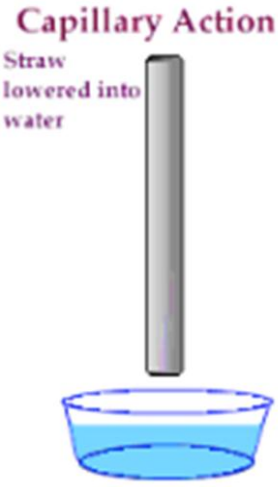
Activity #4. CAPILLARY ACTION CAUSED BY ADHESION

CAPILLARY ACTION is related to the **ADHESIVE** properties of water. You can see **capillary action** 'in action' by placing a straw into a petri dish.

1. Remove the paper clip from the petri dish.

2. Carefully set a straw into the water of the petri dish.

3. What do you observe? _____



READ: The water 'climbs' up the straw. The water molecules are attracted to the straw molecules by **ADHESION**. When one water molecule moves closer to the straw molecules, the other water molecules (which are **COHESIVELY** attracted to that water molecule) also move up into the straw.

4. Explain why the water moves up the straw in terms of **ADHESION**.

_____

_____