**Bonding: Intermolecular Forces**

The Penny Drop Lab – Simple IMF lab

**Purpose**: What effects do intermolecular forces have on surface tension?

**Materials:** Pennies Water Rubbing Alcohol

**Safety Concerns:** Rubbing alcohol is toxic and flammable. Care should be exercised when using.

**Real-World Connections**

Surface tension is important in the functioning of living organisms. For example, water striders (a type of insect) are able to “walk” on the surface of ponds.

**Prelab Questions:**

1. Define Surface Tension –
2. How do you think surface tension relates to intermolecular forces (IMF)?
3. How will the surface tension affect the number of drops that can fit on a penny?
4. Do you think the type of liquid will affect how many drops can fit on the penny? Why or why not?
5. Prediction: how many drops of each liquid do you think can fit on the penny before it overflows?

Alcohol Water

**Procedure:**

Water:

1. Place a penny face down on the table.
2. CAREFULLY add drops of water on top of the penny. Your goal is to put as many drops on top of the penny without any water falling onto the table.

Count the number of drops that the penny was able to hold. RECORD YOUR DATA.

 \*Be sure to observe the penny from the side.

1. Dry the penny. Have each person in the group repeat the process. RECORD YOUR DATA.

Alcohol:

1. CAREFULLY add drops of alcohol on top of the penny. Your goal is to put as many drops on top of the penny without any alcohol falling onto the table.

Count the number of drops that the penny was able to hold. RECORD YOUR DATA.

1. Dry the penny. Have each person in the group repeat the process. RECORD YOUR DATA.

Diagram: (side view of the penny)

**Data Table:**

|  |  |  |
| --- | --- | --- |
|  | Water Drops | Alcohol Drops |
| Trial 1 |  |  |
| Trial 2 |  |  |
| Trial 3 |  |  |
| Trail 4 |  |  |
| Average |  |  |

**Questions:**

1. Which liquid had the higher average number of drops?
2. Draw a Lewis Structure for water. What molecular shape is a water molecule?
3. What intermolecular forces are present in water?
4. What intermolecular forces are present in alcohol?
5. Which liquid, water or alcohol, has STRONGER intermolecular forces? Explain using your data
6. Why do you think that liquid was able to have stay on top of the penny better? Justify your answer in terms of intermolecular forces.
7. Suppose you were to try this experiment with oil, a liquid with weaker dipole-dipole interactions. How would you expect the result to be in comparison to the water and alcohol?

**Conclusion:**