

DROPS OF WATER ON A COIN

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MATERIALS NEEDED:

Coins (US pennies, or other coins such as rubles, yen, etc...)
Water
Droppers
Detergent solution (up to 5% detergent)
Ethanol (95%)
Paper towels
Containers such as plastic cups
Optional: Hexane, heptane, or petroleum ether

SAFETY PRECAUTIONS:

Wear safety goggles while performing this experiment.

The organic liquids used in this experiment are flammable. Avoid any sparks or flames.

The vapors from the organic liquids may be irritating. The room should have adequate ventilation.

DISPOSAL:

The alcohol and other organic liquids should be soaked up with a paper towel and disposed of in a fire safe container.

PROCEDURE:

Ask the class "How many drops of water can you put on a (name the coin)?" Write their predictions on the chalkboard.

Hand out coins and droppers to selected groups of students. Give students containers containing about 10 mL of water, detergent solutions, or alcohol. The containers should **DO NOT IDENTIFY THE SOLUTIONS TO THE STUDENTS**. They should put drops of their liquid on the coins, counting the drops and observing the liquid behavior.

EXPLANATION:

Depending on drop size students can get as many as 50 drops of water on a US penny. They will be able to put between 15 and 30 drops of detergent solution or alcohol on a penny depending on drop size.

Use molecular size, shape, and polarity to explain the results.

Water is highly polar with strong hydrogen bonds. Water has a high surface tension. The students should observe a large spherical bead of water on the coin.

Detergents are surfactants, that is, they reduce the surface tension of the water. As a result, the detergent solution will not form as large a bead of liquid on the coin.

The ethyl alcohol is less polar than the water and will have a lower surface tension. The alcohol will not form as large a bead of liquid on the coin.

Try the experiment using other alcohols such as methanol and propanol. How do these polar liquids behave? Can you use their polarities to explain the results?

Try the experiment using a non-polar organic liquid such as hexane, heptane, or petroleum ether. How does a non-polar liquid behave?