**STATIC ELECTRICITY EXPERIMENT**

**DEMONSTRATOR:**

An electroscope is a scientific instrument used to detect the presence and magnitude of electric charge on an object. It works on the principle that like charges repel each other. Different types of electroscopes include:

1. **Gold Leaf Electroscope**: This common type uses thin gold foil leaves and is very sensitive, detecting even small amounts of charge.
2. **Pith Ball Electroscope**: Uses small, lightweight balls made of pith suspended by silk threads, which repel each other when charged.

**Uses of Electroscopes:**

* **Detection of Charge**: Determine if an object is charged and its type (positive or negative).
* **Induction Experiments**: Demonstrate electrostatic induction.
* **Measurement of Ionizing Radiation**: Historically used to measure ionizing radiation.

**Working Principle:**

The electroscope operates on the principle that like charges repel each other. When charged, the leaves spread apart, indicating the presence and type of electric charge.

**Experiment E1: Making a Homemade Gold Leaf Electroscope**

**Materials Required:**

1. Glass or plastic bottle
2. Aluminum foil
3. Copper wire
4. A biro tube
5. Glue or tape
6. Plastic ruler
7. Cloth or wool
8. Scalpel or razor blade
9. A plastic round-shaped cover

**Procedure:**

1. **Preparing the Casing**:
   1. Take a clean, transparent bottle.
   2. Cut the bottle approximately ¾ up to make a cylindrical casing.
   3. Make an opening in the lid or top cover.
   4. Insert the insulating stand through the lid.
2. **Modeling the Copper Wire**:
   1. Cut a 15-20 cm piece of copper wire.
   2. Push the wire through the insulating stand or biro tube, ensuring it stands upright.
   3. Bend one end into a hook shape and coil the other end.
   4. Cut two small pieces of aluminum foil into leaf shapes.
   5. Push the copper wire through the lid opening.
   6. Attach the aluminum foil pieces to the hooked end of the wire.
3. **Setting Up the Electroscope**:
   1. Place the wire with aluminum foils into the cylindrical casing.
   2. Secure the wire and top cover with tape or glue.

Your homemade electroscope is now ready for use.

**Experiment E2: Charging the Electroscope by Induction**

**Procedure:**

1. **Charging the Electroscope**:
   1. Rub a plastic ruler with cloth or wool to create static electricity.
   2. Bring the charged ruler close to the copper wire without touching it (induction).
   3. Observe the movement of the aluminum foil leaves. Observe what happens to the aluminum foil leaves. Do they move away from the wire? Discuss these observations with group and also record the observations in your lab note book.
   4. Repeat with different objects and record observations.

**Experiment E3: Charging the Electroscope by Contact**

**Procedure:**

1. Discharge the electroscope by touching the metal wire with your finger.
2. Rub the ruler and make contact with the copper wire.
3. Observe the movement of the aluminum foil leaves. Observe what happens to the aluminum foil leaves. Do they move away from the wire? Discuss these observations with group and also record the observations in your lab note book.
4. Repeat with different objects and record observations.

**Conclusion:**

With simple materials, we created an electroscope to learn about static electricity. Charging the electroscope made the aluminum foil leaves move due to static charge, and touching the wire discharged it, making the leaves come back down. This experiment helps us understand how charges move and interact.

**Safety Tips:**

1. Be careful with sharp objects like scissors, scalpels, or razor blades.
2. Don't touch electrical outlets or wires during the experiment.

**Experiment E4: Investigating the Nature of Charges**

**Materials Needed:**

1. Balloons (2 or more)
2. Wool or cloth
3. String or tape
4. Small pieces of paper or lightweight objects (optional)

**Part 1: Like Charges Repel**

**Procedure:**

1. Inflate and tie off two balloons.
2. Rub one balloon with wool or cloth for 10-15 seconds.
3. Repeat with the other balloon using a separate piece of wool or cloth.
4. Hold a charged balloon in each hand and bring them close together without touching.
5. Observe and record the behavior of the balloons. Discuss these observations with group and also record the observation in your lab note book.

**Part 2: Unlike Charges Attract**

**Procedure:**

1. Rub one balloon with wool or cloth again.
2. Leave the other balloon uncharged.
3. Hold the charged and uncharged balloons in different hands and bring them close together without touching.
4. Observe and record the behavior of the balloons. Discuss these observations with group and also record the observation in your lab note book.

**Conclusion:**

Like charges repel each other, and unlike charges attract each other. These fundamental principles were confirmed through our observations.

**Safety Precautions:**

* Avoid static shock when rubbing balloons.
* Ensure balloons are securely tied to prevent popping.