** Electrostatic Forces **

The ancient Greeks discovered something very odd. When they rubbed a golden stone called amber with fur or other objects, it could pick up things like feathers! This may have been the first time that humans discovered electricity. In fact, the word electricity comes from the Greek word elector, which means ‘beaming sun’. This name came about because amber had a rich yellow glow in the sunlight.

**Have you had any of these experiences?**

Imagine a hot dry windy Saturday. The wind is blowing up dust. The referee has just blown full time.

You walk to the tap to have a drink. Zap**🗲**

You put a jacket over your nylon team jumper. Zap**🗲**

Here comes mum in the car, and you touch the car door handle. Zap**🗲**

Even at home the carpet can zap you**🗲**

What is going on? What is causing this?

**Static electricity** is made when materials rub together. The more they rub together, the more electricity is made. This means bigger sparks. When you rub or brush a rod with a cloth, you rub off electrons. Having too many electrons makes a negative charge, and having too few electrons makes a positive charge. A spark is formed when electrons jump from where there are too many electrons to where there are too few.

The study of static electricity forces is called electrostatics. An uncharged plastic rod has an equal number of **positive and negative charges**. The negative charges are called **electrons**. Because they are in the outer layers of atoms, electrons are easy to rub off. When you rub or brush a rod with a cloth, you rub off electrons. Sometimes the electrons are rubbed off the rod onto the cloth. And sometimes the electrons are rubbed off the cloth onto the rod.



Static electricity occurs with many non-metal materials. There is an electric field around objects which have an electric charge.

**🗲EXPERIMENT 1: Investigating Electrostatic charges**

**Aim**: To investigate electrostatic charges.

**Materials:**

• Paper

• Plastic Pen

**Method:**

1. Tear the paper into small bits.

2. Rub the plastic pen briskly with your clothes (woollen jumpers work the best)

3. Bring the pen close to the paper.

4. Repeat step 2

5. Bring the pen close to your partner’s hair.

4. Record all your observations.

**Results:**

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**🗲EXPERIMENT 2: Charged Rods**

Aim: To investigate electrostatic charges on various materials.

**Materials:**

• Perspex Rod

• Silk Cloth

• Ebonite rod

• Flannel

• Pieces of paper

• Watch glass

• Plasticine

**Method:**

1. During this experiment you will be investigating various characteristics of charged materials. The Perspex Rod must always be rubbed with the Silk Cloth. The Ebonite Rod must always be rubbed with the Flannel.

2. Investigate each of the questions in the Results section.

**Results:**

1. Can the rods attract pieces of paper? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. Can the rods attract a stream of water from a tap? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3. Can the rods attract the hairs on your arm? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

4. Use the Perspex Rods and Ebonite Rods for this experiment. Rub one rod, and balance it on a watch glass. Rub the other rod, and bring it close to the balanced rod. What happens? Devise a rule to explain what happens if the rods are the same or different. Below, write a report of what YOU did and observed.

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**🗲**Static electricity can attract objects without touching them. There is **non-contact** force.

There is an **electric field** around objects which have an electric charge. The electric field is much weaker than a magnetic field. We cannot map it easily.

**🗲ACTIVITY**: Complete the following

1. Match up the words from the right with the correct meaning from the left.

|  |  |  |
| --- | --- | --- |
| positive charge |  | too many electrons |
| electrostatics |  | too few electrons |
| static electricity |  | detects electric charge |
| negative charge |  | made by rubbing |
| electroscope |  | study of static electricity |

2. Explain what happens when a rod or balloon is charged by rubbing. What type of electricity is made?

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3. What is an electroscope? Draw it on its own, then when it is near a charged object.

4. How could you show someone that electric fields do exist?

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5. What types of fabric produce the most static electricity?

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