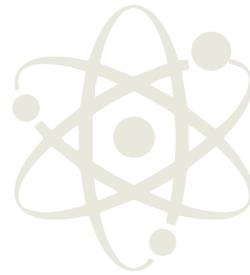




making physics matter



Age
7-11
years

Phizzi practical

How to make a simple electroscope

Introduction

Static electricity was first observed by Thales of Miletus in the sixth century BC. In the centuries that followed people were aware of the phenomena but it wasn't until the 1600s that we really began to understand what was happening. This was down to the work of William Gilbert, Queen Elizabeth's physician, who had an interest in electricity and magnetism. Gilbert invented the first electroscope, a simple device for measuring the amount of static charge on an object. Gilbert called his device a Versorium Needle. It was not very accurate, nevertheless it helped him to detect electric charge in his experiments. By recording the amount of movement in the needle and the direction of the movement he was able to draw conclusions and gain a better understanding of the electrical properties of materials. This guide tells you how you can make your own electroscope.



Scientific explanation

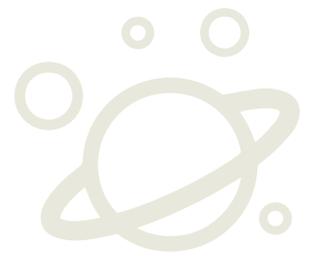
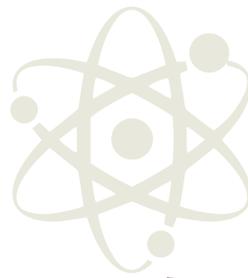
This simple electroscope is based on the gold-leaf electroscope that was invented by Abraham Bennet in 1787 and is more sensitive than Gilbert's original design. It has a vertical metal wire and at the end hang two parallel strips of thin metal foil. The top of the wire is wound into a coil to give a large surface area of conductor for the transfer of charge without touching. To make sure that the foil strips are not affected by drafts, the end of the wire is contained in a glass jar.

When the metal coil at the top is touched with a charged object the foil leaves spread apart in a V shape. This is because the same charge is transferred to each foil strip and like charges repel. If a person then touches the metal coil the charge passes through the human body to the



ground and the discharged foil pieces will fall down.

You can also see the foil strips move if a charged object is brought near the electroscope but doesn't touch it. This is called electrostatic induction which is also the process that occurs when a charged balloon sticks to an uncharged wall.



Equipment needed

- Glass jar with a lid
- 25cm length of copper wire (the thicker the better)
- Drinking straw
- Scissors
- Blu Tack
- Aluminium foil
- Balloon



Method

1. First, an adult will need to punch a hole in the middle of the jar lid (just big enough to fit the length of straw through).
2. Next the straw can be fixed in place using a piece of Blu Tack.
3. The copper wire should be pushed through the straw. The end of the copper wire that will go inside the jar should be formed into a hook while the end that is outside the jar should be wound into a coil (this will prevent the wire falling into the jar).
4. Next the two small pieces of foil should be hung on the hook. This is done by punching a small hole in each that the wire hook can pass through.
5. The hooked end of the wire then goes in the jar and the lid should be firmly closed. Charge up the balloon by rubbing it, bring it near to the coil and observe what happens.
6. To extend this, different materials could be charged and brought near to the electroscope to see if the foil moves in the same way (carpet, vinyl record, shoes, wool, silk, satin).

