WEEK 4
ELECTRIC CHARGES

Introduction:

Electrostatic are the charges that are built on the surface of a material. These charges are not in motion. When a plastic rod is rubbed on a wool or glass rod rubbed on a silk or cotton. The rod can attract a small piece of paper. This is due to static charges (electrostatic)

Types of Charges

There are two types of charges, which are negative and positive charges.
An ebonite rod rubbed on a fur has a negative charge while a glass rod rubbed on a silk or wool has a positive charge.

NB The kind of charge on a material depends on the material it is rubbed with
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Conductor and Insulator

An electric conductor is a material that allows the free flow of electron from one point to another point. Metals are good conductor. An insulator is a substance that does not allow the free flow of electron from one point to another e.g. glass, silk and wool.

Method of Charging A Body

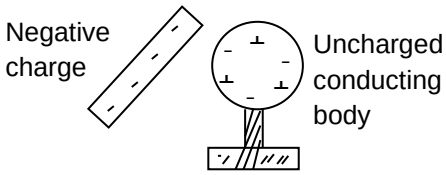
There are three method of charging a body. These are:
Charging by friction
Charging by induction
Charging by contacts.

Charging by Friction

If you rub your pen vigorously on your hair and bring it closer to a piece of paper, it will attract the paper. This is an example of charging by friction.

Charging by Induction

This is a method of charging a body by bringing it near a charge body without contact.



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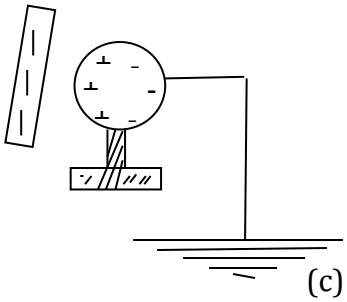

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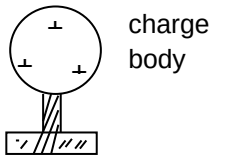

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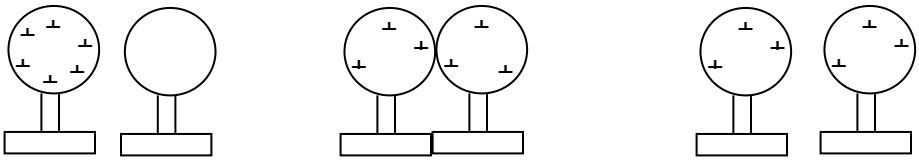
Charging by Contact

This is a method of charging a body by actual contact on another charged body. When separated, both bodies carry charges of the same sign and equal charges.



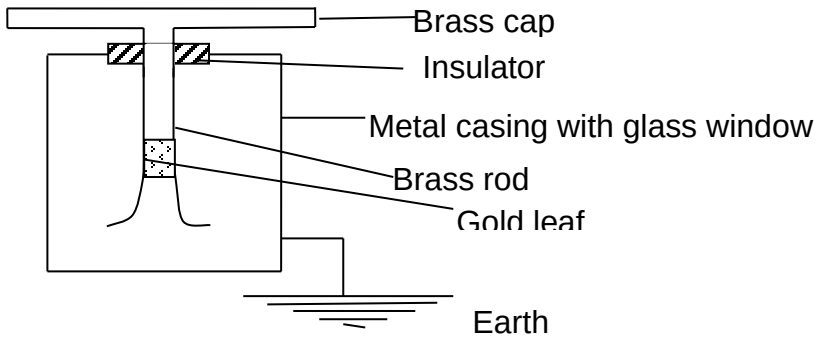
Before contact During contact After contact

Gold leaf Electroscope

Gold leaf electroscope is use in studying electrostatic principles. It is a device for detecting the presence of a charge and the type of charge on a body.

Detecting the Presence of Charge on A Body

If a charged body is brought near the cap of uncharged electroscope, the leaf diverges from the metal. When the charged body is removed, the leaf collapse, showing that the induced charged is temporary. If the charged body has contact with the cap of the gold leaf electroscope, when the charged body is removed, the leaf does not collapse. An indication that it has been charged by contact.



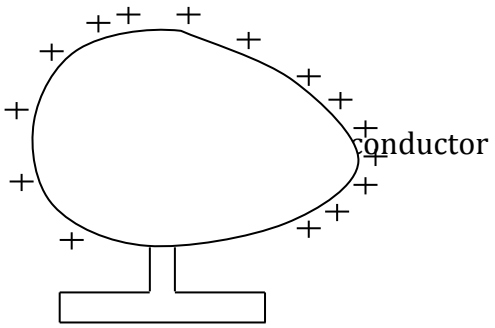
Gold Leaf Electroscope

Test for the Sign of the Charge on A Body

If a charged body having the same charge on the electroscope is brought near it, the leaf diverges further on the other hand, the divergence is reduced if the charge on the body is of opposite sign to that on the electroscope.

Distribution of Charges on a Conductor.

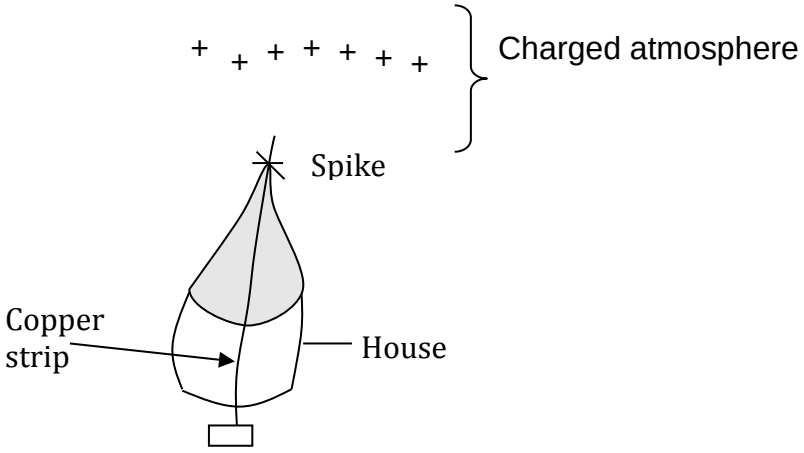
Charges reside on the outer surface of a conductor and it an ellipse. Charge density is greatest where the surface is sharply curve. From the diagram below the curve and his the greatest charges.



Charge distribution on a shaped conductor

Lighting Conductor

A lighting conductor consist of a thick copper stripe fixed to an outside wall of a building where it ends in spike. The other end of the plate is buried below the earth surface. When a negatively charged cloud moves overhead, it attracts positive charges to the spike. The air around the spike is further ionized leading to huge avalanche of positive ions. These ions slowly neutralized the negative charges in the cloud and reduces the possibility of lighting. However, if lighting still strikes, the negative electrons are attracted towards the spike and are carried harmlessly down the earth through the conducting copper stripe.



Action of a Lighting Conduct.