

Introduction to Electricity

Static electricity

Rule 1# : There is positive charges and negative charges

Rule 2# : Like charges repel and unlike charges attract



Repel



Attract



Repel



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Conductors and Insulators

- Materials which allow electrons to flow through them are called Conductors .Metals are the best conductors.(They have free electrons)
- Materials which do not allow electrons to flow them are called Insulators .Their electrons not free to move . Most non-metals conduct charge poorly.(graphite and silicon are exceptions)
- When you switch on a light , the electricity passing through the cable is actually a flow of electrons.



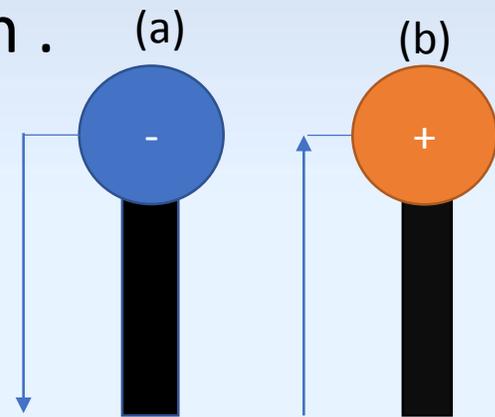
Charging an insulator caused by friction

- Normally , atoms have equal numbers of electrons and protons so the net (overall) charge on a substance is zero. However , when two insulators are **rubbed** together, electrons may be transferred from one to another , so that each is left with a net negative or positive charge.
- *An atom becomes negatively charged when it gains an excess of electrons. similarly, when an object has some electrons removed, it becomes positively charged.*



Earthing

- The Earth is considered to be a huge , neutral (it has a balance of positive and negative charges)conductor.
- When there is a conducting path between a charged object and the Earth, electrons will flow to the discharged object.
- In figure (a) electrons flow to earth .
- In figure (b) electrons flow from the earth



Charging metal sphere by induction

- Consider the following steps to charge a metal :

1. When a charged rod is brought near a metal sphere without touching it , the charge on the sphere becomes redistributed
2. If the sphere is earthed from the other side by a metal wire , some electrons travel through the wire to the earth .
3. When the wire is removed , the sphere is has an excess of positive charge ,which then
4. Become evenly distributed on the surface of the sphere when the rod is removed.



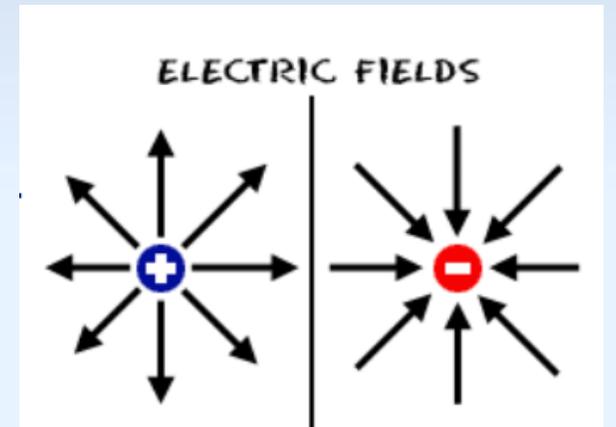
Charged or Neutral

- Uncharged ball is attracted to both positive and negative charged balls .
- If a negatively charged ball is put next to another negatively charged ball they will repel each other as explained before and same goes for the positively charged balls
- **Only repulsion can confirm that an object is charged.**



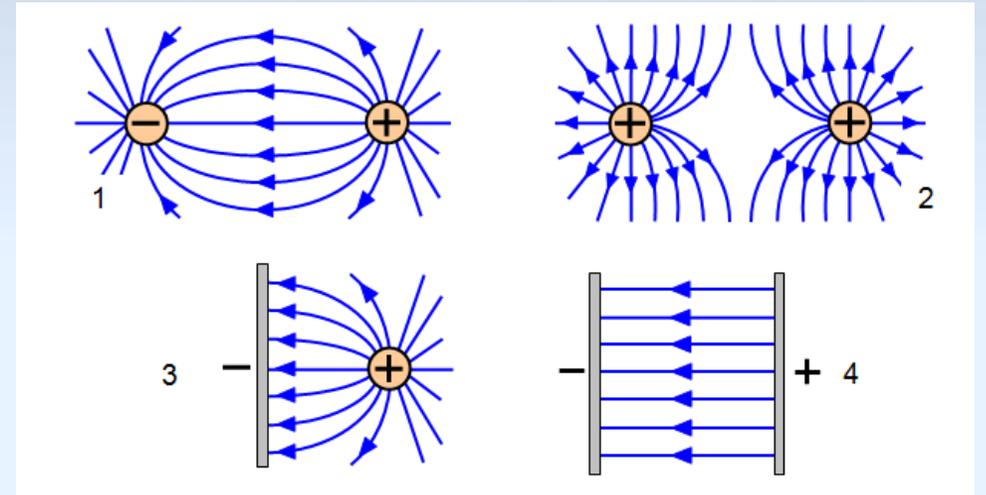
Electric Fields

- *An electric field is a region of space where an electric charge experiences a force, just as a gravitational field is a region where a mass experiences a force.*
- *The arrows on the field lines tell us the direction of the field.*
- *Defined as the direction of force on a positive charge*
- *The spacing between the lines tells us about the strength.*



Electric Fields

- The field lines caused by parallel electrodes are parallel to each other and equally spaced .
- This field is **uniform**
- It has the same strength at all points.





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ANY QUESTIONS ?