

FlexiPrep

Charging of Electroscope by Induction, Charging by Induction, Charging of Electroscope by Induction (For CBSE, ICSE, IAS, NET, NRA 2022)

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Charging of Electroscope by Induction

- Charging by induction using a negatively charged object Charging by induction using a positively charged object Charging of Electroscope by Induction
- Most objects are electrically neutral which means that they have an equal number of positive and negative charges.
- In order to charge an object, one has to alter the charge balance of positive and negative charges.
- There are three ways to do it:
 - **Friction**
 - **Conduction**
 - **Induction**

Charging by Induction

- The induction charging is a charging method that charges an object without touching the object to any another charged object.
- This process is where the charged particle is held near an uncharged conductive material that is grounded on a neutrally charged material.

Charging of Electroscope by Induction

- An Electroscope is an Instrument That is Used to Detect the Presence and Magnitude of Electric Charges on a Body.
- It is Commonly Used by Physics Teachers to Demonstrate the Electrostatic Principles of Charging and Charge Interactions.
- The Demo of the Induction Process of Charging is Commonly Performed with an Electroscope.
- In this Demo, a Charged Particle is Brought Close to but Not Touching the Electroscope.
- The Electrons in the Electroscope Are Induced to Move Due to the Presence of the Charged Particle Above the Plate of the Electroscope.

- With the Charged Particle Still Held Above the Plate, the Electroscope is Touched.
- At this Point, Electrons Will Flow between the Electroscope and the Ground, Giving the Electroscope an Overall Charge.
- The Needle of the Electroscope Deflects Indicating an Overall Charge when the Charged Particle is Pulled Away from It.
- From this Demo, the Following Fundamental Principles Can Be Summarized
 - The object being charged by induction never touches the charged particle.
 - The charged object does not transfer electrons to or receive electrons from the object being charged.
 - The object being charged is touched by a ground; electrons are transferred between the ground and the object being charged (either into the object or out of it) .
 - The charged object serves to polarize the object being charged.
 - The object being charged ultimately receives a charge that is opposite that of the charged object that is used to polarize it.

Application of Inductive Charging

- The application of inductive charging can be divided into
 - high power
 - low power categories
- The low power applications generally include handheld devices, phones, computer, and other devices which charge at power levels below 100 watts.
- Where the High-power inductive charging applications include charging of batteries of power levels above 1 kilowatt.
- The most prominent application is the charging of electric vehicles where an automated and wireless inductive charging is provided as an Alternative to plug-in charging.

List the Various Differences between Electrostatic and Electromagnetic Induction

Electromagnetic Induction	Electrostatic Induction
The generation of emf in a conductor due to the rate of change of current in a nearby conductor without any electrical connection.	The accumulation or redistribution of electric charges in a body due to nearby charged body without any physical contact.
It works for long distances	It works for short distances
It is due to the rate of change of flow of	It is due to static charges

charges	
The effect is maximum in conductors	The effect is maximum in insulators
Electric fields of the charges are the reason	Magnetic fields due to moving charges are the reason
<i>Various Differences between Electrostatic and Electromagnetic Induction</i>	

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