**Chapter 12 : Electricity and its effects Class 10 CBSE notes**

**1. Introduction**

Physical phenomena associated with the presence and flow of electric charge is known as electricity. Electricity and electrical phenomenon have a lot of applications in our day to day life and they also gives a wide variety of well-known effects, such as lightning, static electricity, electromagnetic induction and the flow of electrical current.

* Electricity occurs due to several types :
  1. **Electric charge:** a property of some subatomic particles, which determines their electromagnetic interactions.
  2. **Electric current:** a movement or flow of electrically charged particles, typically measured in amperes.
  3. **Electric field:** an especially simple type of electromagnetic field produced by an electric charge even when it is not moving (i.e., there is no electric current). The electric field produces a force on other charges in its vicinity. Moving charges additionally produce a magnetic field.
  4. **Electric potential:** the capacity of an electric field to do work on an electric charge, typically measured in volts.
* In this chapter we will study about electricity.

**Fractional electricity**

To understand electricity we need to understand the concept of electric charge first. Let us understand this concept using this example.  
When two dry substances of different types are rubbed together and are then separated , each substances acquires property of attracting light pieces of paper , dry leaves, straw etc. The substances being rubbed acquire something which give them this property. That something is called **Fractional Electricity.** The substances are said to have become charged after acquiring or loosing electric charge.  
The fractional electricity produced have been found to be of two types i.e., positive electricity (charge) and negative electricity (charge). The to substances rubbed together acquire equal and opposite charges.

| **Positive charge** | **Negative charge** |
| --- | --- |
| Glass rod | Silk Cloth |
| Woolen cloth or cat skin | Amber, ebonite, rubber rod |
| Woolen carpet | Rubber shoe soles |
| Woolen coat | Plastic seat |

**2. Electric Charges**

* Electric charge is a fundamental property like mass; length etc. associated with elementary particles for example electron, proton and many more.
* Electric charge is the property responsible for electric forces which acts between nucleus and electron to bind the atom together.
* Charges are of two kinds
  1. negative charge
  2. positive charge
* Electrons are negatively charged particles and protons, of which nucleus is made of, are positively charged particles. Actually nucleus is made of protons and neutrons but neutrons are uncharged particles.
* Electric force between two electrons is same as electric force between two protons kept at same distance apart i.e., both set repel each other but electric force between an electron and proton placed at same distance apart is not repulsive but attractive in nature
* All free charges are integral multiples of a unit of charge e, where e = -1.602 × 10 -19 C i. e., charge on an electron or proton.
* Thus charge q on a body is always denoted by  
  q = ne  
  where n = any integer positive or negative

**Unit of electric Charge**

* Charge on a system can be measured by comparing it with the charge on a standard body.
* SI unit of charge is Coulomb written as C.
* 1 Coulomb is the charge flowing through the wire in 1 second if the electric current in it is 1A.
* Charge on electron is -1.602 × 10 -19 C and charge on proton is positive of this value.

**Watch this tutorial for learning about electric charge and conductors.**

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**Concept Map for Electric Charge**

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**3. Conductors and insulators**

* There is a category of materials in which electric charges can flow easily while in other materials charges cannot flow easily.
* Substances through which electric charges can flow easily are called conductors. All metals like copper, aluminum etc. are good conductors of electricity.
* Substances through which electric charges cannot flow are called insulators.
* Few examples of insulating materials are glass, rubber, mica, plastic, dry wood etc.
* Presence or absence of free electrons in a material makes it a conductor or insulator.
* Conductors have free electrons which are loosely held by nuclei of their atoms whereas insulators do not have free electrons as in insulators electrons are strongly held by nuclei of their atoms.

**Concept Map for Materials(conductors, insulators & superconductors)**

**Related Problems**

Following are the related problems for the topics given in this page. I insist that you must solve them before proceeding to next page for new topics. These are very easy questions that you can attempt by memorizing the concepts and definitions given in this page

**Question 1** Calculate the number of electrons constituting one Coulomb of charge?(charge on 1 electron = 1.6 ×10-19C)

**Solution**We know that *n*=*qe*

So, *n*=11.6×10−19=6.25×1018

**Question 2.** What is the difference between static and current electricity?  
**Answer.**  
1. Static(or fractional) electricity is caused by the build up of electrical charges on the surface of objects, while current electricity is a phenomenon involving the flow of electrons along a conductor.  
2. When objects are rubbed, a loss and/or gain of electrons occurs, which results in the phenomenon of static electricity.  
3. Current electricity is normally controlled, and it is the more used phenomenon of electricity, in countless applications.  
4. Static electricity is usually uncontrolled, and just happens occasionally or at irregular intervals.  
5. Current electricity is generated by batteries and power plants.

**Question 3.** Where does charge come from?  
**Answer.**The process of acquiring charge consists of transferring of electrons from one body to another, so that one body has an excess and the other a deficiency of electrons. It was not until the end of nineteenth century that electrons were found to be very small, negatively charged particles. Electrons were discovered by Sir J.J. Thomson. To give a body an excess negative charge, we may add a number of electrons. And to give excess of positive charge, we may remove the electrons from the body.

**Try this yourself**

**Question 2** How many electrons will flow for charge of 4*C*?

**Question 3** What is electricity

**Question 4** What are conductors and insulators? Give one example of each

**Question 5** Unit of electric charge is\_\_\_\_\_\_\_\_.

**Question 6** Define terms like

a. Electric Charge

b. Electric Potential

c. Electric Current