

STATIC ELECTRICITY AND CONDUCTION

Subject Name: Electrical Fundamentals

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1	What is Static Electricity & distribution of electrostatic charges?
2	Electrostatic Laws of Attraction & Repulsion
3	Unit of Charge & Coulomb's Law
4	Conduction of Electricity in solids, liquids & Gases and a Vacuum

1. What are some examples of static electricity?
2. Here are some examples of static electricity in our day to day life:
3. When we walk on a carpeted floor and getting shock when touching a door knob or any other metal....
4. Clothes stuck to one another after being in the dryer is another example of static electricity.
5. When dry hair is brushed with a plastic comb static electricity is produced.

What is static Electricity?

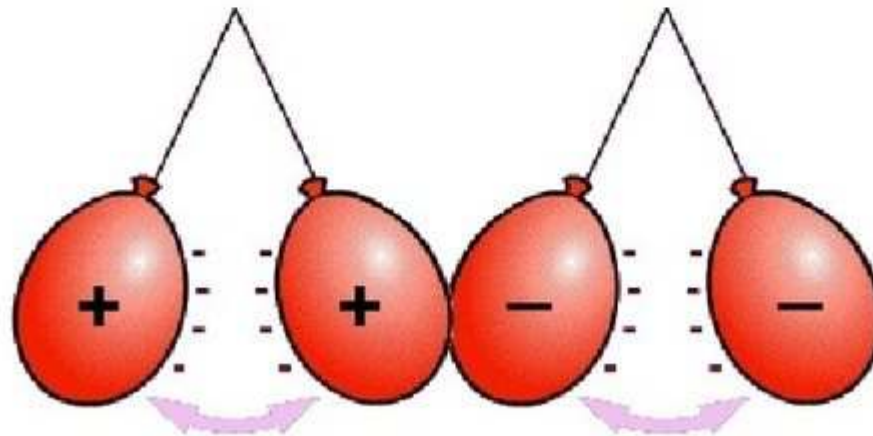
Static electricity is an imbalance of electric charges within or on the surface of a material. The charge remains until it is able to move away by means of an electric current or electrical discharge. Static electricity is named in contrast with current electricity, which flows through wires or other conductors and transmits energy.

Two objects with static charges can attract or repel each other much like magnets.

If the charges are the same (both positive or both negative) the objects will repel just like magnets.

If the charges are different, they attract.

(Opposites attract)



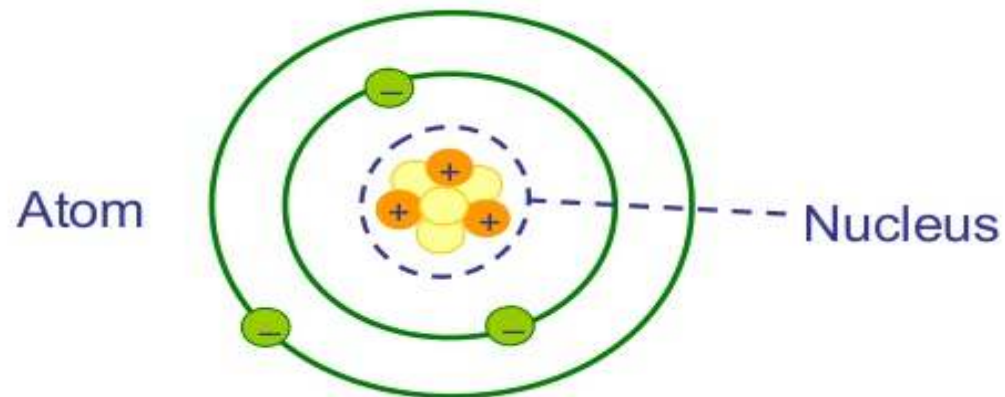
Static Electricity

- What is Static Electricity?
 - Produced by friction
 - Caused by an imbalance of positive and negative charges
- Static Electricity (like magnets) causes oppositely charged objects to attract each other and like charged objects to repel each other.
 - Flow of electrons
- What are some everyday experiences of it?
 - Lightning
 - Receiving shocks after shuffling across a carpet
 - Taking clothes that cling to each other out of the dryer
 - Combing hair in the wintertime
- What are some terms you can use to describe static electricity?
 - repel, attract, static charge, electron transfer

Static Electricity

• **WHAT IS ELECTRICITY**

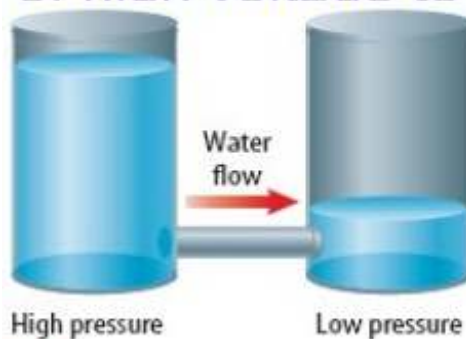
Electricity is a form of energy. Electricity is the flow of electrons. All matter is made up of atoms, and an atom has a center, called a nucleus. The nucleus contains positively charged particles called protons and uncharged particles called neutron



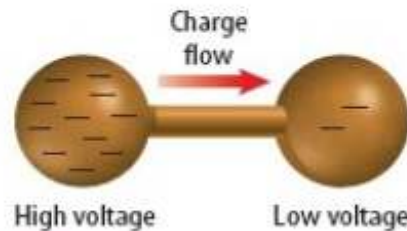
What is the difference between **static electricity** and **current electricity**?

Static electricity is stationary or collects on the surface of an object, whereas current electricity is flowing very rapidly through a conductor.

The flow of electricity in current electricity has electrical pressure or voltage. Electric charges flow from an area of high voltage to an area of low voltage.



A A pressure difference causes water to flow.

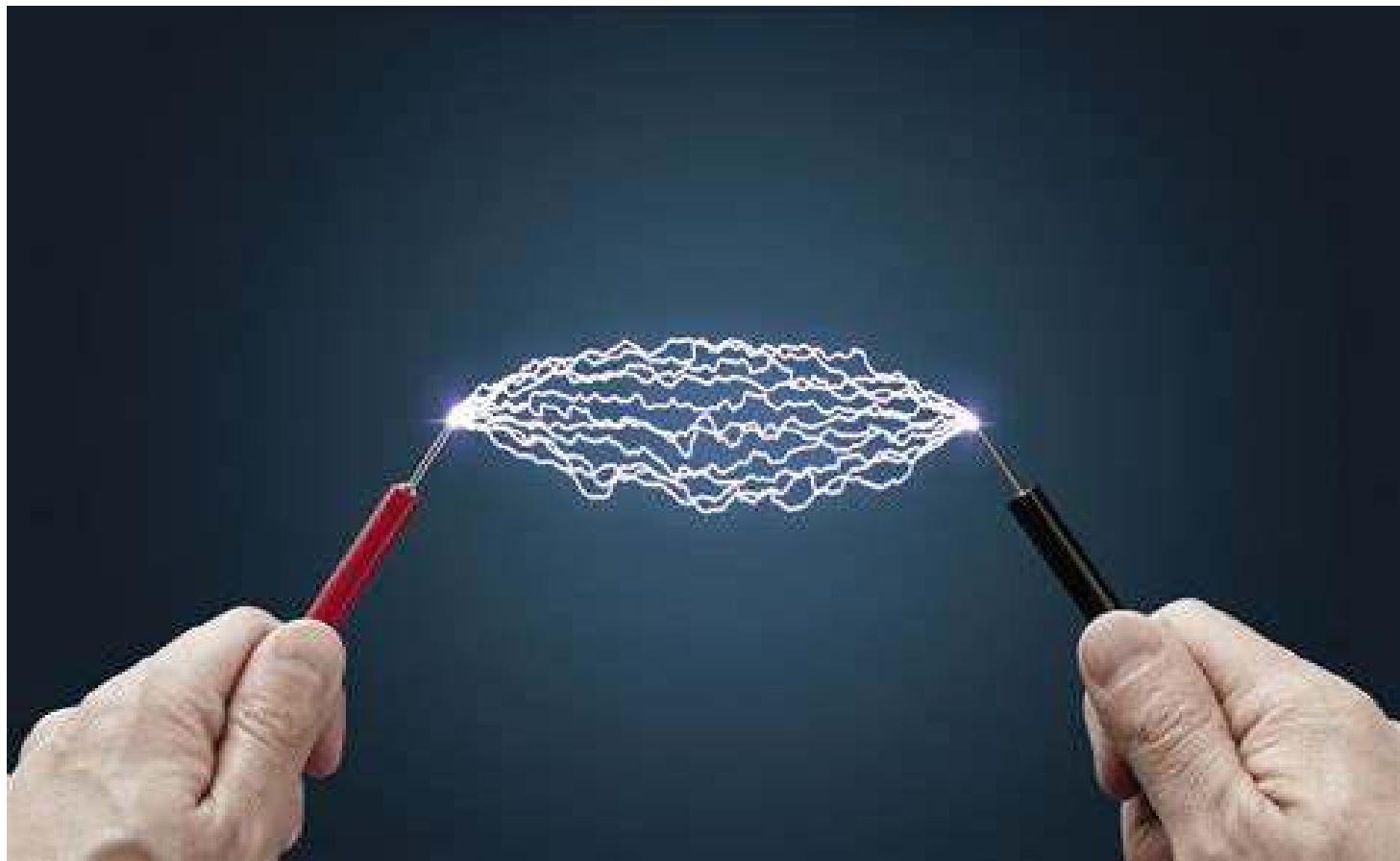


B A voltage difference causes charge to flow.

Water pressure and voltage behave in similar ways.

STATIC ELECTRICITY

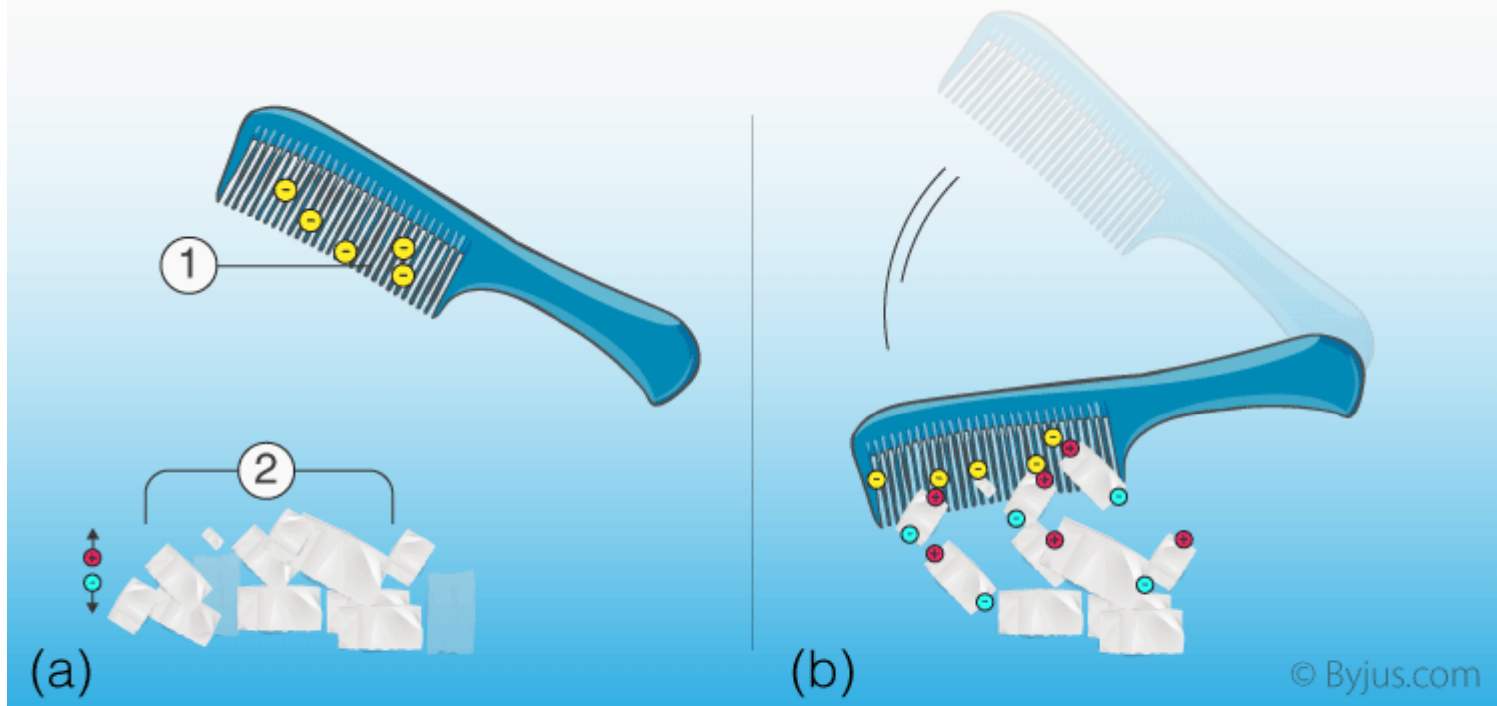






STATIC ELECTRICITY

ELECTRIC CHARGE AND STATIC ELECTRICITY



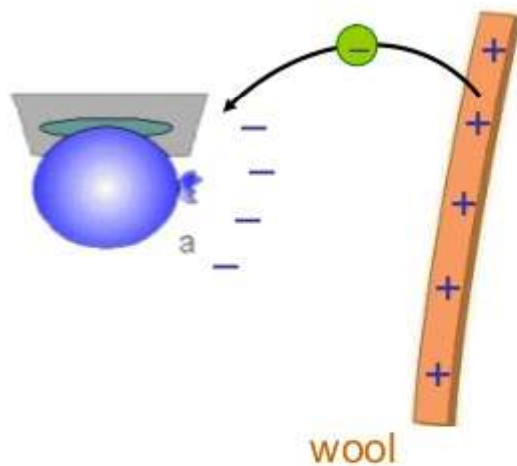
1 Charged comb | 2 Pieces of paper

(b) The comb attracting small pieces of paper with static electricity

Static Electricity

Where do charges come from?

When a balloon rubs a piece of wool...



electrons are pulled from the wool to the balloon.

The balloon has more electrons than usual.

The balloon: **- charged**,
The wool: **+ charged**

Static Electricity

What you need to know:

- 1.) That there is two type of charges (-ve and +ve)
- 2.) That like charges repel and unlike charges attract
- 3.) Explain electrostatic phenomena
- 4.) State some dangers and uses of electrostatics

The First Law of Electrostatics :

The negative charge of the electron is equal, but opposite to, the positive charge of the proton.

These charges are referred to as electrostatic charges. In nature, unlike charges (like electrons and protons) attract each other, and like charges repel each other.

The second law of electrostatics has three parts. This law states that the force that is exerted between two point charges is directly proportional to the product of their strengths, is proportioned inversely to the squared distance between the two points, and is proportioned inversely to the absolute permittivity of the medium surrounding them. This is referred to as Coulomb's law

Conduction in solids:

Among solids, metals are good conductors of electricity. In metals, some electrons are not very tightly bound to the atoms. They move about randomly in different directions within the metal.

Conduction in liquids:

Molten metal's and mercury (a liquid metal) conduct electricity. The current through them is constituted by the flow of electrons. Other liquids conduct electricity because they have ions. What are ions? Under some conditions, an atom may lose one or more electrons, which get added to another atom.

The atom that loses an electron (or electrons) has more protons than electrons. So, it becomes positively charged. And the atom that gains the electrons has more electrons than protons. So, it becomes negatively charged