Static Electricity

Static electricity is a build up of **electrical charge**. This charge is **stationary** (or non-moving) and hence is called static (means non-moving). Examples of static charge can be seen when you receive a carpet shock or a lightening bolt. In this case the spark is a discharge of the static charge (in which case the charge moves very quickly). Static charge is also responsible for static cling on your clothing or for holding a rubbed balloon to a wall. **Insulators** are any substance that does not allow electrical charge to flow easily (such as wood or rubber). **Conductors** are any

substance that will allow electrical charge to flow easily (any metal). Only insulators will allow for a static charge build up.

The Law of Attraction and Repulsion

Two types of charge exist: **positive (+)** and **negative (–).** Benjamin Franklin who discovered electricity was the first person to name these two types of charge. These two types of charge behave in particular ways.

First Charge	Second Charge	Behaviour
(+)	(+)	repel each other
(+)	(–)	attract each other
(–)	(–)	repel each other
(–)	(+)	attract each other

From these observation the **Law of Attraction and Repulsion** was formed.

Law of Attraction and Repulsion:

- **Unlike Charges Attract**
- **Like Charges Repel**

This simple law forms the basis of most of the study of static electricity.

Electron Theory of Charge

All matter is composed of atoms. That atoms themselves are composed of subatomic particles called **protons, neutrons** and **electrons.** These subatomic properties have the following properties:

Subatomic Particle	Type of Charge	Location in Atom	Ability to Move
proton	(+) positive	nucleus of atom	**immobile** – trapped in the nucleus
neutron	neutral (no charge)	nucleus of atom	**immobile** – trapped in the nucleus
electron	(–) negative	orbits nucleus of atom	**mobile** – can leave the atom

Only electrons, the carriers of (–) negative charge can move. All charges must therefore be explained by the movement of electrons;

1. **Neutral Objects:** the number of protons (+) and electrons (–) are equal and the positive and negative charges cancel out

neutral	+ – + – + – + – + – + – + – + – + – + – + – + – + – + – + – + – + – + –

positive = negative, therefore neutral

2. **Positive Object:** electrons have been removed, therefore there are more protons than electrons, overall positive charge

positive	+ − + + − + + − + − + − + − + − + − + + − + − + + + −

positive > negative, therefore positive

3. **Negative Charge:** electrons have been added, therefore there are more electrons than protons, overall negative charge

negative	+ − + − + − + − + − + − + − + − − − − − − − − − + − + − + − + − + − + − + − + − − − − − − − − −

negative > positive, therefore negative

Positive, negative and neutral charges can therefore be

explained by the number of electrons present. Extra electrons makes negative, too few electrons makes positive.