

an International CBSE Finger Print School
Coimbatore







Science 7th Class

Chapter 17 – Learning notes

Introduction

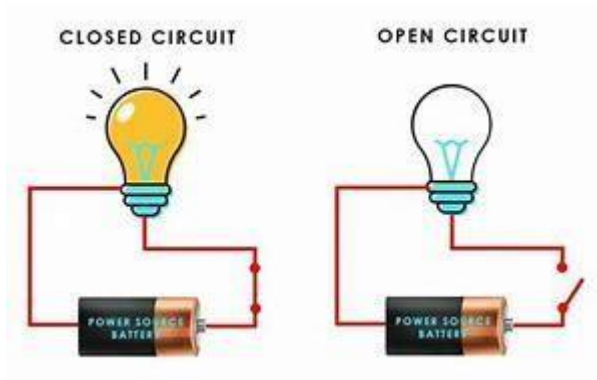
Electric current and its effect

- **Electricity** is form of energy which can be converted into light, sound or heat energy, etc.
- Electric is generated due to the movement of electric charges i.e. positive (+ve) and negative (-ve) charges from their sources.
- The sources of electric current are cells or batteries.
- The SI unit of electric current is ampere (A) and that of charge is coulomb (C).
- The electric current flows from its source through the conducting material only. A material set to be **good conductor** of electricity if it allows electric current to flow or pass easily through it for example the metals like iron, copper, aluminium in their solid states or salt solutions, acid solution, alkali solution, water etc. are good conductors of electricity. The materials through which electricity cannot pass or flow easily are known as **bad conductors** of electricity. For example plastic, wood, rubber, wax, paper etc. The bad conductor of electricity are also called **insulator**.

Conductors	Insulators
 Aluminum	 Wood
 Steel	 Plastic
 Gold	 Rubber

- **Electric circuit**

- An electric circuit is a path through which current flows. An electric circuit may be a complete electric circuit (closed circuit) or incomplete electric circuit(open circuit)
- In a **closed electric circuit** , the electric current starts from the positive terminal of the source and ends at the negative terminal of the source without any break. The current flows only if the circuit is complete or closed, all the elements of the electric circuit start functioning.



- In an **open electric circuit**, the electric current starts from the positive terminal of the source but does not reach the negative terminal of the source because the circuit is broken at some point. In the open circuit, current does not flow and the elements /components of the electric circuit do not work.
- **Elements/Components of Electric Circuit:** The parts which constitutes anelectric circuit are called elements of electric circuit. A source(cell or battery),connecting wire, an appliance(bulb, fan, heater, etc.),The key(switch)
- **Symbols of electric components**

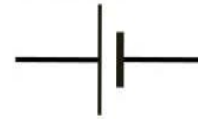
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1) Symbols of electric components :-

Electric component

Symbol

i) Electric cell



ii) Electric bulb



iii) Switch in
OFF position



iv) Switch in
ON position



v) Battery



vi) Wire



- **Source of electricity is a cell** or a battery. There may be one or more source of circuit. Combination of cells may be in series or a parallel.
- **Connecting Wires:** These are normally conducting materials covered with insulating materials like plastics or rubbers. For example, copper wire, aluminium wire, etc.
- **An Appliance:** It is a device which uses the current. For example, electric bulb, fan, heater, etc.
- **A key:** This is the switch by which we can close the circuit or open (break) it.

Effects of electric current: When an electric current is passed through an electric circuit, it may produce the following effect:--

Heating effect 2.lighting effect 3. Magnetic effect

- **Heating effect of electric current:**

When electric current flows through a conductor, some heat is produced(due to resistance of the conductor).This effect of current is known as heating effect of electric current.

Heat produced in a conductor by an electric current depends on:

- 1.Length of the conductor
- 2.Thickness of the conductor
3. Nature of the material of the conductor

In our daily life, there are many applications of heating effect of electric current. **The working of electric bulb, electric iron, electric heater, room heater, and many other electric appliances** is based on the heating effect of electric current.

- The wires used for making electric circuits do not normally become hot. On the other hand, the elements of some electric appliances become so hot that they are easily visible. The **Filament of an electric bulb gets heated to such a high temperature that it starts glowing.**
- An electric bulb is used for light but it also gives heat. This is not desirable. This results in the wastage of electricity. This wastage can be reduced by using fluorescent tube lights in place of the bulbs. **Compact fluorescent lamps (CFLs)** also reduce wastage and can be fixed in the ordinary bulb holders.

Short circuit

The short circuit is generally caused due to the accidental connection of live wire (positive and negative terminal) with the earth wire or the neutral wire.

Overloaded electric circuit

A circuit is said to be **overloaded** when more current passes through the circuit than it can tolerate without heating the conducting wires. Overloading of circuit occurs due to a large current, short circuit or fluctuation of voltage.

An Electric Fuse

The Fuse is a safety device making use of the heating effect of electric current.

It is used to protect electric circuits and electric appliances against high current. High current flows through the circuit because of **short circuit** or random voltage fluctuations. When high current flows in a circuit, it is called **overloaded circuit**.

Types of fuses

1. Kit-Kat fuse: It is the combination of the porcelain fuse socket and a carrier.



2. Cartridge Fuse: Cartridge fuse is made by putting a fuse wire inside a glass tube and connecting its two ends to a metallic caps fitted tightly over the glass tube.

These type of fuses are used to protect sensitive electronic appliance from excessive current.



3. Miniature Circuit Breaker (MCB): MCB is also a type of safety device which is connected in the electric circuit. Unlike in fuse, the MCB stopsthe flow of current by simple, turning OFF. To continue the current flow, one has to turn ON the MCB again.



MAGNETIC EFFECT OF ELECTRIC CURRENT

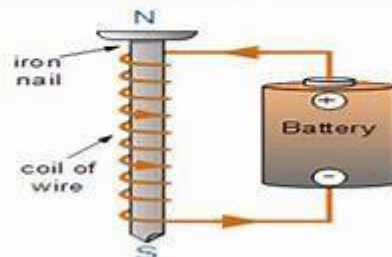
In 1820 Danish Scientist **Hans Christian Oersted** discovered that the electric current has magnetic effect. The relationship between electricity and magnetism is known as **electromagnetism**.

ELECTROMAGNET

A coil wound around an iron core which acts as a magnet as long as electric current flows through the coil, is called an **electromagnet**.



Electromagnetism



USES OF ELECTROMAGNET:

- Electromagnets are used in many electrical appliances such as electric motors, electric fan, electric bell, etc.
- They are used in electric generators.
- Electromagnets are used in television for deflecting electron beam of the picture tube.
- They are used in magnetic separation of iron ores from earthly substances.
- They are used in clinical apparatus to remove magnetic foreign bodies like iron filings from a patient's body part.
- They are used to make permanent magnets.



Electric Bell

Principle: It works on the principle of Electromagnetism.

- **Construction and working:** It consists of a soft iron armature mounted on a springy metal strip placed in front of a U-shaped electromagnet.
- The electromagnet is wound on an insulated copper wire of a large number of turns. One end of the insulated copper wire is connected to the T1 of the cell and the other end of the metal strips.
- The metal strip makes contact with one adjustable contact screw at contact point.
- A hammer made up of steel is attached to the armature.
- It also consists of a gong which is made of brass.
- When the bell operates, the hammer repeatedly strikes against the gong and produces the sound.

Electric Bell

An electric bell is a mechanical bell that functions by means of an **electromagnet**.

