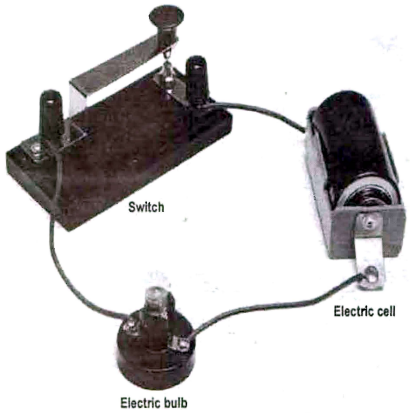
ELECTRICITY AND CIRCUIT

INTROOUCTION

- Electricity can be represent by the charge. If body is charged by friction and the charge is stationary then the electricity is called frictional electricity.
- If charge is moving from one place to another through the conductor it is called current electricity.

ELECTRICITY CIRCUITS

- The path of flow of electricity from one terminal of the cell and returning to the other is called and electrical circuit.

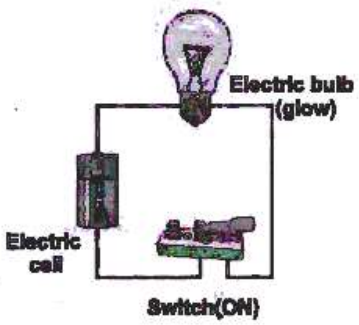


(a) Open Electric Circuit :

An electric circuit through which no electric current flows is known as open electric circuit. The electric circuit or it the connecting wires break from any point.

(b) Closed Circuit :

An electric circuit through which electric current flows continuously is known as closed circuit.



- For flow of electricity, the circuit must be made of conductors, insulators in the path of electrical circuits makes the circuit incomplete.

ELECTRICAL CELLS

Electrical cells are the sources of electric current.

Types of electrical cell :

(i) primary (ii) secondary

(i) Primary Cells :

The cells which cannot be charged again and again are known as primary cells.

Eg : Voltaic, Daniel, laclanche and dry cells.

(ii) Secondary Cells :

The cells which can be charged again and again are known as secondary cells.

Eg : Edison cell, lead - acid accumulator.

Note : Combination of cell is known as battery.

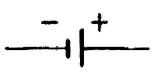
Volatic cell

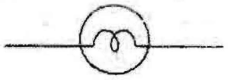
9V battery

Battery

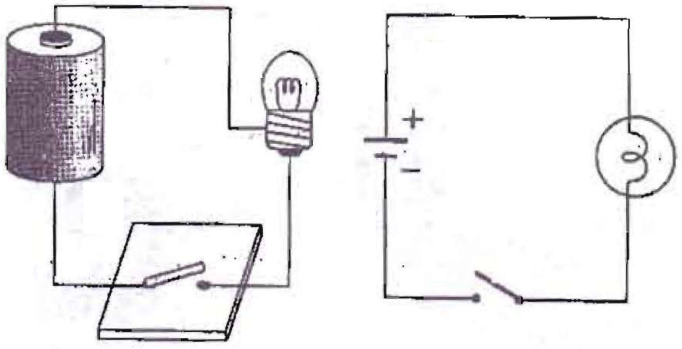
CIRCUIT DIAGRAM AND CIRCUIT SYMBOLS

Scientists use certain symbols to draw electrical circuits. An electrical circuit drawn using these symbols is called a circuit diagram. The symbols used to indicate different components are called circuit symbols. Figure shows some components and their circuit symbols.

Picture	Symbol
A  a cell	 single cell
B  many cells	 many cells

Picture	Symbol
C a switch 	open closed
D  a bulb	 a bulb

An electrical circuit in symbols :

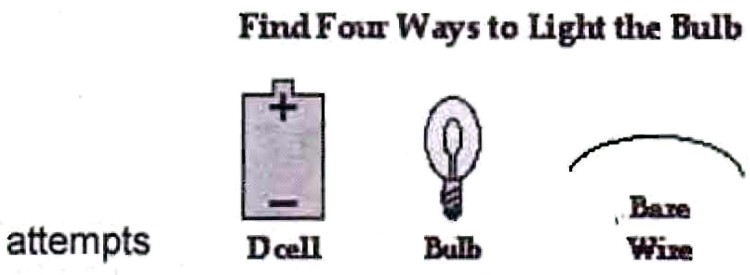


(a) Electrical circuit (b) Circuit diagrams

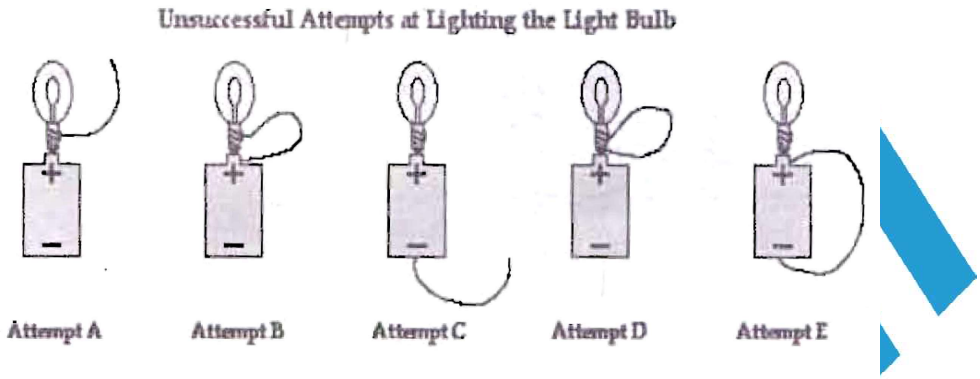
REQUIREMENTS OF A CIRCUIT

Suppose that you were given a small light bulb, an electrochemical cell and a bare copper wire and were asked to find the four different arrangements of the three items that would result in the formation of an electric circuit that would light the bulb.

4 different



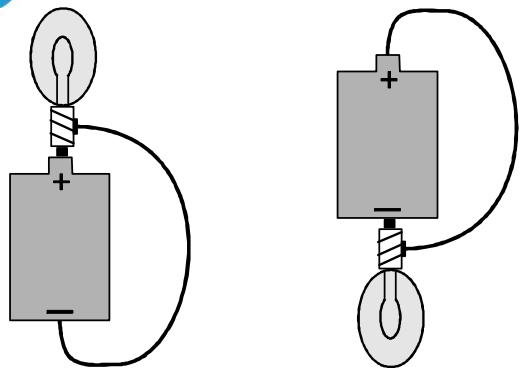
In attempt A, the wire does not loop back to the negative terminal of the cell. In attempt 8, the wire does form a loop but not back to the negative terminal of the cell. In attempt C, there is no complete loop at all. Attempt D resembles attempt B in that there is a loop but not from the positive terminal to the negative terminal. And in attempt E, there is a loop and it does go from positive terminal to negative terminal; this is a circuit but the light bulb is not included as part of it. CAUTION: Attempt E will cause your fingers to get hot as you hold the bare wire and charge begins to flow at a high rate between the positive and negative terminals.



LIGHT BULB ANATOMY

A light bulb is a relatively simple device consisting of a filament resting upon or somehow attached to two wires. The wires and the filament are conducting materials that allow charge to flow through them. One wire is connected to the ribbed sides of the light bulbs. The other wire is connected to the bottom base of the light bulb. The ribbed edge and the bottom base are separated by an insulating material that prevents the direct flow of charge between the bottom base and the ribbed edge. The only pathway by which charge can make it from the ribbed edge to the bottom base or vice versa is the pathway that includes the wires and the filament. Charge can either enter the ribbed edge, make the pathway through the filament and exit out the bottom base; or it can enter the bottom base, make the pathway through the filament and exit out the ribbed edge. As such, there are two possible entry points and two corresponding exit points.

The successful means of lighting the bulb as shown above involved placing the bottom base of the bulb on the positive terminal and connecting the ribbed edge to the negative terminal using a wire. Any charge that enters the light bulb at the bottom base exits the bulb at the location where the wire makes contact with the ribbed edge. The second arrangement that lead to a lit light bulb involve placing the bulb at the negative terminal of the cell. A wire must then connect the other part of the bulb to the positive terminal of the cell.



Successful attempts at lighting the electric bulb.

CONDUCTORS AND INSULATORS

(i) Conductors :

Those substances through which electric charges can flow, are called conductors.

Eg : silver, copper and aluminium etc.

(ii) Insulators :

The material in which there is no flow of current are called insulators.

Eg: Plastic, rubber and wood etc.

THE REQUIREMENT OF A CLOSED CONDUCTING PATH

There must be a closed conducting path that extends from the positive terminal to the negative terminal. 11 is not enough that there is simply a closed conducting loop; the loop itself must extend from the positive terminal to the negative terminal of the electrochemical cell. An electric circuit is like a water circuit at a water park. The flow of charge through wires is similar to the flow of water through the pipes and along the slides at a water park. If a pipe gets plugged or broken such that water cannot make the complete path through the circuit, then the flow of water will soon cease, In an electric circuit, all connections must be made and made by conducting materials capable of carrying charge. As the cell, bulb and wire experiment continues, some students explore the capability of various materials to carry a charge by Inserting them in their circuit. Metallic materials are conductors and can be inserted into the circuit to successfully light the bulb. On the other hand, paper and plastic materials are typically insulators and their insertion within the circuit will hinder the flow of charge to such a degree that the current ceases and the bulb no longer lights. There must be a closed conducting loop from the positive to the negative terminal in order to establish a circuit and to have a current.