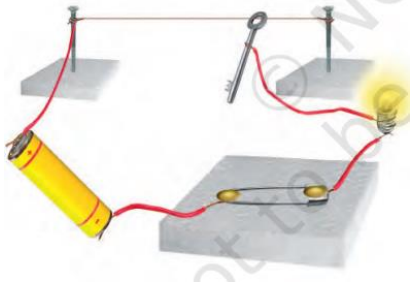
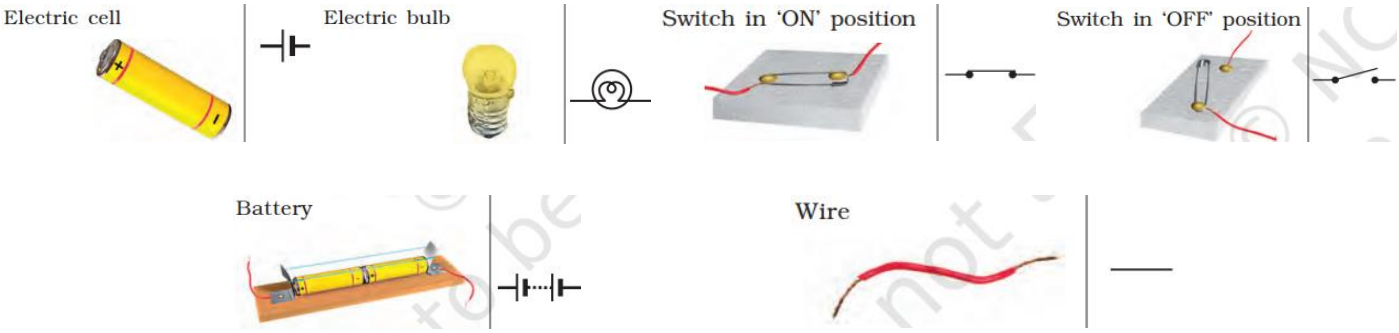
Chapter – 10: Electric Current and its Effects

- Game – how steady is your hand – uses electric current
- Boojho and Paheli – tried it – suggested to their friends
- Paheli – made a diagram – Boojho – wondered – is there an easier way to draw it?

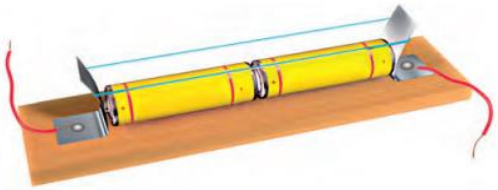


Symbols of Electric Components

- Common electric components – represented by symbols
- Different books – different symbols
- Symbol for electric cell – a longer line – positive terminal – another shorter line – negative terminal
- Symbol for switch – 'ON' and 'OFF' positions – different symbols
- Symbol for wires – straight lines

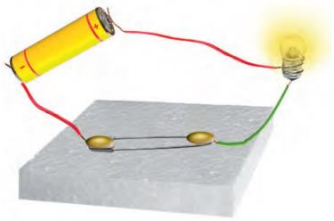
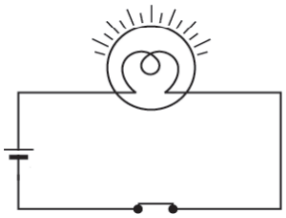
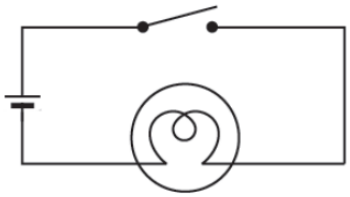


- Combination of cells – positive terminal of one cell – connected to negative terminal of next cell – **battery**
- Many devices – torches, transistors, toys, TV remote – use batteries
- BUT – some devices – cells placed side by side – metal strip – connects the cells
- We may make a cell holder – wooden block, 2 iron strips, rubber bands – connect 2 wires to the metal strips



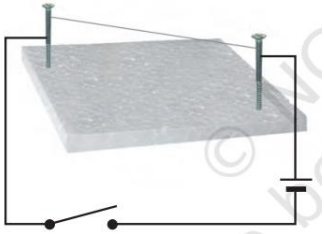
- We can also buy cell holders from market
- Let's make a simple circuit –
  - Connect switch to cell – connect cell to bulb – connect bulb to switch
  - Bulb glows only when switch is 'ON'
- Make a circuit diagram – using symbols – much easier to draw

- Inside bulb – there's a wire – glows when electric current passes through it – bulb fused – filament is broken
- Glowing bulb – becomes warm

Heating Effects of Electric Current

- Activity –
  - Make a simple circuit – keep the switch in 'OFF' position – touch the bulb
  - Turn the switch 'ON' – let the bulb glow for some time – touch the bulb again
- Activity –
  - Make a circuit as shown – tie a 10 cm long nichrome wire – between the nails
  - Touch the wire – switch in 'OFF' position
  - Turn the switch 'ON' – after few seconds – touch the wire – DO NOT HOLD FOR LONG

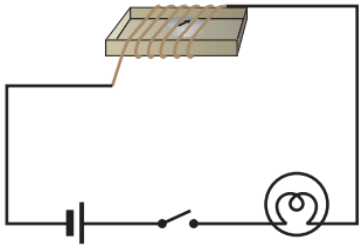


- Wire – gets hot – electric current passed through it – heating effect of electric current
- Electric room heater, electric heater – contain a coil – element
- Connected to electric supply – elements heat up – become red hot – give out heat
- Amount of heat – depends on material, length, thickness
- Different requirements – different kinds of wires used
- Wires – electric circuit – never heat up easily – BUT – elements – some appliances – become very hot
- Filament – electric bulb – heated too much – starts glowing
- Too much current passed through – wire melts and breaks
- Activity –
  - Make a circuit from previous activity
  - Replace the cell with 4 cells – replace the nichrome wire with steel wool (used in cleaning utensils)
  - Switch off all the fans – turn the switch in circuit 'ON' – keep it like that – some time
  - Steel wool – melts and breaks
- Wires – special materials – melt quickly – large currents passed
- These wires – used for – electric fuses
- Every circuit – maximum limit of current – current exceeds the limit – wires may burn and cause fire
- Proper fuse used in the circuit – blows off – breaks the circuit
- Fuse – known as safety device – prevents damages to electric circuits

- Different fuses – used for different purposes
- Electric current – other effects too

Magnetic Effect of Electric Current

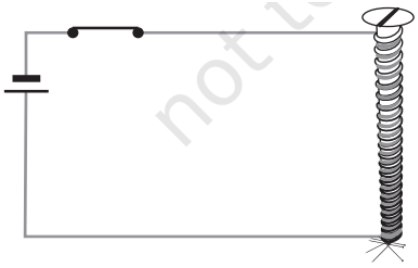
- Activity –
  - Take a piece of cardboard – wrap an electric wire around it
  - Place a compass needle on the cardboard piece
  - Connect the free ends of wire to cell – through switch
  - Note the direction of compass – place a bar magnet near it
  - While watching the needle – turn the switch 'ON'



- Observe the needle carefully – repeat the experiment few times
- Needle of compass – small magnet – points in north-south direction
- Bring a magnet close to it – needle deflects
- Needle also deflects – when current passes in nearby wire
- Hans Christian Oersted – observed the deflection of needle – current passes in nearby wire
- Magnetic effect of electric current – electric current passes through a wire – it behaves like a magnet

Electromagnet

- Activity –
  - Take a 75 cm long insulated wire – wrap it around 6-10 cm long iron nail
  - Connect free ends of wires – to a cell – through switch
  - Place some pins near the nail
  - Turn the switch 'ON' – pins stick to the nail
  - Turn the switch 'OFF' – pins detach from the nail



- Coil – above activity – behaves like magnet – current passed through it
- Electric current – switched off – loses its magnetism
- Such coils – electromagnets
- Electromagnets – can be made stronger – lift heavy loads
- Also used – separate materials from junk

- Small electromagnets – used by doctors – take out – small pieces of magnetic material from eyes
- Many toys – electromagnets inside them

Electric Bell

- Electric bell – works with electromagnet
- Consists – coil of wire – wrapped around iron piece – this coil – electromagnet
- Iron strip with hammer – kept close to electromagnet – contact screw – near the iron strip
- Iron strip – in contact with screw – circuit completes – current flows
- Coil – turns into an electromagnet – attracts the iron strip – hammer strikes the gong – produces a sound
- Iron strip – pulled by electromagnet – circuit breaks – current stops
- Coil – no longer an electromagnet – iron strip returns to starting position – touches the contact screw
- Circuit completed again – whole process repeated – bell rings this way