

1. EFFECTS OF ELECTRIC CURRENT:CLASS:3

Heating Coil: It is in heating coil, heat produces in heating appliances like iron box, heater etc.. *Heating coils are made of nichrome, an alloy of nickel, chromium,iron.*

Features of Nichrome: Ability to remain red hot for long time, high resistivity, high melting point.

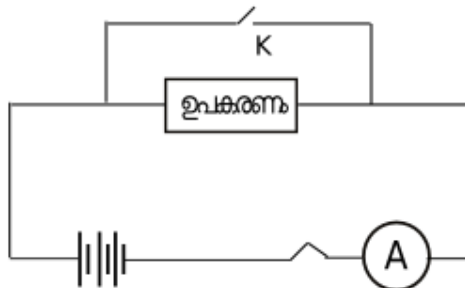
Short circuit and Overloading.

Short circuit and over loading are the two situations that leads to excess current in an electric circuit.

Short circuit is the direct contact between positive & negative terminals of a battery or two wires from the mains without the presence of resistance in between them.

In the circuit shown here, if the switch K is turn on, it will be short circuited. Because now the negative and positive terminals of the battery are in direct contact.

A circuit is said to be overloaded, when total power of the appliances included in the circuit is more than what the circuit can withstand.



Safety fuse

Safety fuse is a device which protects electric circuit and appliances from danger due to excess current flows through the circuit. It works on **heating effect of electric current**. The main part of a safety fuse is a fuse wire, which is made of an alloy of **lead and Tin** having **low melting point**. It is connected **in series** to the circuit. When the current exceeds the permissible limit, the heat generated in the fuse wire becomes excessive and hence it melts and breaks the circuit.

Amperage: Amperage is the sufficient current required for proper functioning of an electric appliance. It is the ratio of the power of the appliance to the working voltage. (In the case of a conducting wire or fuse wire, amperage is the maximum current that can withstand)

Amperage = Wattage/Voltage. Amperage of a conducting wire depends on its **thickness**. That is, **amperage increases with the thickness of the wire**.

As the intensity of current differs from one appliance/circuit to another, fuse wire of appropriate amperage is to be selected.

Fuses are safety devices. But their improper handling may leads to adverse effect. The following precautions are to be taken while using fuses.

- *The ends of the fuse wire must be connected firmly at appropriate points for avoiding loose contact.
- *Fuse wire should not project out of the carrier base.
- * Use fuse wire having required amperage/ thickness according to the load of the circuit.
- * Use fuse wires made of suitable material having low melting point.

PRACTICE QUESTIONS & ANSWERS

1. Amperage indicates current bearing capacity of a conductor/electric device. What is the relation between amperage and thickness of a wire?

Answer: a. Amperage increases with thickness.

2. Analyse the circuit and suggest the amperage of the fuse wire required for this circuit.

Answer: Current required for operating all devices
 $= \text{total power/voltage} = (250+1500+1000+750)/250$
 $= 3500/250 = 14\text{A}.$

So the required amperage of the fuse wire is 14A.

3. Iron box is a heating appliance.

a. Which substance is used to make heating coil?

b. What are the constituents of this substance?

c. Give two features of this substance.

Answer: a. Nichrome. b. Nickel, Chromium, Iron.

c. High melting point, High resistivity, ability to remain hot red for long time, low vaporisation.

4. Safety fuse is a device that protect circuit and appliances from danger due to excess current flow through the circuit. a. Which effect of current is used in safety fuse?

b. How is the fuse connected in a circuit? (in parallel/series)

c. What must be the major feature of the substance used to make fuse wire?

d. Briefly explain how does a safety fuse make sure the safety of circuit and appliance.

e. What is your opinion about using thick wire as fuse wire?

Answer: a. Heating effect. b. In series c. Low melting point.

d. Melting point of fuse wire is low. When excess current flows through the circuit due to short circuit or over load, the fuse gets heated. As its melting point is low, it melts and the circuit is broken.

e. If we use thick wire, it may not melt and break while excess flow of current. So it is not good to use thick wire as fuse wire.

5. The following are the electrical appliances in a house.

One 1000W Iron box, One 750 W Mixie, One 2000W heater, five 60W bulbs. If all are designed to work on 230V, find amperage of fuse wire suitable to this house.

Answer: Total power of the appliances = $1000+750+2000+5 \times 60 = 4050\text{W}$

Total current required = $4050/230 = 17.6\text{ A} \approx 18\text{ A}.$

Therefore Amperage of the fuse wire is 18A.

6. Which of the following feature is correct in respect of a fuse wire?

a. High melting point. b. Low melting point. c. High resistance.

Answer: Low melting point.

