

There is 1 change in today's paper (Q.42). The correct answer of Q.42 is Option a.

Q.42) A doubt was raised whether the material used in the fuse wire should have high conductivity or low conductivity.

Exp) The material used in the fuse wire should have high conductivity as the fuse wire itself is part of the electrical circuit. For the circuit to normally work, the fuse wire material should have high conductivity as it is connected in series with the circuit. But at the same time the fuse wire has a higher resistance compared to the rest of the circuit. The higher resistance would help in dissipating excess electrical energy as heat, and as the wire has a lower melting point compared to the rest of the circuit, it would melt. This would break the circuit.

The resistance is made high in a high-conductivity material by changing the physical dimension. As electrical conductivity is intrinsic to the material, and the total resistance is determined by its length, cross-sectional area, etc. High-length and low cross-sectional area material is used to achieve high resistance.

For Future Reference:

Q.42) The material used as fuse wire must possess which of the following characteristics?

- a) Low melting point and High electrical conductivity.
- b) Low melting point and Low electrical conductivity.
- c) High melting point and High electrical conductivity.
- d) High melting point and Low electrical conductivity.

Ans) a

Exp) Option a is the correct answer.

A fuse wire is designed to melt quickly when excess current flows, thereby breaking the circuit. Hence, it must have a low melting point so that it melts easily during overload conditions. The fuse wire should heat up sufficiently when excess current flows; hence, it must have relatively high resistance to facilitate quick melting. A higher resistance ensures that the heat produced is concentrated at the fuse itself.

The material used in the fuse wire should have high conductivity, as the fuse wire itself is part of the electrical circuit. For the circuit to normally work, the fuse wire material should have high conductivity as it is connected in series with the circuit. But at the same time, the fuse wire has a higher resistance compared to the rest of the circuit. The higher resistance would help in dissipating excess electrical energy as heat, and as the wire has a lower melting point compared to the rest of the circuit, it would melt. This would break the circuit.

The resistance is made high in a high-conductivity material by changing the physical dimension. As electrical conductivity is intrinsic to the material, and the total resistance is determined by its length, cross-sectional area, etc. High-length and low cross-sectional area material is used to achieve high resistance.

Source: NCERT Science Class X: Chapter 12: Electricity Pg: 218-219

<https://egyankosh.ac.in/bitstream/123456789/9327/3/Unit-13.pdf> Pg: 13, 14

<https://egyankosh.ac.in/bitstream/123456789/110542/1/Unit-10.pdf> Pg:402