# Science

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#### Page 209

## **Question 1:**

On what factors does the resistance of a conductor depend?

## Answer 1:

The resistance of a conductor depends upon the following factors:

- > Length of the conductor
- > Cross-sectional area of the conductor
- > Material of the conductor
- > Temperature of the conductor.

## **Question 2:**

Will current flow more easily through a thick wire or a thin wire of the same material, when connected to the same source? Why?

## Answer 2:

Resistance (R) is inversely proportional to the area of cross-section (A) of the wire. So, thicker the wire, lower is the resistance of the wire and vice-versa. Therefore, current can flow more easily through a thick wire than a thin wire.

$$R = \rho \frac{L}{A}$$
$$R \propto \frac{1}{A}$$

# **Question 3:**

Let the resistance of an electrical component remains constant while the potential difference across the two ends of the component decreases to half of its former value. What change will occur in the current through it?

## Answer 3:

According to the Ohm's law V = IRIf the resistance remains constant, V is directly proportional to I.

 $V \propto I$ 

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Now, if potential difference is reduced to half of its value, the current also become half of its original value.

### **Question 4:**

Why are coils of electric toasters and electric irons made of an alloy rather than a pure metal?

#### Answer 4:

The resistivity of an alloy is higher than the pure metal and it does not corrode easily. Moreover, even at high temperatures, the alloys do not melt readily. Hence, the coils of heating appliances such as electric toasters and electric irons are made of an alloy rather than a pure metal.

## **Question 5:**

Use the data in Table 12.2 to answer the following -

(a) Which among iron and mercury is a better conductor?

(b) Which material is the best conductor?

**Table 12.2** Electrical resistivity\* of some substances at 20°C

	Material	Resistivity ( $\Omega$ m)
Conductors	Silver	$1.60 \times 10^{-8}$
	Copper	$1.62 \times 10^{-8}$
	Aluminium	$2.63 \times 10^{-8}$
	Tungsten	$5.20 \times 10^{-8}$
	Nickel	$6.84 \times 10^{-8}$
	Iron	$10.0 \times 10^{-8}$
	Chromium	$12.9 \times 10^{-8}$
	Mercury	$94.0 \times 10^{-8}$
	Manganese	$1.84 \times 10^{-6}$
Alloys	Constantan	$49 \times 10^{-6}$
	(alloy of Cu and Ni)	emy
	Manganin	44 × 10 <sup>-6</sup> by
	(alloy of Cu, Mn and Ni)	aria
	Nichrome	100 × 10 <sup>-6</sup>
	(alloy of Ni, Cr, Mn and Fe)	MMM
Insulators	Glass	$10^{10} - 10^{14}$
	Hard rubber	$10^{13} - 10^{16}$
	Ebonite	$10^{15} - 10^{17}$
	Diamond	1012 - 1013
	Paper (drv)	1012

## **Answer 5:**

(a). Resistivity of iron  $(10.0 \times 10^{-8} \Omega m)$  is lesser than that of the mercury (94.0  $\times 10^{-8} \Omega m$ ). So, iron is good conductor as compared to mercury.

(b). Silver has lowest resistivity, so it is the best conductor.

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