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Q1. The resistance decreases.
Q2. Resistance also gets doubled.
Q3. Resistance of a conductor depends on the following factors:- Length of the conductor, area of cross section of the conductor, nature of material of the conductor and temperature of the conductor.
Q4. Silver metal.
Q5. Iron.
Q6. Because copper and aluminium have very low resistivities.
Q7. Nichrome.
Q8. Nichrome is an alloy of nickel, chromium, manganese ad iron having a resistivity of about 60 times more than that of copper. It is used for making the heating elements of electrical heating appliances.
Q9. Nichrome alloy is used for making the heating elements of electrical appliances because:
(i) nichrome has very high resistivity
(ii) nichrome does not undergo oxidation (or burn) easily even at high temperature.
Q10. Because
(i) resistivity of an alloy is much higher than that of a pure metal
(ii) an alloy does not undergo oxidation (or burn) easily even at high temperature.
Q11. (a) A long piece of nichrome wire.
(b) A thin piece of nichrome wire.
Q12. (a) On decreasing the temperature, the resistance decreases.
(b) Presence of impurities in a metal increases the resistance.
Q13. Ohms; increases; increases; decreases.
Q14. (a) Resistivity is the characteristic property of a substance which depends on the nature of the substance and its temperature. It is numerically equal to the resistance between the opposite faces of a 1 m cube of the substance.
(b) l = 1m
r = d/2 = 0.2/2 mm = 0.1 mm = 0.0001m,
R = 10 ohm
We know that,

$$R = \rho \frac{l}{A}$$

$$\rho = \frac{RA}{l}$$

$$= \frac{10 \times \pi \times (0.0001)^2}{1}$$

$$= 31.4 \times 10^{-8}\ \Omega m$$

Q15.

$$(b)\ l = 2m$$

$$A = 1.55 \times 10^{-6}\ m^2$$

$$\rho = 2.8 \times 10^{-8} \Omega m$$

$$R = \rho \frac{l}{A}$$

$$= 2.8 \times 10^{-8} \times \frac{2}{1.55 \times 10^{-6}}$$

$$= 0.036\ \Omega$$

Q16. (a) Silver and copper are good conductors of electricity because they have free electrons available for conduction.

$$(b)\ l = 1km = 1000m$$

$$r = \frac{d}{2} = \frac{0.5}{2} mm = 0.25mm = 0.25 \times 10^{-3}\ m$$

$$\rho = 1.7 \times 10^{-8} \Omega m$$

$$R = \rho \frac{l}{A} = \rho \frac{l}{\pi r^2}$$

$$R = 1.7 \times 10^{-8} \times \frac{1000}{3.14 \times (0.25 \times 10^{-3})^2} = 86.6\ \Omega$$

Q17. Current will flow more easily through thick wire because the

resistance of the thick wire will be lesser than that of thin wire.
Q18. (a) Resistance of a conductor increases (or decreases) with increase (or decrease) in the length of the conductor.
(b) Resistance of a conductor decreases (increases) with increase (decrease) in the area of cross-section of the conductor.
(c) Resistance of a conductor increases on raising the temperature and decreases on lowering the temperature.
Q19. (a) If we take two similar wires of same length and same diameter, one of copper metal and other of nichrome alloy, we will find that the resistance of nichrome wire is about 60 times more than that of the copper wire. This shows that the resistance depends on the nature of material of the conductor.

$$(b)\ l = 10\ km = 10000\ m$$

$$d = 2mm$$

$$r = 1mm = 10^{-3}\ m$$

$$\rho = 2.7 \times 10^{-8}\ \Omega m$$

$$R = \rho \frac{l}{A}$$

$$= 2.7 \times 10^{-8} \times \frac{10000}{3.14 \times \left(10^{-3}\right)^2}$$

$$= 0.859 \times 10^{2}\ \Omega$$

$$\approx 86\ \Omega$$

Q20. (a) Resistance will increase.
(b) Resistance will decrease.
(c) Resistance will increase.
Q21. (a) By increasing the area of cross section, the resistance will decrease.
(b) By increasing the diameter, the resistance will decrease.

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Q22.

$$R=\rho\frac{l}{A}$$

(a) $l \rightarrow 3l$

$$R'=\rho\frac{3l}{A}=3R$$

Resistance gets tripled.

(b) $d \rightarrow 3d$

$$R=\rho\frac{l}{A}=R=\rho\frac{l}{\pi r^2}=\rho\frac{l}{\pi\left(d/2\right)^2}$$

$$R'=\rho\frac{l}{\pi\left(3d/2\right)^2}=\frac{1}{9}\rho\frac{l}{\pi\left(d/2\right)^2}=\frac{R}{9}$$

Resistance becomes $\frac{1}{9}$ th.

(c) $R=\rho\frac{l}{A}$

$\rho \rightarrow 3\rho$

$$R'=3\rho\frac{l}{A}=3R$$

Resistance becomes 3 times.

Q23.

$$l = 1.0\,m$$

$$R = 23\ ohm$$

$$\rho = 1.84 \times 10^{-6}\ ohm\text{-}meter$$

we have

$$R = \rho \frac{l}{A}$$

$$23 = 1.84 \times 10^{-6} \times \frac{1}{A}$$

$$A = \frac{1.84 \times 10^{-6}}{23}$$

$$= 0.08 \times 10^{-6}\ m^2$$

$$= 8 \times 10^{-8}\ m^2$$

Q24.

(a) Resistivity, $\rho = \frac{R \times A}{l}$

where, R is the resistance of the conductor
A is the area of cross-section of the conductor
l is the length of the conductor.

(b) Ohm-meter

(c) 1. Resistance is the property of the conductor, while resistivity is the property of the material of the conductor.
2. Resistance of a conductor is the opposition to the flow of electric current through it. Resistivity of a substance is the opposition to the flow of electric current by a rod of that substance which is 1m long and $1m^2$ in cross section.
3. Resistance of a conductor depends on length, thickness, nature of material and temperature of the conductor; while resistivity of a substance depends on the nature of the substance and temperature.

(d) Resistivity of a substance depends on the nature of the substance and its temperature. It does not depend on the length or thickness of the conductor.

(e) l = 1m
R = 26 ohm

$r = \frac{d}{2} = \frac{0.3}{2}\ mm = 0.15mm = 0.15 \times 10^{-3}\ m$

$\rho = \frac{R \times A}{l} = \frac{R \times \pi r^2}{l}$

$= \frac{26 \times 3.14 \times (0.15 \times 10^{-3})^2}{1}$

$= 1.83 \times 10^{-6}\ \Omega m$

Q33.

$R = \rho \frac{l}{A}$

Now,

$l' = 2l$ and $A' = \frac{A}{2}$

$\rho' = \rho$ (since the material of the wire is the same)

So, $R' = \rho' \frac{l'}{A'}$

$= \rho \frac{2l}{A/2}$

$= 4\rho \frac{l}{A} = 4R$

$R' = 4 \times 20 = 80\,\Omega$

Q34.

(a) Material Q with resistivity 2.63×10^{-8} ohm-m can be used for making electric wires because it has very low resistivity.

(b) Material R with resistivity 1.0×10^{15} ohm-m can be used for making handle of soldering iron because it has very high resistivity.

(c) Material P with resistivity 2.3×10^{3} ohm-m can be used for making solar cell because it is a semiconductor.

Q35.

(a) Good conductor = C (10×10^{-8} ohm-m)

(b) Resistor = A (110×10^{-8} ohm-m)

(c) Insulator= B (1×10^{10} ohm-m)

(d) Semiconductor= D (2.3×10^{3} ohm-m)

Q36. (a) E is best conductor of electricity due to its least electrical resistivity.

(b) C, because its resistivity is lesser than that of A.

(c) B, because it has the highest electrical resistivity.

(d) C and E, because of their low electrical resistivities.

********** END **********