

A wire of resistance 100 ohm is doubled on itself. The percentage of decrease of its resistance is

(A)25% (B)50% (C)75% (D)20%

Solution

Resistance of the wire

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

where l – the length of the wire, A – the area of the wire, ρ - resistivity of the wire.

When the wire is doubled on itself:

(1) The area of cross-section is doubled. If A is the original C.S. area, now it is $2A$.

(2) The length becomes half i.e. $\frac{l}{2}$.

Resistance of the wire

$$R' = \rho \frac{l/2}{2A} = \frac{1}{4} * \rho \frac{l}{A}$$

But $\rho \frac{l}{A} = R = 100$ ohm.

$$R' = \frac{1}{4} * 100 = 25 \text{ ohm.}$$

The percentage of decrease of its resistance is

$$\frac{R'}{R} = \frac{25}{100} * 100\% = 25\%.$$

Answer: (A)25%.