



Surface Areas and Volumes Ex.16.1 Q26

Answer :

The radius of the big spherical ball is 3cm. Therefore, the volume of the big spherical ball is

$$V = \frac{4}{3} \pi \times (3)^3 \text{ cubic cm}$$

The radii of the 1st and 2nd small spherical balls are 1.5 cm and 2 cm respectively. Therefore, the volumes of the 1st and 2nd spherical balls are respectively

$$V_1 = \frac{4}{3} \pi \times (1.5)^3 \text{ cubic cm,}$$

$$V_2 = \frac{4}{3} \pi \times (2)^3 \text{ cubic cm}$$

Let, the radius of the 3rd small spherical ball is r cm. Then, its volume is

$$V_3 = \frac{4}{3} \pi \times (r)^3 \text{ cubic cm}$$

Since, the big spherical ball is melted to produce the three small spherical balls; the volume of the big spherical ball is same as the sum of the volumes of the three small spherical balls. Therefore, we have

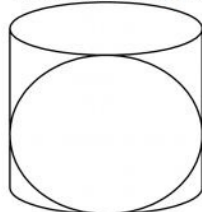
$$\begin{aligned} V &= V_1 + V_2 + V_3 \\ \Rightarrow \frac{4}{3} \pi \times (3)^3 &= \frac{4}{3} \pi \times (1.5)^3 + \frac{4}{3} \pi \times (2)^3 + \frac{4}{3} \pi \times (r)^3 \\ \Rightarrow (3)^3 &= (1.5)^3 + (2)^3 + (r)^3 \\ \Rightarrow (r)^3 &= (3)^3 - (1.5)^3 - (2)^3 \\ \Rightarrow r^3 &= 27 - 3.375 - 8 \\ \Rightarrow &= 15.625 \\ \Rightarrow &= 2.5 \end{aligned}$$

Therefore, the diameter of the 3rd ball is $2r = 5 \text{ cm}$

Surface Areas and Volumes Ex.16.1 Q27

Answer :

We have the following figure to visualize the situation



Let the radius of the sphere is r . Therefore, the surface area of the sphere is

$$\begin{aligned} S &= 4\pi \times r^2 \\ &= 4\pi r^2 \end{aligned}$$

The circumscribed cylinder of the sphere must have radius r cm and height $2r$ cm. Therefore, the curved surface area of the cylinder is

$$\begin{aligned} S_1 &= 2\pi r \times 2r \\ &= 4\pi r^2 \end{aligned}$$

Hence, S and S_1 are same. Thus the proof is complete.

Surface Areas and Volumes Ex.16.1 Q28

Answer :

The radius of the metallic sphere is $\frac{9}{2} = 4.5 \text{ cm} = 45 \text{ mm}$. Therefore, the volume of the metallic sphere is

$$V = \frac{4}{3} \pi \times (45)^3 \text{ Cubic mm}$$

The metallic sphere is melted to produce a long wire of uniform cross section of radius $\frac{2}{2} = 1 \text{ mm}$. Let

the length of the wire be l mm. Then, the volume of the wire is

$$V_1 = \pi \times (1)^2 \times l = \pi l \text{ Cubic mm}$$

Since, the volume of the metallic sphere is equal to the volume of the wire, we have

$$V = V_1$$

$$\Rightarrow \frac{4}{3} \pi \times (45)^3 = \pi l$$

$$\Rightarrow l = \frac{4}{3} \times (45)^3$$

$$\Rightarrow = 4 \times (45)^2 \times 15$$

$$\Rightarrow = 121500$$

Hence, the length of the wire is $121500 \text{ mm} = 12150 \text{ cm}$.

Hence length=12150 cm

***** END *****