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

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

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

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

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

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

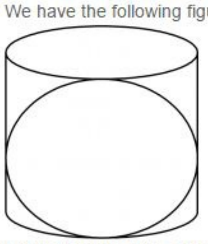
$$V = V_1 + V_2 + V_3$$
$$\Rightarrow \frac{4}{3}\pi \times (3)^3 = \frac{4}{3}\pi \times (1.5)^3 + \frac{4}{3}\pi \times (2)^3 + \frac{4}{3}\pi \times (r)^3$$
$$\Rightarrow (3)^3 = (1.5)^3 + (2)^3 + (r)^3$$
$$\Rightarrow (r)^3 = (3)^3 - (1.5)^3 - (2)^3$$
$$\Rightarrow r^3 = 27 - 3.375 - 8$$
$$\Rightarrow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

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

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

$$S = 4\pi \times r^2$$
$$= 4\pi r^2$$

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

$$S_1 = 2\pi r \times 2r$$
$$= 4\pi r^2$$

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

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

The metallic sphere is melted to produce a long wire of uniform cross section of radius $\frac{2}{2} = 1$ mm. Let the length of the wire be l mm. Then, the volume of the wire is

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

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

$$V = V_1$$

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

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

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

$$\Rightarrow \quad = 121500$$

Hence, the length of the wire is 121500 mm $= 12150$ cm.

Hence $\boxed{\text{length=12150 cm}}$

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