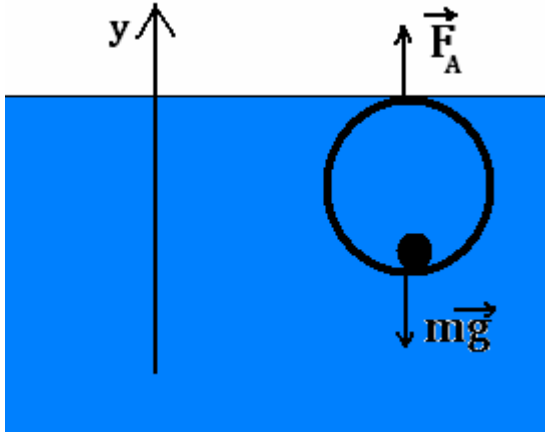**QUESTION:**
A solid steel ball of volume 1 cm3 is recast into a hollow sphere so as to float on water. What should be the minimum volume of this hollow sphere when density of steel is 7.71 g/cm3 and that of water is 1g/cm3 ?

SOLUTION
Let's draw a free-body diagram for the ball in the hollow sphere:

We assume that the sphere is massless, and as sphere is floating in the water:

$$F_B - m_{ball}g = 0 \ (y - axis \ projection)$$
$$F_B = \rho_{water}g \cdot V_{sphere} \ (the \, buoyancy \, force)$$
$$m_{ball} = \rho_{steel}V_{ball}$$
$$Hence,$$
$$F_B - m_{ball}g = 0$$
$$\rho_{water}g \cdot V_{sphere} - \rho_{steel}V_{ball}g = 0$$
$$\rho_{water} \cdot V_{sphere} - \rho_{steel}V_{ball} = 0$$
$$V_{sphere} = \frac{\rho_{steel}}{\rho_{water}}V_{ball}$$
$$V_{sphere} = \frac{7.71}{1} \cdot 1 = 7.71 \ cm^3$$

ANSWER
$$V_{sphere} = 7.71 \ cm^3$$