Mass, weight and density

Numerical

1. **A block of metal has a length of 20 cm, breadth 10 cm and height 5 cm. Its mass is 2.7 kg. Find the density of the metal in g/cm3**
   Find out what the block is made of.

Solution:

Volume of the block = V = Length× Breadth× Height

Volume = V = 20× 10× 5= 1000 cm3

Mass of the metal block = m = 2.7 kg = 2700 gm

Density of the metal block = Mass / Volume

= 2700 / 1000

= 2.7 g/cm3

Thus, the density of the metal block is 2.7 g/cm3.

The metal block is made of aluminium (density = 2.7 g/cm3).

2. **A)Find the volume of 5 g of cork whose density is 0.25 g/cm3**

   B)**Find the volume of 800 g of spirit whose density is 0.25 g/cm3**

Solution:

A)Mass of the cork = 5 g

Density of the cork = 0.25 g/cm3

Volume of the cork = Mass / Density

Volume of the cork = 5 / 0.25 = 20 cm3

B) Mass of the spirit = 800 g

Density of the spirit = 0.25 g/cm3

Volume of the spirit = Mass / Density

Volume of the spirit = 800 / 0.25

= 3200 cm3

3. The density of butter is 0.9 g/cm3. What is the volume of 800 g of butter?

Solution:

Density of butter = 0.9 g/cm3

Mass of the butter sample = 800 g

Volume = Mass / Density

= 800 g / 0.9 g/cm3

Volume of the butter sample = 888.9 cm3

4. Aluminum has a density of 2.7 g/cm3. What is the mass of 200 cm3 of aluminum?

Solution:

Density of aluminium = 2.7 g/cm3

Volume of the aluminium sample = 200 cm3

Mass of the aluminium sample = Density ×Volume

= 2.7 ×200

= 540 g

5. A piece of steel has a volume of 12 cm3 and a mass of 96 g. What is its density?

Solution:

Volume of the piece of steel = 12 cm3

Mass of the piece of steel = 96 g

Density of the piece of steel = Mass / Volume

= 96 g / 12 cm3

= 8 g/cm3

6. What is the mass of 5 m3 of cement of density 3000 kg/m3?

Solution:

Density of the cement sample = 3000 kg/m3

Volume of the cement sample = 5 m3

Mass of the cement sample = Density ×Volume

= 3000 ×5

= 15000 kg

7. What is the mass of air in a room measuring 10 m × 6 m × 5 m if the density of air is 1.3 kg/cm3?

Solution:

Volume of the air in the room = Volume of the room

= 10 m × 6 m × 5 m

= 300 m3

Density of the air = 1.3 kg/cm3

Mass of the air = Density × Volume

= 1.3 kg/cm3 × 300 m3

= 1.3 kg/cm3 × 300 × 1000000 cm3

= 390000000 kg

8. A lump of copper of mass 890 g is dipped into a glass filled to the brim with water. What volume of water will overflow? (Thedensity of copper = 8.9 g/cm3.)

Solution:

Mass of the lump of copper = 890 g

Density of copper = 8.9 g/cm3

So, the volume of the lump of copper = Mass / Density

= 890 g / 8.9 g/cm3

= 100 cm3

Thus, when the lump of copper is dipped into a glass filled to the brim with water, the volume of water that will overflow is 100cm3

9. **Which will occupy more space: 480 g of teak wood of density 0.48 g/cm3, or 7900 g of iron of density 7.9 g/cm3?**

Solution:

Mass of the teak wood sample = 480 g

Density of the teak wood sample = 0.48 g/cm3

Volume of the teak wood sample = Mass / Density

= 480 g / 0.48 g/cm3

= 1000 cm3

Mass of the iron sample = 7900 g

Density of the iron sample = 0.79 g/cm3

Volume of the iron sample = Mass / Density

= 7900 g / 0.79 g/cm3

= 1000 cm3

Both the teak wood and iron samples will occupy the same amount of space.

10. **The volume of 40 g of a substance is 20 cm3. The density of water is 1 g/cm3. Will the substance float or sink in water?**

Solution:

Mass of the substance = 40 g

Volume of the substance = 20 cm3

Density of the substance = Mass / Volume

= 40 g / 20 cm3

= 2 g/cm3

As the density of the substance (2 g/cm3) is higher than the density of water (1 g/cm3), the substance will sink in water.

11. **The volume of 900 g of a substance is 1000 cm3. Will the substance float or sink in water, if the density of water is 1 g/cm3?What will be the mass of water displaced by this substance?**

Solution:

Mass of the substance = 900 g

Volume of the substance = 1000 cm3

Density of the substance = Mass / Volume

= 900 g / 1000 cm3

= 0.9 g/cm3

As the density of the substance (0.9 g/cm3) is less than the density of the water (1 g/cm3), the substance will float on water.