

Density Worksheet

Name KEY Section _____
 Chemistry 101



Density is the **ratio** of the **mass** of the substance to the **volume** of the substance at a given temperature. Density has units of **g/cm³** or **g/c.c.** or **g/mL** for liquids and solids, and **g/L** for gases.

Density is an **intensive** property. Density **varies** with change in **temperature**.

1. A gold-colored ring has a mass of 18.9 grams and a volume of 1.12 mL. Is the ring pure gold? (The density of gold is 19.3 g/mL.)

$$D = \frac{M}{V} = \frac{18.9g}{1.12mL} = 16.9g/mL ; \text{ NOT GOLD}$$

$$\frac{1.12mL}{1000mL}$$

2. What volume would a 0.871 gram sample of air occupy if the density of air is 1.29 g/L?

$$V = \frac{M}{D} = \frac{0.871g}{1.29g/L} = 0.675L$$

3. Pumice is volcanic rock that contains many trapped air bubbles. A 225 gram sample occupied 236.6 mL. What is the density of pumice? (Answer is 0.951 g/mL)

$$D = \frac{M}{V} = \frac{225g}{236.6mL} = 0.951g/mL$$

Will pumice float on water? The density of water is 1.0 g/mL.)

yes ; its density is less than 1.0g/mL

4. A cup of sugar has a volume of 237 mL. What is the mass of the cup of sugar if the density is 1.59 g/mL? (Ans. is 377 grams)

$$M = D \cdot V = 1.59g/mL \cdot 237mL = 377g$$

5. Which has the greater mass, 1 liter of water or 1 liter of gasoline? The density of water is 1.00 g/mL and that of gasoline is approximately 0.68 g/mL.

$$M_{\text{Gas}} = D \cdot V = 0.68g/mL \cdot 1000mL = 680g$$

$$M_{\text{water}} = D \cdot V = 1.00g/mL \cdot 1000mL = 1000g \rightarrow \text{water Greater mass}$$

6. A crumpet recipe calls for 175 grams of flour. According to Julia Child's data, the density of flour is 0.620 g/mL. How many mL of flour are needed for this recipe? (Ans. is 282 mL)

$$V = \frac{M}{D} = \frac{175g}{0.620g/mL} = 282mL$$

7. From their density values, decide whether each of the following substances will sink or float when placed in sea water, which has a density of 1.025 g/mL.

Gasoline 0.66 g/mL **Float**

Asphalt 1.2 g/mL **Sink**

Mercury 13.6 g/mL **Sink**

Cork 0.26 g/mL **Float**

8. Mercury is a liquid metal having a density of 13.6 g/mL. What is the volume of 1.00 lb of mercury metal? (33.4 mL)

$$d = 13.6 \text{ g/mL}$$

$$m = 1.00 \text{ lb} \quad \text{need conversion g to lb}$$

$$D = \frac{M}{V} \Rightarrow V = \frac{M}{D} = \frac{\quad}{13.6 \text{ g/mL}}$$

9. A sample of lead is found to have a mass of 32.6 g. A graduated cylinder contains 2.8 mL of water. After the lead sample is added to the cylinder the water level reads 5.7 mL. Calculate the density of the lead sample. (11 g/mL)

$$m = 32.6 \text{ g}$$

$$V = 5.7 \text{ mL} - 2.8 \text{ mL} =$$

$$d = ?$$

$$D = \frac{32.6 \text{ g}}{2.9 \text{ mL}}$$

$$D = 11 \text{ g/mL}$$

10. A piece of magnesium is in the shape of a cylinder with a height of 5.62 cm and a diameter of 1.34 cm. If the magnesium sample has a mass of 14.1 g, what is the density of the sample? (1.78 g/mL)

$$1 \text{ cm}^3 = 1 \text{ mL}$$

$$V = \pi r^2 h = 3.14 \cdot \left(\frac{1.34 \text{ cm}}{2}\right)^2 \cdot 5.62 \text{ cm} = 7.92 \text{ cm}^3$$

$$m = 14.1 \text{ g}$$

$$d = ?$$

$$D = \frac{M}{V} = \frac{14.1 \text{ g}}{7.92 \text{ cm}^3 (\text{mL})}$$

$$D = 1.78 \text{ g/mL}$$