

Mass, volume, density

- **Mass of an object describes the amount of matter contained in it. Mass is denoted by m .**

Units of mass are kilograms (kg), grams (g), tons, pounds, ounces, etc.

- **Volume of an object tells us how much space does the object take up. Volume is denoted by V .**

Units of volume are liters(l), milliliters (ml), cubic meters (m^3), gallons, etc.

- **Density is a property of a material: it tells us how much mass is contained in a given volume of the material. It tells us how tightly the matter is packed. Density is denoted by ρ (Greek letter “rho”).**

$$\text{Density} = \frac{\text{Mass}}{\text{Volume}} \quad \text{or} \quad \rho = \frac{m}{V}$$

Homework

Problem 1.

Bronze is an alloy containing primarily copper with a 12% (by mass) admixture of tin. Density of copper is 8.9 g/cm^3 ; density of tin is 7.3 g/cm^3 . Find density of bronze.

Problem 2.

The planet Earth's total mass can be measured and turns out to be about $6 \cdot 10^{24}$ kilograms. The Earth is almost a perfect sphere with the radius approximately 6400 km (4000 miles). Find average density of the Earth. Convert it to g/cm^3 and compare to copper density from the last problem and to the density of water (1 g/cm^3).

Hint: Volume of a spherical body can be found with the formula $V = \frac{4}{3}\pi R^3$ where R is the radius.