

Problem Set: Converting Units

Try to express your final answers in the proper number of significant figures.

4.1. Construct two conversion factors from the following relationships.

(a) 1 inch = 2.54 cm

(b) 1 dozen = 12 things

(c) 1 m = 10^6 μ m

(d) 1 cm³ = 1 mL

4.2. Convert, in a single step:

(a) 5.209 kW into W

(b) 20.0 μ L into L

(c) 38,000 g into Mg

(d) 0.000 000 035 torr into mtorr (torr is a unit of pressure)

4.3. Convert, in two steps:

(a) 35.4 MHz to mHz

(b) 7.24×10^7 nm to km

(c) 29.11 μ L to mL

(d) 0.95 msec to nsec

4.4. The human eye is most sensitive to green light, which has a wavelength of about 5500 Å, where 1 Å ('Ångström') equals 1×10^{-10} m. What is the wavelength of green light in units of m?

4.5. Evaluate the following expressions using your calculator, and determine the correct final unit:

(a) $78.3 \text{ kg} \cdot \frac{1000 \text{ g}}{1 \text{ kg}} \cdot \frac{1000 \text{ mg}}{1 \text{ g}} =$

(b) $0.073 \text{ L} \cdot \frac{832 \text{ g}}{1 \text{ L}} \cdot \frac{1 \text{ mol}}{40.04 \text{ g}} =$

(c) $1.088 \text{ L} \cdot \frac{1 \text{ mol}}{22.4 \text{ L}} \cdot \frac{28.02 \text{ g}}{1 \text{ mol}} \cdot \frac{1000 \text{ mg}}{1 \text{ g}} =$

- 4.6. What is the density of a material, in units of $\frac{\text{g}}{\text{cm}^3}$, if 0.497 kg has a volume of 0.107 L?
- 4.7. What mass of helium has a volume of 125.0 L if the density of helium gas is $0.1787 \frac{\text{g}}{\text{L}}$?
- 4.8. Sodium chloride, NaCl, has a density of $2.17 \frac{\text{g}}{\text{cm}^3}$. If you needed 250.0 grams of NaCl, what volume would you need?
- 4.9. Which has more mass, 2750 mL of argon gas having a density of $1.784 \frac{\text{g}}{\text{L}}$ or 4.50 cm^3 of phenol, which has a density of $1.058 \frac{\text{g}}{\text{cm}^3}$? (Argon gas is sometimes used to fill light bulbs; phenol is the active ingredient in some sore-throat lozenges.)
- 4.10. How many mm^3 are there in one liter?