

## Dimensional Analysis Problems

1. The density of lead (Pb) is  $11.4 \text{ g/cm}^3$ . What is the mass (in kg) of a lead brick with the dimensions 2.0 in. by 4.0 in. by 8.0 in? (12 kg)
2. If gasoline cost \$3.79/gallon, compare the expense of driving 10,000 miles in a big SUV that gets 14 mi/gal with that of a compact car that gets 15 km/L. (Given:  $1.06 \text{ qt} = 1.0 \text{ L}$ ) (\$2707 compared to \$1080)
3. In order to walk 3.5 miles, the average adult consumes 270 kcal. A can of pop contains 150 kcal. If you plan to walk a distance of 105 km, how many cans of pop should you take along for fuel? (34 cans)
4. The radius of an aluminum (Al) atom is 0.125 nm ( $1 \text{ nm} = 10^{-9} \text{ m}$ ). How many Al atoms would be lined up in a row to form a line 1.0 cm in length? ( $4 \times 10^7$  atoms)
5. Seawater is 4% salts, and the density of seawater is  $62.4 \text{ lb/ft}^3$ . How many pounds of salt are there in 100.0 gallons of seawater? (Given:  $1 \text{ ft}^3 = 7.5 \text{ gallons}$ ) (33.28 lbs)

6. Copper (Cu) is a trace element that is essential for nutrition. Newborn infants require  $80 \mu\text{g}$  of Cu per kilogram of body weight per day. ( $1 \mu\text{g} = 10^{-6} \text{g}$ ) The Cu content of a popular baby formula is  $0.48 \mu\text{g}$  of Cu per milliliter. How many milliliters of formula should a 7.0-lb baby consume per day to obtain the minimum daily Cu requirement? (530 mL)
7. A certain automobile engine has a displacement of 5.74 L. Convert this volume to cubic inches. ( $350 \text{ in}^3$ )
8. How many seconds are required to run a 100 yard dash at an average speed of  $10.0 \text{ m/s}$ ? (9.14s)
9. Calculate the density of mercury (Hg), given that a spherical droplet of Hg with radius of 0.328 cm has a mass of 2.00g and the volume of a sphere =  $\frac{4}{3}\pi r^3$ . ( $13.5 \text{ g/cm}^3$ )
10. On a certain day the concentration of carbon monoxide (CO) in the air over Detroit reached  $1.8 \times 10^{-5} \text{ g/L}$ . Convert this concentration to milligrams per cubic meter. ( $18 \text{ mg/m}^3$ )