Exercise 1.12

(a) The recommended daily allowance (RDA) of the trace metal magnesium is 410 mg/day for males. Express this quantity in μg/day. (b) For adults, the RDA of the amino acid lysine is 12 mg per kg of body weight. How many grams per day should a 75-kg adult receive? (c) A typical multivitamin tablet can contain 2.0 mg of vitamin B2 (riboflavin), and the RDA is 0.0030 g/day. How many such tablets should a person take each day to get the proper amount of this vitamin, if he gets none from other sources? (d) The RDA for the trace element selenium is 0.000070 g/day. Express this dose in mg/day.

Solution

Start with the given quantities and go from there.

Part (a)

$$410 \; \frac{\text{mg}}{\text{day}} \times \frac{1 \; \text{g}}{1000 \; \text{mg}} \times \frac{10^6 \; \mu\text{g}}{1 \; \text{g}} = 4.1 \times 10^5 \; \frac{\mu\text{g}}{\text{day}}$$

Here it's assumed that the uncertainty is in the tens place in "410 mg/day" so that there are two significant figures. Scientific notation is needed to be specific.

Part (b)

Multiply the RDA by the adult's mass to find out how much lysine he or she needs and then convert it to grams.

$$12 \; \frac{\text{mg lysine}}{\text{kg body weight}} \times 75 \; \text{kg} \times \frac{1 \; \text{g}}{1000 \; \text{mg}} = 0.90 \; \text{g lysine}$$

Part (c)

$$\frac{1 \; \text{tablet}}{2.0 \; \text{mg}} \times \frac{1000 \; \text{mg}}{1 \; \text{g}} \times \frac{0.0030 \; \text{g}}{1 \; \text{day}} = 1.5 \; \frac{\text{tablets}}{\text{day}}$$

Part (d)

$$0.000070 \; \frac{\text{g}}{\text{day}} \times \frac{1000 \; \text{mg}}{1 \; \text{g}} = 0.070 \; \frac{\text{mg}}{\text{day}}$$