Problem 29

The following masses are given in kilograms. Use metric prefixes on the gram to rewrite them so the numerical value is bigger than one but less than 1000. For example, 7×10^{-4} kg could be written as 70 cg or 700 mg. (a) 3.8×10^{-5} kg; (b) 2.3×10^{17} kg; (c) 2.4×10^{-11} kg; (d) 8×10^{15} kg; (e) 4.2×10^{-3} kg.

Solution

The prefixes and their meanings are listed in Figure 1.2 on page 17.

$$3.8 \times 10^{-5} \text{ kg} = 3.8 \times 10^{-5} \text{ kg} \times \frac{10^3 \text{ g}}{1 \text{ kg}} \times \frac{10^3 \text{ mg}}{1 \text{ g}} = 3.8 \times 10^1 \text{ mg} = 38 \text{ mg}$$

$$2.3 \times 10^{17} \text{ kg} = 2.3 \times 10^{17} \text{ kg} \times \frac{10^3 \text{ g}}{1 \text{ kg}} \times \frac{1 \text{ Eg}}{10^{18} \text{ g}} = 2.3 \times 10^2 \text{ Eg} = 230 \text{ Eg}$$

$$2.4 \times 10^{-11} \text{ kg} = 2.4 \times 10^{-11} \text{ kg} \times \frac{10^3 \text{ g}}{1 \text{ kg}} \times \frac{10^9 \text{ ng}}{1 \text{ g}} = 2.4 \times 10^1 \text{ ng} = 24 \text{ ng}$$

$$8 \times 10^{15} \text{ kg} = 8 \times 10^{15} \text{ kg} \times \frac{10^3 \text{ g}}{1 \text{ kg}} \times \frac{1 \text{ Eg}}{10^{18} \text{ g}} = 8 \text{ Eg}$$

$$4.2 \times 10^{-3} \text{ kg} = 4.2 \times 10^{-3} \text{ kg} \times \frac{10^3 \text{ g}}{1 \text{ kg}} = 4.2 \text{ g}$$