

Learning Outcomes

After studying this chapter, you should be able to:

- Distinguish among elements, compounds, and mixtures. (Section 1.2)
- Identify symbols of common elements. (Section 1.2)
- Identify common metric prefixes. (Section 1.4)
- Demonstrate the use of significant figures, scientific notation, and SI units in calculations. (Section 1.5)
- Attach appropriate SI units to defined quantities, and employ dimensional analysis in calculations. (Sections 1.4 and 1.6)

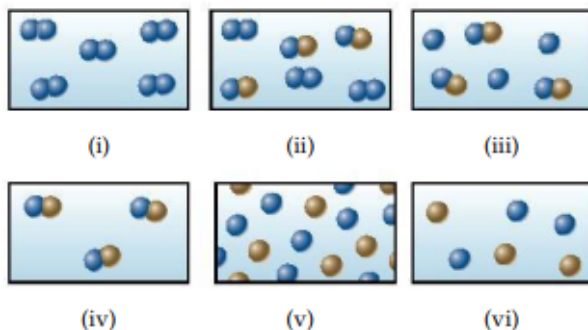
Key Equations

- $K = ^\circ\text{C} + 273.15$ [1.1] Converting between Celsius ($^\circ\text{C}$) and Kelvin (K) temperature scales
- $^\circ\text{C} = \frac{5}{9}(^\circ\text{F} - 32)$ or $^\circ\text{F} = \frac{9}{5}(^\circ\text{C}) + 32$ [1.2] Converting between Celsius ($^\circ\text{C}$) and Fahrenheit ($^\circ\text{F}$) temperature scales
- $\text{Density} = \frac{\text{mass}}{\text{volume}}$ [1.3] Definition of density

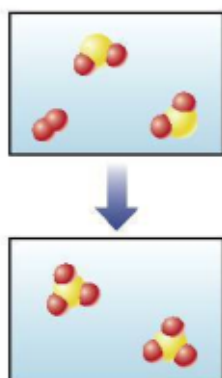
Exercises

Visualizing Concepts

- 1.1 Which of the following figures represents (a) a pure element, (b) a mixture of two elements, (c) a pure compound, (d) a mixture of an element and a compound? (More than one picture might fit each description.) [Section 1.2]



- 1.2 Does the following diagram represent a chemical or physical change? How do you know? [Section 1.3]



- 1.3 Describe the separation method(s) involved in brewing a cup of coffee. [Section 1.3]



- 1.4 Identify each of the following as measurements of length, area, volume, mass, density, time, or temperature: (a) 25 ps, (b) 374.2 mg, (c) 77 K, (d) 100,000 km², (e) 1.06 μm, (f) 16 nm², (g) -78 °C, (h) 2.56 g/cm³, (i) 28 cm³. [Section 1.4]
- 1.5 (a) Three spheres of equal size are composed of aluminum (density = 2.70 g/cm³), silver (density = 10.49 g/cm³), and nickel (density = 8.90 g/cm³). List the spheres from lightest to heaviest. (b) Three cubes of equal mass are composed of gold (density = 19.32 g/cm³), platinum (density = 21.45 g/cm³), and lead (density = 11.35 g/cm³). List the cubes from smallest to largest. [Section 1.4]
- 1.6 The three targets from a rifle range shown on the next page were produced by: (A) the instructor firing a newly acquired target rifle; (B) the instructor firing his personal target rifle; and (C) a student who has fired his target rifle only a few times. (a) Comment on the accuracy and precision for each of these three sets of results. (b) For the A and C results in the future to look like those in B, what needs to happen? [Section 1.5]