1.12  
Li: Lithium  
F: Fluorine  
P: Phosphorus  
Cu: Copper  
As: Arsenic  
Zn: Zinc  
Cl: Chlorine  
Pt: Platinum  
Mg: Magnesium  
U: Uranium  
Al: Aluminum  
Si: Silicon  
Ne: Neon

1.13  
(a) K (potassium)  
(b) Sn (tin)  
(c) Cr (chromium)  
(d) B (boron)  
(e) Ba (barium)  
(f) Pu (plutonium)  
(g) S (sulfur)  
(h) Ar (argon)  
(i) Hg (mercury)

1.23  
Strategy: Use the density equation \( d = \frac{m}{V} \).  
Solution: \( d = \frac{586 \text{ g}}{188 \text{ mL}} = 3.12 \text{ g/mL} \)

1.24  
\text{mass of ethanol} = \frac{0.798 \text{ g}}{1 \text{ mL}} \times 17.4 \text{ mL} = 13.9 \text{ g}

1.27  
Strategy: Use the density equation.  
Solution: \( V = \frac{m}{d} = \frac{2.50 \text{ g}}{0.992 \text{ g/mL}} = 2.52 \text{ mL} \)

1.35  
(a) Quantitative. This statement involves a measurable distance.  
(b) Qualitative. This is a value judgment. There is no numerical scale of measurement for artistic excellence.  
(c) Qualitative. If the numerical values for the densities of ice and water were given, it would be a quantitative statement.  
(d) Qualitative. The statement is a value judgment.  
(e) Qualitative. Even though numbers are involved, they are not the result of measurement.

1.37  
(a) Physical change. The material is helium regardless of whether it is located inside or outside the balloon.  
(b) Chemical change in the battery.  
(c) Physical change. The orange juice concentrate can be regenerated by evaporation of the water.  
(d) Chemical change. Photosynthesis changes water, carbon dioxide, etc., into complex organic matter.  
(e) Physical change. The salt can be recovered unchanged by evaporation.
1.40 a. exact  b. inexact  c. exact  d. inexact  e. exact

1.48 (a) four  (b) two  (c) five  (d) two, three, or four  (e) three  (f) one  (g) one  (h) two

1.50 (a) 10.6 m  (b) 0.79 g  (c) 16.5 cm

1.53 Tailor Z’s measurements are the most accurate. Tailor Y’s measurements are the least accurate. Tailor X’s measurements are the most precise. Tailor Y’s measurements are the least precise.

1.59 (a) Strategy: The measurement is given in mi/min. We are asked to convert this rate to in/s. Use conversion factors to convert mi → ft → in and to convert min → s.

Setup:
Use the conversion factors: \[ \frac{5280 \text{ ft}}{1 \text{ mi}} \times \frac{12 \text{ in}}{1 \text{ ft}} \times \frac{1 \text{ min}}{60 \text{ s}} \]

Solution:
\[ \frac{1 \text{ mi}}{13 \text{ min}} \times \frac{5280 \text{ ft}}{1 \text{ mi}} \times \frac{12 \text{ in}}{1 \text{ ft}} \times \frac{1 \text{ min}}{60 \text{ s}} = 81 \text{ in/s} \]

(b) Strategy: The measurement is given in mi/min. We are asked to convert this rate to m/min. Use a conversion factor to convert mi → m.

Setup:
Use the conversion factor \[ \frac{1609 \text{ m}}{1 \text{ mi}} \]

Solution:
\[ \frac{1 \text{ mi}}{13 \text{ min}} \times \frac{1609 \text{ m}}{1 \text{ mi}} = 1.2 \times 10^2 \text{ m/min} \]

(c) Strategy: The measurement is given in mi/min. We are asked to convert this rate to km/h. Use conversion factors to convert mi → m → km and to convert min → h.

Setup:
Use the conversion factors:
\[ \frac{1609 \text{ m}}{1 \text{ mi}} \times \frac{1 \text{ km}}{1000 \text{ m}} \times \frac{60 \text{ min}}{1 \text{ h}} \]

Solution:
\[ \frac{1 \text{ mi}}{13 \text{ min}} \times \frac{1609 \text{ m}}{1 \text{ mi}} \times \frac{1 \text{ km}}{1000 \text{ m}} \times \frac{60 \text{ min}}{1 \text{ h}} = 7.4 \text{ km/h} \]

1.60 \[ 6.0 \text{ ft} \times \frac{1 \text{ m}}{3.28 \text{ ft}} = 1.8 \text{ m} \]

\[ 168 \text{ lb} \times \frac{453.6 \text{ g}}{1 \text{ lb}} \times \frac{1 \text{ kg}}{1000 \text{ g}} = 76.2 \text{ kg} \]

1.68 (a) Convert the dimensions of the room to dm:

\[ 17.6 \text{ m} \times \frac{10 \text{ dm}}{\text{m}} = 176 \text{ dm}; \ 8.80 \text{ m} \times \frac{10 \text{ dm}}{\text{m}} = 88.0 \text{ dm}; \ 2.64 \text{ m} \times \frac{10 \text{ dm}}{\text{m}} = 26.4 \text{ dm} \]

Multiply the room dimensions to get the volume of the room:

\[ 176 \text{ dm} \times 88.0 \text{ dm} \times 26.4 \text{ dm} = 4.089 \times 10^5 \text{ dm}^3 = 4.089 \times 10^5 \text{ L} \]

Because the concentration of CO in the room is \( 8.00 \times 10^2 \text{ ppm} \), the volume that would be occupied under the same conditions by the CO alone is

\[ 4.089 \times 10^5 \text{ L} \times \frac{8.00 \times 10^2 \text{ L CO}}{1.00 \times 10^5 \text{ L total}} = 327 \text{ L} \]
(b) \[ \frac{0.050 \text{ mg}}{\text{m}^3} \times \frac{1 \text{ g}}{1 \times 10^3 \text{ mg}} \times \left( \frac{1 \text{ m}}{10 \text{ dm}} \right)^3 = 5.0 \times 10^{-8} \text{ g/dm}^3 = 5.0 \times 10^{-8} \text{ g/L} \]

(c) \[ \frac{120 \text{ mg}}{1 \text{ dL}} \times \frac{1 \times 10^3 \text{ µg}}{1 \text{ mg}} \times \frac{10 \text{ dL}}{1 \text{ L}} \times \frac{1 \text{ L}}{1000 \text{ mL}} = 1.20 \times 10^3 \text{ µg/mL} \]

1.72 Volume of sample: \( V = 18.45 \text{ mL} - 17.00 \text{ mL} = 1.45 \text{ mL} \)

Density: \[ d = \frac{m}{V} = \frac{13.2 \text{ g}}{1.45 \text{ mL}} = 9.10 \text{ g/mL} \]