Ch. 1 # 1, 5, 27, 31, 37, 44, 46, 55, 57, 59, 67, 73, 75, 77, 82, 84

(1) (a) $A + B \rightarrow C$ Chemical change

(b) $A + B \rightarrow D$ Chemical change

(c) $C \rightarrow D$ physical

(d) same chemical properties went from g → solid

(5) physical change - state of substance is changed but not Chemical composition

Chemical Change - one or more substances is converted into one or more new substances with different composition and properties

(a) Chemical $MgCl_2 \rightarrow Mg + Cl_2$

(b) Chemical "rusting"

(27) $2.22 \times 10^{-10}\ m \Rightarrow A^\circ$ $\quad 1A^\circ = 10^{-10}\ m$

$$2.22 \times 10^{-10}\ m \times \frac{1\text{Å}}{10^{-10}\ m} = \boxed{2.22\ \text{Å}}$$

(31) (a) $7903\ mm^2 \rightarrow ft^2$

$$7903\ mm^2 \times \left(\frac{1\ cm}{10\ mm}\right)^2 \times \left(\frac{1\ m}{100\ cm}\right)^2 \times \left(\frac{39.37\ in}{1\ m}\right)^2 \times \left(\frac{1\ ft}{12\ in}\right)^2 = \boxed{0.08511\ ft^2 \text{ or } 8.51 \times 10^{-2}\ ft^2}$$

(b) $$7903\ mm^2 \times \frac{45\ s}{135\ mm^2} = \boxed{2.634 \times 10^3\ s}$$

(37) (a) $1\ qt = 946.4\ mL = ?\ m^3$

$$946.4\ cm^3 \times \left(\frac{1\ m}{100\ cm}\right)^3 = \boxed{9.46 \times 10^{-4}\ m^3}$$

(b) $$835\ gal \times \frac{4\ qt}{1\ gal} \times \frac{1000\ cm^3}{1.057\ qt} \times \frac{1\ L}{1000\ cm^3} =$$

$\boxed{3.16 \times 10^3\ L}$

(44) $m = 25g$ added to $25mL\ H_2O$

$Zn = 7.14 g/mL$

$Fe = 7.87 g/mL$

$Ni = 8.91 g/mL$

(a) $V = 28.1 - 25 = 3.1\ mL$

$D = 25g / 3.1 = 8.06 g/mL$ → Fe

(b) $V = 27.7 - 25 = 2.7 mL$

$D = 25g / 2.7 = 9.25 g/mL$ → Ni

(c) $V = 28.5 - 25 = 3.5$

$D = 25g / 3.5 = 7.14 g/mL$ → Zn

(46) (a) more dense than water = A

less dense than water = B + C

(b) $W_{den} = 1.0 g/mL$

$C_{den} = 0.88 g/mL$

$A_{den} = 1.4 g/mL$

B_{den} = * must be less than water but greater than C

$= 0.94 g/mL$

(55) (a) 231.554 → 231.6

5 followed by nonzeros so preceding # ↑ by 1

(b) 0.00845 → 0.0084

5 not followed by any #'s so preceeding # is even so it stays the same

(c) 144000 → 140000 or 1.4×10^5

(57) round to 1 few & calculate

$$\frac{11 * 6.2 * 2.38}{24 * 2 * 20} = 0.16907\ldots \rightarrow 0.2$$

↑ controls # sigfigs

(59) (a) $\frac{2.420 + 15.6}{4.8} = \boxed{3.8}$

↑ controls Sigfig

(b) $\frac{7.87}{16.1 - 8.44} = 1.0274 \rightarrow 1.0$

$16.1 - 8.44$

7.66

7.6 subtraction carries only 1 place past decimal resulting in 2 sigfig

(c) $V = \pi r^2 h$ $\quad r = 6.23\,cm$ $\quad h = 4.630\,cm$

$V = 3.14(6.23)^2(4.630) = 564.555\,cm^3$

3 sigfigs → $565\,cm^3$

(67) (a) $\frac{4.32 \times 10^7\,g}{\frac{4}{3}(3.1416)(1.95 \times 10^2\,cm)^3} = 1.39\,g/cm^3$

(b) $\frac{(1.84 \times 10^2\,g)(44.7\,m/s)^2}{2} = 1.84 \times 10^5\,g\,m^2/s^2$

(c) $\frac{(1.07 \times 10^{-4}\,mol/L)^2(3.8 \times 10^{-3}\,mol/L)}{(8.35 \times 10^{-5}\,mol/L)(1.48 \times 10^{-2}\,mol/L)^3} = 0.16\,mol^{-1}L$

(73)

(a) same average result = II / IV

(b) high precision = III / IV all shots close together

(c) high accuracy = IV (maybe II)

(d) systematic error = III ★ problem w/ instrument ★ not calibrated

(75) (a) How many chemical changes

yellow + red → yellow red

red + blue → red blue (2)

(b) physical changes

blue (solid) or (liquid) → b (gas) (1)

(77) 50.0m x 25.0m

(a) How many gallons H_2O w/ d = 1.0 g/mL needed for 4.8ft deep?

$4.8\,ft \times \frac{0.3048\,m}{1\,ft} = 1.463\,m$ deep

total volume = $50.0(25.0)(1.463) = 1828.75\,m^3$

$1828.75\,m^3 \times \frac{1\,dM}{10^{-3}\,m^3} \times \frac{1\,gal}{3.785\,dM^3} =$

4.8×10^5 gallons of water needed

(b) mass of water = $4.8 \times 10^5\,gal \times \frac{1000\,cM^3}{0.2642\,gal} \times \frac{1\,g}{1\,cM^3} \times \frac{1\,Kg}{1000} = 1.8 \times 10^6\,Kg$

(82) $N_{2(l)}$ b.p. = 77.36K

(a) temp in °C = 77.36K − 273.15 = **−195.79 °C**

(b) ★ don't need to know

$\frac{9}{5}(-195.79°C) + 32 =$ **−320.35 °F**

(c) $\text{density}_{\text{liquid}} = 809\ g/L$

$\text{density}_{gas} = 4.566\ g/L$

How many liters of liquid nitrogen are produced when 895.0L of N_2 gas (liquified) at 77.36K?

$N_{2(g)} \rightarrow N_{2(l)}$

895.0L ? L

$$895.0L \times \frac{4.566g}{1L} =$$

$$4086.57\ g\ N_2 \times \frac{1L}{809g} = 5.05L$$

Convert to L of liquid N_2 using density

(84)

(a) Physical change = A

(b) Chemical change = B

(c) different physical properties = A & B

(d) different chemical properties = B

(e) change in state = A