Pg. 100 #69

$$Cd(NO_3)_2 + (NH_4)_2S \longrightarrow 2NH_4NO_3 + CdS$$

cadmium nitrate + ammonium sulfide $\longrightarrow$ *ammonium nitrate + cadmium sulfide*

Pg. 100 #70

$$(227\ g\ insecticide)(0.05) = 11\ g\ rotenone$$

$$\frac{11}{344.0\ \frac{g}{mol}} = 0.028\ mol \times (6.022 \times 10^{23}) = 1.7 \times 10^{22}\ molecules$$

Pg. 100 #71

$$300.\ mg \times 2\ tablets = 600.\ mg = 0.600\ g\ C_7H_5BiO_4$$

$$\frac{0.600\ g\ C_7H_5BiO_4}{(12.0)(7)+(1.01)(5)+209.0+(16.0)(4)} = 0.00166\ mol$$

$$\%Bi = \frac{209.0}{(12.0)(7)+(1.01)(5)+209.0+(16.0)(4)} = 57.7\%$$

$$(0.577)(0.600\ g) = 0.346\ g\ Bi$$

Pg. 100 #72

$$\frac{0.050\ g\ SnF_2}{(118.7)+2(19.0)} = 3.2\times10^{-4}\ mol\ SnF_2$$

$$3.2\times10^{-4}\ mol\ SnF_2 \times \frac{1\ Sn^{+2}}{1\ molecule} = 3.2\times10^{-4}\ mol\ Sn^{+2}\ ions = 1.9\times10^{20}\ molecules$$

$$3.2\times10^{-4}\ mol\ SnF_2 \times \frac{2\ F^{-1}}{1\ molecule} = 6.4\times10^{-4}\ mol\ F^{-1}\ ions = 3.8\times10^{20}\ molecules$$

Pg. 100 #73

$$\frac{0.75\ g}{(21)(12.0)+(22)(1.01)+(2)(14.0)+(2)(16.0)}$$

$$= 0.0022\ mol$$

Pg. 100 #74

$$\frac{0.394\ g\ Mn}{54.9\ \frac{g}{mol}\ Mn} = 0.00718\ mol\ Mn \div 0.00718 = 1$$

$$\frac{1.006\ g\ CO}{28.0\ \frac{g}{mol}\ CO} = 0.0359\ mol\ Mn \div 0.00718 = 5$$

$Mn(CO)_5$ *has a mass of* $194.9\ g$ (*empirical*)

$Mn_2(CO)_{10}$ *has a mass of* $389.9\ g$ (*molecular*)

Pg. 100 #75

$$\frac{2.0\ g}{397.2\ \frac{g}{mol}} = 0.0050\ mol$$

Pg. 100 #76

$$0.673\ g\ N \times \frac{1\ mol}{14.0} = 0.0481\ mol\ N$$

$$1.00\ g\ M \times \frac{1\ mol}{x} = 0.144\ mol\ M$$

$$x = 6.94 \frac{g}{mol} = Li$$

Pg. 100 #77

$1.00\ mol\ S$

$24.1\times10^{23}\ atoms\ F\ =\ 4.00\ mol\ F$

$71.0\ g\ Cl_2 \div 35.5\frac{g}{mol} = 2.00\ mol\ Cl$

SF_4Cl_2

Pg. 100 #78

$$2MO \xrightarrow[\Delta]{} 2M + O_2$$

$$\frac{4.062}{4.386} = \%M = 92.6\% \ \therefore \ 7.4\%O$$

$$\frac{0.324\ g}{16.0\ \frac{g}{mol}} = 0.0203\ mol\ O$$

$$\frac{4.062}{x} = 0.0203\ mol\ M$$

$$M = 200.0\ g\ or\ mercury$$

Pg. 100 #79

$$0.33\%\ Fe\ and\ hemoglobin\ =\ 6.8\times10^{4}\ \frac{g}{mol}$$

$$(0.0033)(6.8\times10^{4}) = 220\ g$$

$$\frac{220\ g}{55.8\ \frac{g}{mol}} = 4.0\ mol\ =\ 2.4\times10^{24}\ atoms$$

Pg. 100 #80

a. 29.0 g
b. 3.0 g
c. 28.0 g
d. 27.6 g
e. 28.0 formula units

Ranking from least to greatest:

e, b, d, c, a

Pg. 100 #81

$$(28.3\ g)(1.0\times10^{6}) = 2.83\times10^{-5}\ g$$

$$\frac{2.83\times10^{-5}\ g}{322.0\ \frac{g}{mol}} = 8.79\times10^{-8}\ mol$$

Pg. 100 #82

$$C_{16}H_{15}Cl_3O_2 = 345.5\ \frac{g}{mol}$$

$$C = \frac{192\ g}{345.5\ \frac{g}{mol}} = 55.6\% \qquad H = \frac{15.0\ g}{345.5\ \frac{g}{mol}} = 4.34\%$$

$$Cl = \frac{106.5\ g}{345.5\ \frac{g}{mol}} = 30.8\% \qquad O = \frac{32.0\ g}{345.5\ \frac{g}{mol}} = 9.26\%$$

$$\frac{1.00}{0.454kg} = \frac{your\ mass}{x} \qquad 7.5x\ =\ fatal\ dosage$$

Pg. 100 #83

$$\frac{0.454\ g\ DDT}{354.5\ \frac{g}{mol}} = 1.28\ mol\ DDT$$

$$\%Cl = 50.1\% \qquad (0.501)(454) = 227\ g\ Cl$$

Pg. 100 #84

$$\frac{0.060\ g}{176.0\ \frac{g}{mol}} = 3.4\times10^{-4}\ mol$$

$$\frac{1.00\ g}{176.0\ \frac{g}{mol}} = 0.00568\ mol$$

$$0.00568\ mol \times 6 = 0.0341\ mol\ O\ =\ 2.05\times10^{22}\ atoms$$

Pg. 100 #85

$$\frac{1.056\ \text{g}}{63.5\ \frac{g}{mol}} = 0.0166\ \text{mol Cu}$$

$$\frac{0.266\ \text{g}}{16.0\ \frac{g}{mol}} = 0.0166\ \text{mol O}$$

CuO

Pg. 100 #86

$$23.5\ kg = 23500\ g$$

$$(0.788)(23500) = 18518\ g\ Sn$$

$$\%Sn = 78.8\%$$

Pg. 100 #87

FeS_2

$\%Fe = 46.5\%$

$(15.8\ kg)(0.465) = 7.35\ kg\ Fe$

Pg. 101 #88

$$(.0675)(1000\ kg) = 67.5\ kg = 67500\ g$$

$$\frac{Ti}{FeTiO_3} = \frac{47.9}{55.8 + 47.9 + 3(16.0)} = \frac{67500}{x}$$

$$x = 214000\ g = 214\ kg$$

Pg. 101 #89

$$(.106)(454\ g) = 48.1\ \text{g}$$

$$\frac{Sb}{Sb_2S_3} = \frac{2(121.8)}{2(121.8)+3(32.1)} = \frac{48.1}{x}$$

$$x = 67.1\ g$$

Pg. 101 #90

$$(0.1898)(100.0\ g) = 18.98\ g\ Na \times \frac{1\ mol\ Na}{23.0\ g} = 0.8252\ \text{mol} \div 0.207 = 4$$

$$(0.167)(100.0\ g) = 16.7\ g\ Al \times \frac{1\ mol\ Al}{27.0\ g} = 0.619\ \text{mol} \div 0.207 = 3$$

$$(0.1739)(100.0\ g) = 17.39\ g\ Si \times \frac{1\ mol\ Si}{28.1\ g} = 0.6185\ \text{mol} \div 0.207 = 3$$

$$(0.0732)(100.0\ g) = 7.32\ g\ Cl \times \frac{1\ mol\ Cl}{35.5\ g} = 0.207\ \text{mol} \div 0.207 = 1$$

$$(0.3961)(100.0\ g) = 39.61\ g\ O \times \frac{1\ mol\ Cl}{16.0\ g} = 2.48\ \text{mol} \div 0.207 = 12$$

$Na_4Al_3Si_3ClO_{12}$

Pg. 101 #91

Since $CuCO_3$ contains all of the carbon and $Cu(OH)_2$ contains all of the hydrogen, we will use those elements to determine the mass of $CuCO_3$ and $Cu(OH)_2$ in 100 g of the mineral.

$$\frac{6.97}{x} = \frac{12.0\ g}{123.5\ g} = \frac{C}{CuCO_3} \qquad x = 71.7\ g$$

$$\frac{0.58}{x} = \frac{2.0\ g}{97.5\ g} = \frac{H}{Cu(OH)_2} \qquad x = 28.2\ g$$

$$71.7\ g \div 123.5 \tfrac{g}{mol} = 0.581 \text{ mol } CuCO_3 \div 0.289 = 2$$

$$28.2\ g \div 97.5 \tfrac{g}{mol} = 0.289 \text{ mol } Cu(OH)_2 \div 0.289 = 1$$

$$[CuCO_3]_2 \bullet [Cu(OH)_2]$$

Pg. 101 #92

$$V = (0.0550)(1.25)(1.25) = 0.0859\ cm^2$$

$$m = dV = (8.908)(0.0859) = 0.765\ g\ Ni$$

$$0.765\ g\ Ni \times \frac{1\ mol\ Ni}{58.7\ g} = 0.0130\ mol\ Ni$$

$$1.261\ g\ -\ 0.765\ g\ =\ 0.496\ g\ F$$

$$0.765\ g\ Ni \times \frac{1\ mol\ Ni}{58.7\ g} = 0.0130\ mol\ Ni \div 0.0130 = 1$$

$$0.496\ g\ F \times \frac{1\ mol\ F}{19.0\ g} = 0.0261\ mol\ Ni \div 0.0130 = 2$$

NiF_2 *is nickel(II) fluoride.*

Pg. 101 #93

$$V = (0.0450)(1.50)(1.95) = 0.132\ cm^2$$

$$m = dV = (2.699)(0.132) = 0.356\ g\ Al$$

$$0.356\ g\ Ni \times \frac{1\ mol\ Al}{27.0\ g} = 0.0132\ mol\ Al \times \frac{6.022 \times 10^{23}}{1\ mol\ Al} = 7.94 \times 10^{21}\ atoms$$

$$3.51\ g - 0.356\ g\ =\ 3.15\ g\ Br$$

$$\left(\frac{3.15\ g\ Br}{3.51\ g\ cmpd}\right) \times 533\ \tfrac{g}{mol}\ = 478\ g\ Br \div 79.9\ \tfrac{g}{mol} = 6$$

$$\left(\frac{0.356\ g\ Al}{3.51\ g\ cmpd}\right) \times 533\ \tfrac{g}{mol}\ = 54.0\ g\ Al \div 27.0\ \tfrac{g}{mol} = 2$$

Al_2Br_6 is aluminum bromide.

Pg. 101 #94a

$$0.169\ g\ U \times \frac{1\ mol\ U}{238.0\ g} = 7.10 \times 10^{-4}\ mol\ U$$

$$0.199 - 0.169 = 0.030\ g\ O$$

$$0.030\ g\ O \times \frac{1\ mol\ O}{16.0\ g} = 1.88 \times 10^{-3}\ mol\ O \div 7.10 \times 10^{-4} = 2.66 \times 3 = 8$$

$$0.169\ g\ U \times \frac{1\ mol\ U}{238.0\ g} = 7.10 \times 10^{-4}\ mol\ U \div 7.10 \times 10^{-4} = 1 \times 3 = 3$$

U_3O_8

$$0.199\ g\ U_3O_8 \times \frac{1\ mol\ U_3O_8}{842.0\ g} = 2.36 \times 10^{-4}\ mol$$

Pg. 101 #94bc

Since the molar mass of uranium is so close to 238, U-238 must be the most abundant isotope.

$$0.865 - 0.679 = 0.186 \text{ g water}$$

$$0.679 \text{ g } UO_2(NO_3)_2 \times \frac{1 \text{ mol } UO_2(NO_3)_2}{394.0 \text{ g}} = 0.00172 \text{ mol} \div 0.00172 = 1$$

$$0.186 \text{ g } water \times \frac{1 \text{ mol } water}{18.0 \text{ g}} = 0.0103 \text{ mol} \div 0.00172 = 6$$

$$UO_2(NO_3)_2 \bullet 6H_2O$$