CH1020 Exercises (Worksheet 1)

1) Calculate the percent composition of (a) sodium sulfate, (b) dinitrogen tetroxide, (c) strontium nitrate, and (d) aluminum sulfide.
   a) Na_2SO_4: 32.37% Na; 22.57% S; 45.06%O
   b) N_2O_4: 30.45% N; 69.56% O;
   c) $Sr(NO_3)_2$ 41.40% Sr; 13.24% N; 45.36% O
   d) Al_2S_3 35.94% Al; 64.05% S

2) A sample of an iron-containing compound is 22.0% iron, 50.2% oxygen, and 27.8% chlorine by mass. What is the empirical formula of this compound?

   Empirical formula: FeO_8Cl_2

3) Ferrophosphorus (Fe_2P) reacts with pyrite (FeS_2), producing iron(II) sulfide and a compound that is 27.87% P and 72.13% S by mass and has a molar mass of 444.56 g/mol.
   a) Determine the empirical and molecular formulas of the compound
   b) Write a balanced chemical equation for the reaction

   Empirical Formula: P_2S_5 ; Molecular Formula: P_4S_{10}
   $4\ Fe_2P(s) + 18\ FeS_2(s) \rightarrow 26\ FeS(s) + P_4S_{10}(s)$

4) What is the empirical formula of the compound that is 24.2% Cu, 27% Cl, and 48.8% O by mass?

   $CuCl_2O_8$

5) Which of the following nitrogen oxides have the same empirical formulas? (a) N_2O; (b) NO; (c) NO_2; (d) N_2O_2; (e) N_2O_4

   NO and N_2O_2 have the same empirical formula, as do NO_2 and N_2O_4.

6) Which two of the hydrocarbons with molecular structures shown below have the same percent composition?

   (b) and (d) have the same percent composition of C and H