CH1020 Exercises (Worksheet 4)

1) In the reaction A + B → C + D, 3.00 grams of substance C and 3.00 grams of substance D are produced as 2.00 grams of substance A are consumed. How many grams of substance B are also consumed?

   4.00g of B

2) Combustion of sulfur may, depending on reaction conditions, produce SO_2 or SO_3. If x grams of O_2 combine with y grams of sulfur to form SO_2, how many grams of O_2 combine with y grams of sulfur to form SO_3?

   1.5 x grams of oxygen

3) Write a balanced chemical equation for each of the following reactions:

   a) Carbon dioxide reacts with carbon to form carbon monoxide.

      $CO_2(g) + C(s) \rightarrow 2\ CO(g)$

   b) Potassium reacts with water to give potassium hydroxide and the element hydrogen

      $2\ K(s) + 2\ H_2O(\ell) \rightarrow 2\ KOH(aq) + H_2(g)$

   c) Phosphorus (P_4) burns in air to give diphosphorus pentoxide.

      $P_4(s) + 5\ O_2(g) \rightarrow 2\ P_2O_5(s)$

4) Some scientists believe that life on Earth originated near geothermal vents. Balance the following reactions, which are among those taking place near such vents:

   a) $2CH_3SH(aq) + CO(aq) \rightarrow CH_3COSCH_3(aq) + H_2S(aq)$

   b) $8H_2S(aq) + 8CO(aq) \rightarrow 4CH_3CO_2H(aq) + S_8(s)$

5) Balance the following reactions that occur during volcanic eruptions:

   a) $2SO_2(g) + O_2(g) \rightarrow 2SO_3(g)$

   b) $2H_2S(g) + 3O_2(g) \rightarrow 2SO_2(g) + 2H_2O(g)$

   c) $16H_2S(g) + 8SO_2(g) \rightarrow 3S_8(s) + 16H_2O(g)$

6) Copper was one of the first metals used by humans because it can be recovered from several copper minerals including cuprite (Cu_2O), chalcocite (Cu_2S), and malachite [$Cu_2CO_3(OH)_2$]. Balance the following reactions for converting these minerals into copper metal:

a) $2Cu_2O(s) + C(s) \rightarrow 4Cu(s) + CO_2(g)$

b) $2Cu_2O(s) + Cu_2S(s) \rightarrow 6Cu(s) + SO_2(g)$

c) $Cu_2CO_3(OH)_2(s) + C(s) \rightarrow 2Cu(s) + 2CO_2(g) + H_2O(g)$