**Using Mole Ratios**

The mass of a reactant available for most reactions in the chemistry laboratory rarely corresponds to the precise number of moles specified by the balanced chemical equation. For one thing, it is impractical and often expensive to investigate the reactions of large quantities of chemicals.

To overcome this problem, mole ratios are used.

**Practice:**

1. For the following reaction.

2 AgNO3(aq) + Na2CrO4(aq)→ Ag2CrO4(s) + 2NaNO3 (aq)

a) Write the ratio of all the components.

b) Write the mole ratio for silver nitrate, AgNO3(aq), and silver chromate, Ag2CrO4(s).

c) What amount (in mole) of Ag2CrO4(s) would be produced from 0.5 mol of AgNO3(aq)?

1. For the following reaction:

 2 NH3(g) + CO2 (g) → NH2CONH2 (s) + H2O (g)

a) Write the ratio of all the components of the reaction.

b) What amount (in mole) of ammonia, NH3(g), is required to prepare 1.30 mole of urea,

 NH2CONH2 (s)

c) What amount (in mole) of water is formed when 6.0 mole of carbon dioxide is consumed in the reaction?

1. The fertilizer ammonium sulfate, (NH4)2SO4(s), is made at Sherrit International Corporation’s plant in Fort Saskatchewan. The following chemical equation shows the reaction:

 2NH3(g) + H2SO4 (aq) → (NH4)2SO4 (s)

a) Write the ratio of all the components of the reaction

b) What amount of ammonia is necessary to prepare 20 000 mol of ammonium sulfate?

c) What amount of ammonium sulfate fertilizer is formed when 3.28 mole of ammonia is consumed in the reaction?

1. At 400°C, xenon and flurine react to produce colorless crystals of xenon tetra fluoride, XeF4(s), as shown below:

Xe(g) + 2F2(g) → XeF4(s)

a) Write a ratio of all the components of the reaction.

b) What amount of F2(g) is necessary to prepare 2.35 mole of XeF4(s)?

c) What amount of F2(g) is required ot reaction with 12.2 mmol of xenon?

1. A wide variety of products are possible from the reaction of nitrogen with oxygen. The equations shown below show two possible reactions:

2 N2(g) + O2 (g) → 2N2O (g) N2 (g) + 2O2 (g) → 2NO2 (g)

a) For each equation, write the ratio of all the components in the reaction.

b) What amount of O2 (g) reacts with 0.0935 mole of nitrogen to form N2O(g)?

c) What amount of O2 (g) reactions with 93.5 mmol of nitrogen to form NO2 (g)?

**Answers:**

1 a) 2:1:1:2 b) 2:1 c) 0.25 2. a) 2:1:1:2 b) 2.6 mole c) 6 mol

3 a) 2: 1: 1 b) 40 000 mol c) 1.64 mol 4. a) 1:2:1 b) 4.70 mol c) 24.4 mol

5 a) 2:1:2 // 1:2:1 b) 0.0418 mol c) 0.187 mol