Solutions stoichiometry

Stoichiometry overview

- Recall that in stoichiometry the mole ratio provides a necessary conversion factor:

molar mass of x ↓ grams (x) ↔ moles (x) ↔ moles (y) ↔ grams (y) ↓ molar mass of y

mole ratio from balanced equation

- We can do something similar with solutions:

mol/L of x ↓ volume (x) ↔ moles (x) ↔ moles (y) ↔ volume (y) ↓ mol/L of y

mole ratio from balanced equation

- Read pg. 351-353. Try Q 1-3a.

Pg. 353, Question 1

Ammonium sulfate is manufactured by reacting sulfuric acid with ammonia. What concentration of sulfuric acid is needed to react with 24.4 mL of a 2.20 mol/L ammonia solution if 50.0 mL of sulfuric acid is used?

Pg. 353, Question 2

Calcium hydroxide is sometimes used in water treatment plants to clarify water for residential use. Calculate the volume of 0.0250 mol/L calcium hydroxide solution that can be completely reacted with 25.0 mL of 0.125 mol/L aluminum sulfate solution.

Pg. 353, Question 3

A chemistry teacher wants 75.0 mL of 0.200 mol/L iron(III) chloride solution to react completely with an excess of 0.250 mol/L sodium carbonate solution. What volume of sodium carbonate solution is needed?

Assignment

1. H_2SO_4 reacts with NaOH, producing water and sodium sulfate. What volume of 2.0 M H_2SO_4 will be required to react completely with 75 mL of 0.50 mol/L NaOH?
2. How many moles of $Fe(OH)_3$ are produced when 85.0 L of iron(III) sulfate at a concentration of 0.600 mol/L reacts with excess NaOH?
3. What mass of precipitate will be produced from the reaction of 50.0 mL of 2.50 mol/L sodium hydroxide with an excess of zinc chloride solution.

Assignment

4. a) What volume of 0.20 mol/L $AgNO_3$ will be needed to react completely with 25.0 mL of 0.50 mol/L potassium phosphate?
   b) What mass of precipitate is produced from the above reaction?
5. What mass of precipitate should result when 0.550 L of 0.500 mol/L aluminum nitrate solution is mixed with 0.240 L of 1.50 mol/L sodium hydroxide solution?