Friday Worksheet   **Name: ……………….**

Gravimetric worksheet 4

1) Determination of the amount of magnesium chloride in a contaminated sample of the product was undertaken by a chemist. A 4.521 gram sample of the contaminated magnesium chloride was weighed and dissolved in 200 mL of water. The sample was then filtered and washed several times. The chemist then used excess silver (I) nitrate as the precipitating reagent to precipitate the chloride ions from the filtrate. The precipitate was filtered and washed with distilled water. The filtrate was repeatedly tested using potassium iodide. After several washings and repeated testing the chemist was convinced that the precipitate was right for drying. A final mass of 3.45 grams of precipitate was obtained.

   a)   Write an ionic equation for the precipitation reaction.

   $Ag^+_{(aq)} + Cl^-_{(aq)} \Rightarrow AgCl_{(s)}$

   b)   Calculate the percentage by mass of $MgCl_2$ in the contaminated sample.

   Step 1 Find the mole of AgCl

   ⇨   3.45 / 143.32 = 0.0241

   Step 2 Find the mole of Cl^-

   ⇨   This is also 0.0241

   Step 3 Find the mole of $MgCl_2$ present

   ⇨   0.0241 / 2 = 0.01205

   Step 4 find the mass of $MgCl_2$

   ⇨   Mass = 0.01205 X 95.21 = 1.15 grams

   Step 5 find the percentage by mass of $MgCl_2$ in the sample.

   ⇨   1.15 / 4.521 = 25.4%

   c)   What result from the test with potassium iodide indicates that the precipitate is ready to dry? Explain
   No precipitate is formed when the filtrate is mixed with potassium iodide. This indicates that all the excess silver ions and all other spectator ions have been washed through.

d) A 5.31 gram sample of contaminated $MgCl_2$ was found to contain 42.7% by mass of magnesium. What was the mass of the precipitate obtained from the experiment?

Step 1 Find the mass of Mg

⇨ 5.31 X 0.427 = 2.27 grams

Step 2 Find the mole of Mg

⇨ 2.27 / 24.31 = 0.0934

Step 3 Find the mole of Cl present

⇨ 0.0934 X 2 = 0.187 mol

Step 4 Find the mol of AgCl formed

⇨ This is also 0.187

Step 5 find the mass of AgCl

⇨ Mass = 0.187 X (107.9 + 35.5) = 26.8 grams