8. Aluminum fluoride, AlF_3 has a solubility of 5.59 g/L of solution at 20°C. Express this solubility in moles per litre.

9. Lead (II) chloride, $PbCl_2$, has solubility of 0.99 g/100.0 mL of solution at 20°C. Calculate the molar solubility of $PbCl_2$.

10. The molar solubility Of $MgCO_3$ is 1.26×10^{-3} M at 25°C. Express this value in grams per litre.

11. The molar solubility of Ag_2CO_3 is 1.2×10^{-4} M at 25°C. Express this value in grams per 100.0 mL.

12. Chromium (VI) oxide, CrO3(s), has a solubility of 92.6 g in 150.0 mL of solution at 0°c. Calculate the molar solubility of CrO_3.

13. Silver chlorite, $AgClO_2$, has a molar solubility of 0.014 M at 25°c. What mass of $AgClO_2$ is contained in 50. 0 mL of saturated $AgClO_2$?

14. Manganese (II) chloride, $MnCl_2$, has a molar solubility of 5.75 M at 0°C. If 125 mL of saturated $MnCl_2$ is evaporated to dryness, what mass of $MnCl_2$ will be left?

15. A chemistry student was assigned the task of determining the solubility of potassium chloride, KCl. She added an excess of solid KCl to water, stirred, and let the solution sit overnight. The next day, she pipetted a 25.00 mL portion of the saturated solution into a pre-weighed evaporating dish, determined the combined and re determined the mass, carefully boiled off the water present, allowed the residue to cool mass of the evaporating dish and residue. The data obtained is given below.

temperature of solution = 22.5°C
mass of evaporating dish = 54.87 g
mass of solution and evaporating dish = 84.84 g
mass of residue and evaporating dish = 62.59 g

Calculate:

(a) the mass of 25.00 mL of the solution.

(b) the mass of KCl in 25.00 mL of solution.

(c) the mass of water in 25.00 mL of solution.

(d) the mass of KCl which can dissolve in 100.0 g of water at 22.5°C.

(e) the molar solubility of KCl, expressed in moles of KCl per litre of solution.

16. The following data was obtained when a saturated solution of aqueous ammonium sulphate, $(NH_4)_2SO_4(aq)$, was poured into a beaker and evaporated to dryness.

temperature of solution = 25°C
volume of solution used 70.0 mL
mass of beaker = 87.23 g
mass of original solution and beaker = 147.42 g
mass of beaker and dried (NH4)2S04 = 104.08 g

Calculate:

(a) The mass of the solution.

(b) The mass of ammonium sulphate in the solution.

(c) The mass of water in the solution.

(d) The mass of ammonium sulphate which could be dissolved in 100.0 g of water.

(e) The molar concentration of the ammonium sulphate solution.

17. Examine the following diagram:

(a) Which salt is the most soluble at 60°C?

(b) If you put 40 g of KCl into 100g of water at 90°C, will you be able to form a saturated solution? Explain your answer.

(c) If you heat a saturated solution of calcium acetate, $Ca(CH_3COO)_2$, from 20°C to 80°C, what will you observe?

(d) If you put 20 g of $MgCl_2$ into 100 g of water at 20°C and gradually heat the solution, what will you observe?

(e) If you dissolve 90 g of both KBr and LiCl in 100 g of water at 90°C and then cool the mixture to 10°C, which salt will form crystals first?

(f) A solution contains 20 g of KCl and 20 g of KBr in 100 g of water at 20°C. If the solution is left open to the air, which salt will form crystals first as the water evaporates?

(g) Make a general statement regarding the change in solubility of LiCl(s) with a change in temperature. What does this imply about shifting the equilibrium:
$LiCl(s) \rightleftharpoons Li^+(aq) + Cl^-(aq)$
when the temperature is increased? Is the dissolving of LiCl(s) an endothermic or exothermic process?

(h) Is the dissolving of $Ca(CH_3COO)_2(s)$ endothermic or exothermic?

18. Calculate the concentration of all the ions in each of the following solutions.

(a) 0.25 M $FeCl_3$

(b) 1.5×10^{-3} M $Al_2(SO_4)_3$

(c) 12.0 g of $(NH_4)_2CO_3$ in 2.50 L

(d) 0.41 g of $Ca(OH)_2$ in 500 mL of aqueous solution

(e) 2.50 g of KBr in 150 mL of aqueous solution

19. (a) Write an equation showing the equilibrium in a saturated solution of lead (II) bromide, $PbBr_2$.

(b) The solubility of $PbBr_2$ is 0.844 g/100 mL. What is its molar solubility?

(c) Calculate the concentrations of Pb^{2+}(aq) and Br^- (aq) in a saturated solution of $PbBr_2$.

20. Calculate the concentration of all the ions present when

(a) 25.0 mL of water is added to 20.0 mL of 0.35 M Fe^{3+}.

(b) 50.0 mL of 0.25 M Ag^{+} is mixed with 100.0 mL of 0. 10 M NO_3^-.

(c) 15.0 mL of 6.5×10^{-5} M Cu^{2+} is mixed with 40.0 mL of 3.2×10^{-3} M Cl^-.

(d) 55.0 mL of 0.185 M $MgCl_2$ is mixed with 25.0 mL of 4.8×10^{-2} M $CaBr_2$.

(e) 95.0 mL of 8.65×10^{-4} M $Al(NO_3)_3$ mixed with 15.0 mL of 7.50×10^{-6} M Ag_2SO_4.

(f) 50.0 mL of 0.200 M $CaCl_2$ is mixed with 50.0 mL of 0.200 M NaCl.

(g) 25.0 mL of 0.360 M NH_4Br is mixed with 75.0 mL of 0.160 M $(NH_4)_2SO_4$.

(h) 10.0 mL of 0. 100 M $Ba(NO_3)_2$ is mixed with 40.0 mL of 0.300 M $AgNO_3$.