G12 Chemistry: Class 13 Homework

1. Predict whether an aqueous solution of each salt is neutral, acidic or basic. **[6 marks]**

   a) NaCN _____

   b) LiF _____

   c) $Mg(NO_3)_2$ _____

   d) NH_4I _____

   e) NH_4BrO_4 _____

   f) NH_4Br _____

2. Part way through a titration, 20ml of 0.10 mol/L sodium hydroxide has been added to 30ml of 0.10 mol/L hydrochloric acid. What is the pH of the solution? **[6 marks]**

3. 0.025 mol/L benzoic acid, C_6H_5COOH, is titrated with 0.025 mol/L sodium hydroxide solution. Calculate the pH at equivalence. (K_a of $C_6H_5COOH = 6.3 \times 10^{-5}$) **[6 marks]**

4. 50.0 mL of 0.10 mol/L hydrobromic acid is titrated with 0.10 mol/L aqueous ammonia. Determine the pH at equivalence. (K_b of NH_3 = 1.8 x 10^{-5}) **[5 marks]**

5. 0.10 mol/L hydrochloric acid is titrated with 0.10 mol/L methylamine, CH_3NH_2. Calculate the pH at the equivalence point. (K_b of CH_3NH_2 = 4.6 x 10^{-4}) **[5 marks]**

6. A student uses a transfer pipette to put 25.00 mL of 0.100 mol/L acetic acid into an Erlenmeyer flask. Then the student adds sodium hydroxide from a burette to the flask, and records the following readings of volume and pH.

volume (mL)	0.00	6.00	10.00	12.00	14.00	14.40	14.60	14.80	15.20	15.40	16.00
pH	2.8	4.2	5.1	5.5	6.2	6.5	6.8	7.6	9.8	10.5	11.4

a. Draw a graph that shows the results. Plot pH on the vertical axis and the volume of base added on the horizontal axis. **[5 marks]**

b. From your graph, what is the pH at the equivalence point? **[1 marks]**

c. Determine the initial concentration of the sodium hydroxide. **[4 marks]**

d. Suggest a suitable indicator for this titration. **[1 mark]**

7. Which of the following solutions can act as a buffer? Explain why. **[4 marks]**

   a) KCN / HCl

   b) $KHSO_4$ / H_2SO_4

   c) Na_2HPO_4 / NaH_2PO_4

   d) KNO_2 / HNO_2

8. Calculate the pH of the buffer system made up of 0.15M NH_3 and 0.35M NH_4Cl. (K_b of NH_3 = 1.8×10^{-5}) **[3 marks]**

9. The pH of blood plasma is 7.40. Assuming the principal buffer system is HCO_3^- / H_2CO_3, calculate the ratio $[HCO_3^-]/[H_2CO_3]$. Is this buffer more effective against an added acid or an added base? (K_a of H_2CO_3 = 4.5×10^{-7}) **[4 marks]**