

CHEM1102 Problem Sheet 8 (Week 10)

Work through the ChemCAL modules "*Weak Acids and Bases*", "*Calculations With Weak Acids And Bases*" and "*Acid-Base Titrations*".

- In a titration experiment, 50.0 mL of 0.100 M acetic acid ($pK_a = 4.76$) is reacted with NaOH.
 - Calculate the pH when the following quantities of 0.100 M NaOH have been added:
 - 0.0 mL (initial pH)
 - 25.0 mL
 - 45.0 mL
 - 50.0 mL
 - 55.0 mL
 - 75.0 mL
 - Using the calculated values, plot the pH curve for the titration.
 - Compare your curve with that obtained for Q3 on Sheet 7.
- The pH of a 0.6 M solution of a weak acid is 4.0. What percentage of the acid has ionised?
- The pK_a of acetic acid is 4.76. Calculate the pH of the following solutions:
 - 0.2 M acetic acid
 - 0.2 M sodium acetate
 - A buffer that is 0.2 M in acetic acid and 0.2 M in sodium acetate
- What volumes of 0.200 M solutions of HNO_2 and KNO_2 are required to make 1.00 L of a buffer solution of pH 3.00? (K_a for $\text{HNO}_2 = 4.00 \times 10^{-4}$ M)
- Give the chemical equations and state whether the final solutions are acidic, neutral or basic when the following are dissolved in water.
 - Na_2O
 - Cl_2O_7