Questions and problems to solve and learn

Exercises No. 1-3

Equilibrium chemistry
Acid-base equilibria and titration

Basic tools and operations: volumetric analysis.
Methods of expressing the concentration of a solution.
Calculation of the pH of acids and bases
Reversible reactions and chemical equilibria.
The law of mass action.
The equilibrium constant.
Activity, activity coefficients and ionic strength.
The thermodynamic equilibrium constant.
Le Châtelier's principle
Acid-base theories.
Brønsted-Lowry theory.
Strengths of acids and bases.
Protic and aprotic solvents.
Relation between *K*a and *K*b.
The pH scale.
Ostwald's dilution law.
Buffers
Detection of the end point: indicators.

Experiments:
1. Determination of total acidity (HCl) in the presence of phenolphthalein.
Determination of total alkalinity (NaOH) in the presence of methyl orange.
2. Simultaneous determination of sodium carbonate and sodium bicarbonate using Warder titration.
3. Determination of ammonia using the formaldehyde method.

Recommended References:
1. Analytical Chemistry; G.D. Christian, P.K. (Sandy) Dasgupta, K. A. Schug; John Wiley & Sons, Inc.
2. Modern Analytical Chemistry; D. Harvey; The McGraw-Hill Companies.
3. Quantitative Chemical Analysis; D.C. Harris; W.H. Freeman and Company, NY.
4. Lectures on analytical chemistry:
section 3 Basic tools and operations part 1 Volumetric anal.
section 5 Equilibrium chemistry
section 6 Acid-base equilibria
section 7 Acid-base titration