

KUT 101/2 – General Chemistry Practical I

Course Objective: To expose students to conduct the basic experiments that covers analytical and inorganic chemistry.

Experiment Title	Content	Number of laboratory hours	Expected outcome - upon completion of these experiments, the student should be able to:
1. Gravimetric Determination of Phosphorous in Plant Food	<ul style="list-style-type: none">Determination of phosphorus in plant food using gravimetric method	3	<ul style="list-style-type: none">Recognize two common analytical methods, gravimetric and volumetric analyses.Learn some practical skills on filtration.Calculate the standard deviation from the results.
2. Hydrolysis of Salts and pH of Buffer Solutions	<ul style="list-style-type: none">Using several indicators and observing colour change in solutionsPreparation of buffer solutionInvestigation of the effect of acid and base on the buffer pH.	3	<ul style="list-style-type: none">Gain familiarity with acid-base indicators and behaviour of buffer solutions.Understand the concept of hydrolysis.Operate and calibrate pH meters.
3. Titration Curves of Polyprotic Acids	<ul style="list-style-type: none">Preparation of ~ 0.100 M NaOH and standardizing itDetermination of acid dissociation constant and molarity of unknown acid	3	<ul style="list-style-type: none">Understand equilibria, acid dissociation constants and molarity.Prepare and standardize solutions.Plot a pH graph.
4. Determination of Solubility – Product Constant for Sparingly Soluble Salts	<ul style="list-style-type: none">Preparation of Ag_2CrO_4 saltMeasurement of absorbance using spectrophotometerObtaining a calibration curve	3	<ul style="list-style-type: none">Use a calibration curve to calculate molar concentrations of CrO_4^{2-}.Determine the K_{sp} value.Operate a spectrophotometer.
5. Separation of the Components of A Mixture	<ul style="list-style-type: none">Separation of components using decantation, filtration, extraction and sublimation methods	2.5	<ul style="list-style-type: none">Identify heterogeneous and homogenous mixtures.Separate the components and calculate the percentages of each component.

6. Chemical Formulae	<ul style="list-style-type: none"> Preparation of ZnCl_2 and Cu_2S 	2.5	<ul style="list-style-type: none"> Understand the mole concept and stoichiometry of reactions. Write chemical formulae and balance chemical ions.
7. Preparation and Reactions of Coordination Compounds: Oxalate Complexes	<ul style="list-style-type: none"> Preparation of complex ion $\text{K}_2[\text{Cu}(\text{C}_2\text{O}_4)_2 \cdot 2\text{H}_2\text{O}$ 	3	<ul style="list-style-type: none"> Recognise coordination compounds, wherein the metal is a Lewis acid and the atoms or molecules joined to the metal are Lewis base or ligands. Calculate the percentage yield.
8. Oxidation-reduction Titrations: Analysis of Bleach	<ul style="list-style-type: none"> Preparation of $\text{Na}_2\text{S}_2\text{O}_3$ solution and standardizing it Determination of the oxidizing capacity of an unknown liquid bleach 	3	<ul style="list-style-type: none"> Use two redox reactions to determine the amount of hypochlorite in household bleach. Write a redox reaction.
9. Chemical Reactions of Copper and Percent Yield	<ul style="list-style-type: none"> Preparation of $\text{Cu}(\text{NO}_3)_2$ and performing basic laboratory procedures Reduction of copper with zinc 	2	<ul style="list-style-type: none"> Write and name all the chemical reactions involved. Recover all the copper. Calculate the percentage yield.
10. Titration of Acids and Bases	<ul style="list-style-type: none"> Preparation of $\sim 0.100 \text{ M}$ NaOH and standardizing it. Analysis of an unknown acid 	3	<ul style="list-style-type: none"> Understand the volumetric method of analysis and titration techniques. Differentiate the primary and secondary standards. Differentiate the equivalence and end-points. Choose suitable indicators for acid-base titration. Determine the amount of acid in an unknown.
11. Analysis of Water for Dissolved Oxygen	<ul style="list-style-type: none"> Determination of total dissolved oxygen (DO) content in water sample using azide modification of the iodometric method 	2.5	<ul style="list-style-type: none"> Know a quantitative technique of volumetric analysis. Understand the definition of BOD (Biochemical Oxygen Demand). Determine the number of milligrams of oxygen per litre. Name the factors affecting the amount of dissolved oxygen. Know the value range of BOD for clean and polluted water.

12. Preparation of Sodium Bicarbonate and Sodium Carbonate	<ul style="list-style-type: none"> • Preparation of sodium bicarbonate by bubbling CO_2 into a solution saturated with NaCl and $(\text{NH}_4)\text{CO}_3$ • Preparation of sodium carbonate by heating sodium bicarbonate 	3	<ul style="list-style-type: none"> • Understand the chemistry involved in the production of NaHCO_3 and its conversion to Na_2CO_3. • Understand the importance of NaHCO_3 and Na_2CO_3 for commercial use. • Name the properties of NaHCO_3 and Na_2CO_3. • Write the chemical reactions involved.
TOTAL		33.5	