

KUT 205/2 – Chemistry Practical V - Analytical

Course Objective : To become acquainted with the analytical techniques – spectroscopic methods, electroanalytical method and chromatographic techniques.

Experiment title	Content	Number of laboratory hours	Expected outcomes – upon completion of the experiments, the student should be able to:
1. Absorption Spectrophotometry	<ul style="list-style-type: none"> Determination of iron with 1,10-phenanthroline 	3	<ul style="list-style-type: none"> Operate an UV/Visible spectrophotometer. Perform an analysis using a calibration curve technique.
2. Ion Exchange Resin and Complexometric Titration	<ul style="list-style-type: none"> Determination of the sodium, magnesium and acidic content of a solution mixture using an ion exchange resin 	3	<ul style="list-style-type: none"> Understand ion exchange. Use ion exchange resin to determine contents of a solution mixture - H^+, Na^+ dan Mg^{2+}. Perform an acid-base titration. Perform a complexometric titration using EDTA.
3. Electrogravimetry	<ul style="list-style-type: none"> Determination of copper in an unknown solution 	3	<ul style="list-style-type: none"> Operate an experimental setup for electrogravimetry Perform an electrogravimetric analysis for the determination of metals.
4. Electroanalytical Method – Ion Selective Electrode	<ul style="list-style-type: none"> Determination of fluoride in tap water and a tooth paste sample using a fluoride ion selective electrode 	3	<ul style="list-style-type: none"> Perform determination of fluoride using an ion selective electrode.
5. Infrared Spectrophotometry	<ul style="list-style-type: none"> Quantitative analyses of m-xylene and p-xylene in a mixture of xylenes using infrared spectrophotometry 	3	<ul style="list-style-type: none"> Operate an infrared spectrophotometer. Perform a quantitative determination of m-xylene and p-xylene using an internal standard method.
6. Gas Chromatography	<ul style="list-style-type: none"> Separation and quantitative determination of a mixture. 	3	<ul style="list-style-type: none"> Operate a gas chromatograph. Calculate number of theoretical plates from a gas chromatogram. Carry out a quantitative analysis of mixtures of common industrial solvents such cyclohexane (C_6H_{12}), methylene chloride (CH_2Cl_2) in toluene (C_7H_8). Determine the efficiency of the column.

Experiment title	Content	Number of laboratory hours	Expected outcomes – upon completion of the experiments, the student should be able to:
7. High performance liquid chromatography	<ul style="list-style-type: none"> HPLC separation of a mixture of hydrocarbons 	3	<ul style="list-style-type: none"> Carry out a qualitative and quantitative analysis of mixtures of hydrocarbons.
8. Atomic Absorption Spectroscopy	<ul style="list-style-type: none"> Determination of calcium by atomic absorption spectroscopy. 	3	<ul style="list-style-type: none"> Optimize instrument parameters. Study interference effects. Determine calcium concentration in mineral water by atomic absorption spectroscopy using the calibration technique and method of standard additions.
9. Visible spectrophotometry	<ul style="list-style-type: none"> Determination of the Mole Ratio of Iron : 1,10- phenanthroline in the complex formed. 	3	<ul style="list-style-type: none"> Determine the mole ratio using the method of continuous variation and mole ratio method.
10. Flame Emission Spectroscopy.	<ul style="list-style-type: none"> Determination of sodium by flame emission spectroscopy. 	3	<ul style="list-style-type: none"> Optimize instrument parameters. Study interference effects. Determine sodium concentration in mineral water by flame emission spectroscopy using calibration technique and internal standard method.
TOTAL		30	