Lession Plan Of Chemistry

Faculty Name Mr. Krishan Kumar

Subject :- SEC Chemistry Practical – I

Time Each Friday (III & IV Lecture)

Name of Program	B.Sc. Physical Sciences	Program Code	UMLS4 or UMPS4
Paper No.	SEC Paper – I	Nomenclature	SEC Chemistry Practical – I
Name of the Course	Skill Enhancement Course	Course Code	24CHE401SE01
Credits	01	Maximum Marks	25
Hours per Week	02	External Marks	20
Duration of Examination	02 Hrs	Internal Marks	05

Course Objectives: This course aims to make the students understand the colloidal solution, their preparation and principle of paper chromatography. It aims to build concepts related to the detection of sulphur in organic compounds as well as purity and purification methods for organic compounds
Note: Examiner will set two experiments for practical examinations. (7×2)
Marks Course Learning Outcomes (CLO): By the end of the course, the students will be able to:
CLO1: Learn preparation of colloidal solution.
CLO2: Check the purity of compounds.
CLO3: Explore detection of sulphur.
CLO4: Learn about the purification methods of organic compounds.
CLO5: Gain a comprehensive understanding of the principles underlying crystallization.
CLO6: Understand the principle of paper chromatography.

Week	Practical Topic Covered
Week 1 &2	Preparation of colloidal solution of ferric hydroxide [Fe(OH)3].
Week 3 & 4	Check the purity of organic compounds. (By determination of melting and boiling points).
Week 5 & 6	Detection of sulphur in organic compound by Nitroprusside test and Lead acetate test.
Week 7& 8	Purification of the organic compounds by crystallization (from water and alcohol) and distillation methods
Week 9 & 10	Separation of mixture of organic compounds by paper chromatography.
Week 11 & 12	Separation of mixture of inks (blue, red and green) by paper chromatography.

After that revise all practical and it's application
Viva-Voce (03 Marks)
Note Book (03 Marks)

Major practical

Time Monday & Tuesday (IV & V Lecture)

Name of Program	B.Sc. Physical Sciences	Program Code	UMLS4 or UMPS4
Paper No.	Paper – I	Nomenclature	Chemistry Practical (MD) – I
Name of the Course	Discipline Specific Course	Course Code	24CHEM401DS01
Credits	02	Maximum Marks	50
Hours per Week	04	External Marks	35
Duration of Examination	04 Hrs	Internal Marks	15

Course Objectives: This course aims to provide a fundamental knowledge of acidity, basicity and redox reaction. It further develops a clear understanding of principle of Abbe's refractometer, refractive index and its determination. Students will gain a comprehensive understanding of the fundamental principles of distillation. This course also provides an overview of the purification of organic compounds and the criteria of purity.

Note: Examiner will set two experiments for practical examinations. (12×2)

Marks Course Learning Outcomes (CLO): By the end of the course, the students will be able to:

CLO1: Prepare different types of solutions.

CLO2: Estimate the strength of various unknown solution in acid-base and redox titrations.

CLO3: Explain the principle, calibration and procedure of Abbe's refractometer for determining the refractive index.

CLO4: Determine the refractive index by using Abbe's refractometer.

CLO5: Calibrate thermometer and can determine the B.P. and M.P. of organic compounds.

CLO6: Learn preparation and purification of organic compounds.

Week	Practical covered
Week 1&2	Unit–I (Inorganic) 1. Acid-Base Titrations (i) Determination of strength of HCl and CH3COOH using NaOH.
Week 3&4	(ii) Estimation of sodium carbonate using standardized HCl.
Week 5&6	Unit–II (Physical) 1. Refractometry (i) Determine the refractive index of given solutions: Ethyl acetate, benzene, ethylene dichloride, chloroform, water and n-hexane by using Abbe's refractometer.
Week 7&8	(ii) Determine the specific refraction of given liquids: Ethyl acetate, benzene, ethylene dichloride, chloroform, water and n-hexane by using Abbe's refractometer.
Week 9&10	2. Redox titrations: Determination of Fe2+, C2O4 2- (using KMnO4 and K2Cr2O7).
Week 11&12	Unit–III (Organic) 1. Purification of organic compounds by crystallization using the following solvents: (i) Water (ii) Alcohol (iii) Alcohol-Water
Week 13&15	2. Preparation and purification through crystallization or distillation and ascertaining their purity through melting point: (i) Dibenzalacetone from acetone and benzaldehyde
Week 16&17	(ii) Phenylhydrazone of cyclohexanone. V

After that revise all practical and it's application

viva-Voce (06 Marks)

Note Book (05 Marks)

Semester — III Fundamental Chemistry – III
Time WEDNESDAY & THURSDAY (IST Lecture)

Name of Program	B.Sc. Physical Sciences	Program Code	UMLS4 or UMPS4
Paper No.	Paper – III	Nomenclature	Fundamental Chemistry – III
Name of the Course	Discipline Specific Course	Course Code	25CHEM403DS01
Credits	02	Maximum Marks	50
Hours per Week	02	External Marks	35
Duration of Examination	02 Hrs	Internal Marks	15

Course Objectives: The students will learn about general characteristics of transition metal and about the concept of partial molar properties. In electrochemical cells, the students will learn about electrolytic and galvanic cells, measurement of conductance and its applications, measurement of emf and its applications. It is designed in a manner to give a better understanding of the organic functional groups, which include halogenated hydrocarbons. This course helps the students to relate the structure of an organic compound to its physical and chemical properties.

Note: Examiner will set nine questions and the candidates will be required to attempt five questions in all. Question number one will be compulsory containing seven short answer type questions covering the entire syllabus. Further, examiner will set two questions from each unit and the candidates will be required to attempt one question from each unit. All questions will carry equal marks.

Course Learning Outcomes (CLO): By the end of the course, the students will be able to:

CLO1: Understand the general characteristics of transition metals.

CLO2: Analyse spectral and magnetic properties of transition metal compounds.

CLO3: Explain the concept of partial molar properties and use the concepts learned to predict the feasibility of chemical reactions.

CLO4: Analyse how Gibbs function (G) and Helmholtz function (A) vary with pressure (P), volume (V), and temperature (T).

CLO5: Explain the factors that affect conductance, migration of ions and application of conductance measurement.

CLO6: Understand concept of pH and its effect on the various physical and chemical properties of the compounds.

CLO7: Learn the working of electrochemical cells using different electrodes.

CLO8: Understand preparation, properties and reactions of haloalkanes and haloarenes

Week	Topic covered week wise
Week 1	**Unit–I** **Chemistry of Transition series elements** General characteristics of transition metals, brief discussion of differences between the first, second and third transition series
Week 2	Stability of various oxidation states, magnetic and spectral properties.
Week 3	Binary compounds and complexes illustrating relative stability of their oxidation states. Chemistry of Ti, V, Cr, Mn, Fe, Co, Mo and W in various oxidation states,
Week 4	some important compounds as laboratory reagents: 34 potassium dichromate, potassium permanganate, potassium ferrocyanide, potassium ferricyanide, sodium nitroprusside and sodium cobaltinitrite.
Week 5	**Unit–II** **Thermodynamics-II** Third law of thermodynamics: Nernst heat theorem, concept of residual entropy, evaluation of absolute entropy from heat capacity data
Week 6	Gibbs and Helmholtz functions, Gibbs function (G) and Helmholtz function (A) as

	thermodynamic quantities, A & G as criteria for spontaneity,
Week 7	Thermodynamic equilibrium and their advantage over entropy change. Variation of G and A with P, V and T. Partial molar quantities.
Week 8	**Unit–III** **Electrochemistry** Arrhenius theory of ionization, Ostwald's Dilution Law. Debye-Huckel–Onsager's equation for strong electrolytes (elementary treatment only)
Week 9	Transport number, definition and determination by Hittorf's methods. Electrolytic conduction, factors affecting electrolytic conduction
Week 10	Applications of conductivity measurements: determination of dissociation constant (Ka) and degree of dissociation, determination of solubility product of sparingly soluble salts, conductometric titrations
Week 11	Definition of pH and pKa, buffer solution, buffer action, Henderson – Hasselbalch equation, buffer mechanism of buffer action.
Week 12	Reversible electrodes – Metal- metal ion gas electrode, metal – metal insoluble salt- anion electrode and redox electrode.
Week 13	**Unit–IV** **Alkyl and aryl halides** Alkyl halide: Nomenclature and classes of alkyl halides, general methods of preparation, physical properties and chemical reactions, mechanisms (SN1, SN2, E1, E2 and E1cb)
Week 14	**Deepawali holiday**
Week 15	Stereochemistry of nucleophilic substitution reactions of alkyl halides with energy profile diagrams, elimination vs substitution reactions. Aryl halides: Methods of preparation, Reactions
Week 16	Aromatic nucleophilic substitution and effect of substituents on reactivity. Benzyne Mechanism: KNH2/NH3 (or NaNH2/NH3), reactivity and relative strength of C-halogen bond in alkyl, allyl, benzyl, vinyl and aryl halides.
Week 17	Revesion of unit 1 & test
Week 18	Revesion of unit 2 or 3 & test of both unit
Week 19	Revesion of unit 4 & test

B.Sc (Vth) Semester

Paper No.	Code No.	Nomenclature	Periods (40 min. each)	Max. Marks Written + I.A	Time
XIX	**CH-503**	**Organic Chemistry (theory)**	**30**	**30+8**	**3hrs.**

Note: Examiner will set nine questions and the candidates will be required to attempt five questions in all. Question number one will be compulsory containing six short answer type questions covering the entire syllabus and will be of six marks. Further, examiner will set two questions from each section and the candidates will be required to attempt one question from each section which will be of six marks each.

Week	Topic covered week wise
Week 1	**Section-A** NMR Spectroscopy-I Principle of nuclear magnetic resonance,

Week 2	PMR spectrum,number of signals,
Week 3	peak areas, equivalent and nonequivalent protons positions of signals and chemical shift,
Week 4	Shielding and deshielding of protons, proton counting,splitting of signals
Week 5	coupling constants, magnetic equivalence of protons.
Week 6	**Section-B** NMR Spectroscopy-II Discuss ion of PMR spectra of the molecules: ethyl bromide, npropyl bromide, isopropyl bromide, 1,1-dibromoethane, 1,1,2-tribromoethane
Week 7	ethanol, acetaldehyde, ethyl acetate, toluene, benzaldehyde and acetophenone.
Week 8	Simple problems on PMR spectroscopy for structure determination of organic compounds.
Week 9	**SECTION – C** **Carbohydrates-I** Classification and nomenclature. Monosaccharides, mechanism of osazone formation, inte rconversion of glucose and fructose,
Week 10	Chain lengthening and chain shortening of aldoses. Configuration of monosaccharides. Erythro and threo diastereomers.
Week 11	Conversion of glucose in to mannose. Formation of glycos ides, ethers and esters. Determination of ring size of glucose and fructose
Week 12	Open chain and cyclic structure of D(+)-glucose & D(-) fructose. Mechanism ofmutarotation. Structures of ribose and deoxyribose.
Week 13	**SECTION – D** **1.Carbohydrates-II** An introduc tion to disaccharides (maltose, sucrose and lactose)
Week 14	**Deepawali holiday**
Week 15	Polysaccharides (starch and cellulose) without involving structure determination.
Week 16	**2. Organometallic Compounds** Organomagnesium compounds: the Grignard reagents-formation, structure
Week 17	chemical reactions. Organozinc compounds: formation and chemical reactions. Organolithium compounds: formation and chemical reactions.
Week 18	Revesion of Section A &B & test
Week 19	Revesion of Section C & D & test

Chemistry Department
Faculty Name: Mr. Krishan Kumar