

Course (2020 - 2021)	
Core Paper – I: Inorganic and Organic Chemistry	20UCY101
Core Paper – II: Organic and Physical Chemistry	20UCY202
Core Practical - I: Inorganic Qualitative Analysis	20UCY203

Programme code:	B.Sc.	Programme Title :	CHEMISTRY	
Course Code:	20UCY101	Title	Batch :	2020-2023
		Core Paper – I	Semester	I
Hrs/Week:	7	Inorganic and Organic Chemistry	Credits:	4

Course Objective

To enable the students to

- understand basic theoretical concepts on chemical bonding and hybridization
- acquire knowledge on the mechanistic pathway of aliphatic nucleophilic substitutions and aromatic electrophilic substitutions in organic reactions
- gain knowledge on aromaticity

Course Outcome

On the successful completion of the course, students will be able to

Knowledge Level	CO Number	CO Statement
K4	CO1	interpret the types of chemical bonding present in molecules
K2	CO2	deduce the geometry of the molecules
K2,K3	CO3	understand and apply the concepts in determining the mechanisms of aliphatic nucleophilic substitution reactions
K3, K4	CO4	apply and interpret the factors affecting in determining the orientation and reactivity of substituted benzene

Syllabus

Unit	Content	Hrs
I	Long form of Periodic Table: Main features, advantages and defects. Periodic properties of elements. Chemical bonding: Variable electrovalency - Pseudo inert gas configuration-Inert pair effect. Ionic Bonding-Conditions for the formation of an ionic compound, Characteristics of Ionic compounds, Crystal lattice energy and its determination by Born-Haber Cycle. Covalent Bonding: Lewis – Langmuir concept and Octet rule, Characteristics of covalent compounds- Partial ionic character in covalent bond. Fajan's rules and their applications in explaining melting points and solubility properties. Co-ordinate covalent bonding: Characteristics. <i>Hydrogen bonding-concept, types and applications - melting and boiling points of hydrides of nitrogen, Oxygen and Fluoride and Lesser density of ice.</i>	19
II	Concept of Hybridization: sp, sp^2 and sp^3 with reference to C_2H_2, C_2H_4 and CH_4. Applications of VSEPR Theory to $BeCl_2$, BCl_3, H_2O, NH_3, CH_4, PCl_5 and SF_6 molecules. Molecular Orbital Theory: Symmetry of molecular orbitals. Application to simple Homonuclear and Heteronuclear molecules - H_2, He_2, O_2, F_2, N_2, CO and NO. Bond order and magnetic properties. Ozone: Preparation, properties, structure and uses. Ozone depletion: Causes and effects. Sulphur: Peracids of sulphur and Sodium thiosulphate - Preparation, properties, structure and uses.	18

III	ORGANIC CHEMISTRY: Nomenclature of organic compounds - IUPAC naming of simple and substituted aliphatic, aromatic and alicyclic compounds - priorities of functional groups in polyfunctional compounds. Polar Effects: Inductive, mesomeric, electromeric and hyperconjugative effects. Steric inhibition of resonance Homolytic and Heterolytic fission: Free radicals, carbocation, carbanion and their stability. Electrophiles and nucleophiles with examples. Alkenes: Preparations involving dehydrohalogenation, dehydration, reduction of alkynes and Wittig reaction. Mechanism of β-Elimination: E1 and E2 . Saytzeff and Hofmann rules. Reactions of Alkenes: Addition of hydrogen halide, Markovnikov rule, peroxide effect, hypohalous acid, sulphuric acid, hydroboration. Oxidation by alkaline KMnO_4 and Ozonolysis.	18
IV	Dienes: Classification and stability. 1,2 and 1,4 addition of Butadiene. Diels-Alder reaction. Alkynes: Preparation of alkynes by dehydrohalogenation, dehalogenation and electrolysis. Reactions: Hydroboration, addition of hydrogen halides, water, formation of acetylides and Ozonolysis. Grignard reagent - Preparation and synthetic utility of Ethyl magnesium iodide. Aliphatic Nucleophilic Substitution: SN^1 and SN^2 mechanisms. Effect of structure of substrate, nucleophile and solvent.	18

V	Benzene: Resonance, Resonance energy and structure. Aromaticity: Huckel's rule. Non-benzenoid aromatic compounds. Cyclopropenyl cation, cyclopentadienyl anion and Tropylium cation. Aromatic Electrophilic Substitution: Arenium ion mechanism, mechanism of nitration, sulphonation, halogenation, Friedel-Crafts alkylation and acylation in benzene. Orientation and reactivity of Monosubstituted benzene: ortho, para and meta directing. Role of inductive and mesomeric effects in electrophilic aromatic substitution in phenol and nitrobenzene.	18
	Total contact hours/Semester	91

***Italics denotes self study topics**

Teaching Methods

Lecture by chalk & talk, power point presentations, group discussions, seminar, quiz, assignment, Activity, Models.

Text Books

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Soni. P.L	Text book of Inorganic Chemistry	Sultan Chand & Sons, New Delhi	2012
2.	Bahl.B.S. and Arun Bahl	Advanced Organic Chemistry	S.Chand & Company Ltd., New Delhi	2007
3.	Soni. P.L.	Text book of Organic Chemistry	Sultan Chand & Sons, New Delhi	2012
4.	Madan. R.D.	Advanced Inorganic Chemistry	S.Chand & Company Ltd., New Delhi	2011

Reference Books

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Finar I.L.	Organic Chemistry	Longmans	2006
2.	Morrison. R.T. and Boyd. R.N.	Organic Chemistry	Allyn and Bacon Ltd., NewYork	1976
3.	Wahid U.Malik, G.D, Tuli, and Madan. R.D.	Selected Topics in Inorganic Chemistry	S.Chand & Company, New Delhi	2006

Mapping with Programme Outcomes

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	M	M	H
CO2	M	H	M	H	M
CO3	H	H	H	M	H
CO4	H	M	H	M	M

Low-L,Medium-M,High- H

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
 Dr.Indumathy Ramasamy	 Dr. Indumathy Ramasamy	Mr.K. Srinivasan	Dr.R.Muthukumaran

Programme code:	B.Sc.	Programme Title :	CHEMISTRY	
Course Code:	20UCY202	Title	Batch :	2020-2023
		Core Paper – II	Semester	II
Hrs/Week:	6	Organic and Physical Chemistry	Credits:	4

Course Objective

To make the students to

- acquire knowledge on the mechanisms of naming reactions in carbonyl compounds
- gain knowledge in the synthetic utility of active methylene compounds
- understand basic concepts on quantum mechanics and important laws of thermodynamics

Course Outcome

On the successful completion of the course, students will be able to

Knowledge Level	CO Number	CO Statement
K1	CO1	recollect the mechanisms of various naming reactions
K2,K3	CO2	understand and apply usage of active methylene compounds in synthesizing different substituted carboxylic acids and ketones
K3	CO3	apply quantum mechanical treatment to sub-atomic particles of atom
K4	CO4	interpret the significance of laws of thermodynamics and its applications in deriving various other laws of physical chemistry

Syllabus

Unit	Content	Hrs
I	Alcohols: General methods of Preparation and its chemical properties. Distinction among primary, secondary and tertiary alcohols. <i>Manufacture of ethanol from molasses. Absolute alcohol, methylated spirit and power alcohol.</i> Ethers: General methods of preparation and its chemical properties. Preparation and properties of diethyl ether. Dicboxylic acids: Preparation and properties of oxalic, malonic, succinic and phthalicacids. Acetoacetic ester: Preparation and its applications in the synthesis of acetone, adipic acid, crotonic acid and 4-methyl uracil. Keto-enol tautomerism. Malonic ester: Preparation and its applications in the synthesis of crotonic acid, barbutric acid, succinic acid and dimethyl acetic acid. Acid derivatives: Acetyl chloride and acetic anhydride- Preparation, properties and uses.	16
II	Carbonyl compounds: Preparation by Rosenmund reduction, Stephen reaction and dry distillation of calcium salts of fatty acids. Mechanism of Nucleophilic addition reaction in aldehydes and ketones: Addition of Grignard reagent, HCN, NaHSO₃ and NH₃. Addition with NH₂-NH₂, C₆H₅NHNH₂ and ROH. Mechanism of Aldol, Perkin, Benzoin condensation, Cannizzaro and Reformatsky reactions. Reduction: Wolff-Kishner, Clemmensen, MPV reductions. Reduction with reagents: Lithium Aluminium Hydride and	16

	Sodium Borohydride. Oxidation of aldehydes and ketones using Tollen's reagent, Fehling's solution, SeO_2 and Oppenauer oxidation.	
III	Quantum Theory: Failure of classical theory in explaining the black body radiation. Planck's radiation theory, Quantisation of energy. Einstein's theory of Photoelectric effect. Atomic Structure Rutherford atomic model – Bohr theory of hydrogen atom – Sommerfeld theory - Particle and wave character of electrons. De-Broglie's equation. Davison and Germer experiment. Heisenberg's uncertainty principle - Compton effect. Schrodinger wave equation and significance of Ψ and Ψ^2 (Derivation not required).	16
IV	Thermodynamics: Importance, Limitations and Thermodynamic terms. Types of Thermodynamic equilibrium and processes. First law of Thermodynamics: Law of conservation of energy, internal energy. Enthalpy and Heat capacity: Relation between C_p and C_v. Work done in an isothermal reversible expansion of an ideal gas. Reversible adiabatic expansion of an ideal gas: Relation between temperature and volume and temperature and pressure. Joule- Thomson Experiment: Joule-Thomson Effect, Joule – Thomson coefficient for an ideal gas, Inversion Temperature. Zeroth law of thermodynamics. Absolute zero of temperature.	15

V	Second law of thermodynamics: Limitations of First law. Need for Second law of thermodynamics. Various statements of Second law of thermodynamics. Thermo chemistry: Definition – Standard Enthalpy of formation and Enthalpy of neutralization. Bond energy and its applications Measurement of enthalpy of reactions by Bomb Calorimeter. Entropy: Definition, Entropy changes in reversible and irreversible spontaneous processes. Entropy change accompanying change of phase, isothermal expansion of an ideal gas with change in pressure, volume and temperature. Entropy of mixing of ideal gases. Carnot's cycle, Physical significance of entropy. Helmholtz and Gibbs free energy functions: Variation of free energy with temperature or pressure, Gibbs Helmholtz equation. Third law of Thermodynamics (statement only).	15
	Total hours/Semester	78

***Italics denotes self study topics**

Teaching Methods

Lecture by chalk & talk, power point presentations, group discussions, seminar, quiz, assignment, Experience Discussion, Activity, Models.

Text Books

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Bahl.B.S. and Arun Bahl	Advanced Organic Chemistry	S.Chand & Company Ltd., New Delhi	2007
2.	Soni. P.L	Text book of Inorganic Chemistry	Sultan Chand & Sons, New Delhi	2012

3.	Puri B.R., Sharma L.R and Madan S. Pathania	Principles of Physical Chemistry	Vishal Publishing House	2013
4.	Negi. A.S., and AnandS.C.	A text book of physical chemistry	New Age International PVT Ltd	2009

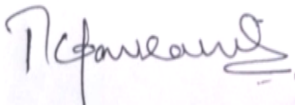
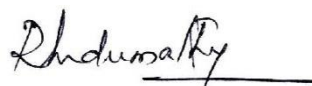
Reference Books

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Finar I.L.	Organic Chemistry, Vol.I and II	Pearson Education, Singapore	2003
2.	Soni. P.L. and Dharmarha O.P.	Text book of Physical Chemistry	Sultan Chand & Sons, New Delhi	2005

Mapping with Programme Outcomes

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	H	M	H
CO2	M	M	M	H	M
CO3	H	H	M	M	H
CO4	H	M	H	M	M

Low-L, Medium-M, High- H

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 Dr.T.Gowrani	 Dr.Indumathy Ramasamy	Mr. K. Srinivasan	Dr.R.Muthukumaran

Programme code:	B.Sc.	Programme Title :	CHEMISTRY	
Course Code:	20UCY203	Title	Batch :	2020-2023
		Core Practical-I Inorganic Qualitative Analysis	Semester	II
Hrs/Week:	2		Credits:	3

Course Objective

To enable the students to

- gain knowledge in the identification of given two acidic and basic radicals
- develop analytical skill in inorganic qualitative analysis

Course Outcomes

Knowledge Level	CO Number	CO Statement
K3	CO1	To remember the procedure for the analysis of given acid and basic Radicals
K4	CO2	To understand the chemical reactions responsible for the precipitation or other reactions leading to identification of the given radicals
K4	CO3	To apply the theoretical knowledge/concept studied to their practical Sessions

Syllabus

Unit	Content	Hrs
	1. Inorganic mixture analysis a) Analysis of a mixture containing two cations and two anions of which one will be an interfering ion. b) Reactions of the following ions: Lead, Copper, Nickel, Bismuth, Cadmium, Iron, Manganese, Zinc, Calcium, Strontium, Barium, Magnesium and Ammonium. Carbonate, Nitrate, Fluoride, Sulphate, Chloride, Oxalate, Phosphate and Borate.	
	Total hours/Semester	26

Teaching Methods

Lab activity, Quiz, Assignment, Discussions, Demonstration

Text Books for Study

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Venkateswaran, V., Veeraswamy. R and Kulandaivelu. A.R.	Basic Principles of Practical Chemistry	S.Chand Publications, New Delhi	2004

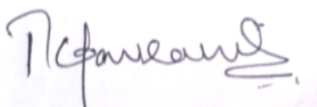
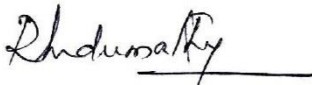
Reference Books

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Thomas, A.O.,	Practical Chemistry	Scientific Book Center, Cannanore	2003

Mapping with Programme Outcomes

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	M	H	H
CO2	M	H	M	H	M
CO3	H	H	H	M	H

Low-L,Medium-M,High- H

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Course (2019 - 2020)	
Core Paper – III: Inorganic and Physical Chemistry	19UCY304
Core Paper – IV: Inorganic, Organic and Physical Chemistry	19UCY405
Core Practical - II: Volumetric and Organic Qualitative Analysis	19UCY406
Allied Chemistry Paper – I: Inorganic, Organic And Physical Chemistry	19UPS3A3/19UBY3A4/ 19UZY3A4
Allied Chemistry Paper – II: Inorganic, Organic And Physical Chemistry	19UPS4A4/19UBY4A5/ 19UZY4A5
Allied Chemistry Practical	19UPS4A5/19UBY4A6/19UZY4A6

Programme code:	B.Sc.	Programme Title :	CHEMISTRY	
Course Code:	19UCY304	Title	Batch :	2019-2022
		Core Paper- III	Semester	III
Hrs/Week:	6	Inorganic and Physical Chemistry	Credits:	04

Course Objective

To learn the industrial aspects of inorganic materials and thermodynamics of solution

Course Outcome

Knowledge Level	CO Number	CO Statement
K1	CO1	To remember the basic metallurgical operations for extraction
K2	CO2	To understand the concept of thermodynamics of solution
K3	CO3	To apply the concept of law of mass action to various equilibria
K4	CO4	To acquire knowledge in colligative properties

Syllabus

Unit	Content	Hours
I	Basic Metallurgical operations: Concentration, calcination, roasting, reduction and refining. Extraction process of Mn, Zn (carbon-reduction and electrolytic method), Fe (Blast furnace) and Ni (Mond's process). Alloys: Preparation and properties. Composition and uses of some important alloys of Al, Ni, Sn and Pb.	15
II	Cement: Types of cement, composition, manufacture and setting of cement. Glass: Manufacture, types and coloured glass. Inorganic Polymers: Silicones-Preparation, properties and applications. Fuels: <i>Classification of fuels, calorific value and characteristics of good fuel.</i> Gaseous Fuels: Advantages, Composition and uses of natural gas, water gas, producer gas, oil gas, LPG, CNG and Gobar gas. Liquid fuels –Petroleum-composition and classification. Refining of crude petroleum and uses of various fractions. Petroleum industries in India. Anti-Knocking agents, Octane and Cetane numbers. Synthetic Petrol – Catalytic Cracking of petroleum.	16
III	Chemical potential, Gibbs – Duhem equation, variation of chemical potential with temperature and pressure. Chemical potential of ideal gases. Clapeyron-Clausius equation-application to various equilibria. Chemical equilibrium: Law of mass action - relationship between K_p and K_c. van't Hoff's reaction isotherm and isochore. De Donder's concept of chemical equilibria. Formation of HI, dissociation of PCl_5 and N_2O_4. Le Chatelier's principle: Application to synthesis of ammonia.	15
IV	Thermodynamics of solutions: Types of solutions: Solution of liquids in liquids. Ideal solution. Raoult's law, Henry's law (Statement only). Non-ideal solution-deviation from Raoult's law. Duhem – Margules equation. Fractional distillation and azeotropes.	16

	Phase equilibria between condensed phases: Partially miscible liquid system-phenol-water, triethylamine –water and nicotine –water system. Completely immiscible liquids: steam distillation. Nernst distribution law-thermodynamic derivation, application to association of benzoic acid and study of $I_2 + I^- \rightleftharpoons I_3^-$.	
V	Colligative properties of solutions: Lowering of vapour pressure: Determination of lowering of vapour pressure by static method and dynamic method. Elevation of Boiling point: Definition, Calculation of molecular weight, Determination of elevation of boiling point by Cottrell's method. Depression of freezing point: Definition, Calculation of molecular weight, Determination of freezing point depression by Beckmann's method. Osmotic pressure: Laws of Osmotic pressure, van't Hoff's equation for osmotic pressure of dilute solution. Berkely and Hartley method of determination of osmotic pressure. Abnormal molecular weight and van't Hoff factor.	16
	Total contact Hrs/Semester	78

***Italics denotes self-study topics Teaching Methods**

Lecture by Chalk and Talk, Power point Presentations, Group discussions, Seminar, Quiz, Assignment.

Text Books

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1	Puri and Sharma and Kalia. K.C.	Principles of Inorganic Chemistry, 31 st Edition	Milestone Publishers and Distributors	2013
2	Soni. P.L.	Text book of Inorganic Chemistry, 20 th edition	Sultan Chand & Sons	2002
3	Puri, Sharma and Pathania.	Principles of Physical Chemistry, 46 th Edition	Vishal Publishing Co., Jalandar	2013

4	SatyaPrakash, Tuli, Basu and Madan	Advanced Inorganic Chemistry, Volume – II, 4 th Edition.	S Chand & Company Pvt Ltd, New Delhi.	2015 (Reprint)
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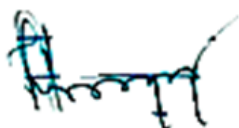
References

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1	Jain.P.C and Monaka Jain	Engineering Chemistry, 15th Edition	Dhanpat Rai Publishing Company (P) Ltd.,	2005
2	Soni.P.L. and Dharmarha. O.P	Text book of Physical Chemistry, 7thEdition	Sultan Chand & Sons,, New Delhi.	2005

Mapping with Programme Outcomes

PSO CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	S	S	H	S
CO2	H	S	H	S	H
CO3	S	S	S	H	S
CO4	S	H	H	S	H

S-Strong; H-High; M-Medium; L-Low

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
 Dr.M.Selladurai	 Dr.A.Ayyasamy	Dr.M.Durairaju	Dr.R.Muthukumaran

Programme code:	B.Sc.	Programme Title :	CHEMISTRY	
Course Code:	19UCY405	Title	Batch :	2019-2022
		Core Paper – IV	Semester	IV
Hrs/Week:	6	Inorganic, Organic and Physical Chemistry	Credits:	04

Course Objective

To study the periodic properties of elements, reactions of organic compounds and phase rule.

Course Outcome

Knowledge Level	CO Number	CO Statement
K1	CO1	To recollect the properties of transition and inner transition elements
K2	CO2	To understand the mechanisms of naming reactions
K3	CO3	To execute the concept of isomerism in various compounds
K4	CO4	To figure out the phase diagram of various systems

Syllabus

Unit	Contents	Hours
I	Transition Elements: Characteristics of transition elements. Trends in periodic properties- electronic configuration, Atomic and ionic radii, oxidation states, ionization potentials, colour, magnetic properties, catalytic properties and ability to form complexes. Extraction and uses of Ti,V,Mo,W and Co. Platinum Metals: Metallurgy of platinum. <i>Platinum black, Platinised asbestos, colloidal platinum - preparation and uses.</i> Group Discussions: (i) Cr, Mo and W (iii) Fe,Co and Ni . Alloy steels. Heat treatment of steel. Iron and steel industry in India. Preparation and uses of the following compounds. TiO₂, TiCl₄, CrO₂Cl₂, ZrOCl₂, V₂O₅, FeSO₄, (NH)₄ MoO₄, PtCl₄.	16
II	Inner Transition Elements: Lanthanides and Actinides: Occurrence, electronic structure, oxidation states, colour, absorption spectra and magnetic properties. Lanthanide contraction and its consequences. Separation of Lanthanide elements by ion exchange method. Comparison of Lanthanides with Actinides. Extraction of Uranium from Pitch blende.	15
III	Preparation of phenol from aryl halide and Grignard reagent. Reactions of Phenol: Nitration. sulphonation , halogenation, Kolbe's Schmidt reaction, Friedel Crafts reaction, Reimer Tiemann reaction, Duff's reaction, Lederer –Manasse reaction and Gattermann aldehyde synthesis. Nitro Compounds: Aliphatic nitro compounds: Nitromethane and Nitroethane- preparation and properties. Nitro-Acinitro tautomerism. Aromatic nitro compounds : Reduction of Nitrobenzene in neutral, acidic and alkaline media and electrolytic reduction. Preparation of ortho, meta and para dinitrobenzenes and T.N.T.	16

IV	Amines: Aliphatic amines: separation of mixture of amines, Basicity of amines. Aromatic amines: Preparation and properties of Aniline, Diazotisation and Coupling with mechanism Conformational analysis of Ethane, n- Butane and Cyclohexane. Distinction between Conformation and Configuration. Stereoisomerism: Types, R-S configuration, optical isomerism in lactic acid and tartaric acid, racemisation, methods of resolution and asymmetric synthesis. Geometrical isomerism: cis and trans isomerism in maleic and fumaric acid and E-Z notation.	15
V	Phase rule and phase equilibria: Concept of phase, components and degrees of freedom with examples. Thermodynamic derivation of Gibbs-Phase Rule. One component system: Phase diagram and discussion of water and sulphur system. Two component system: Construction of phase diagram by thermal analysis. Simple eutectic- Pb-Ag System. Formation of compounds with congruent melting point: Zn-Mg system. Formation of compounds with incongruent melting point: Na-K system. Salt- Water system: Potassium Iodide-Water system.	16
	Total contact Hrs/Semester	78

***Italics denotes self study topics**

Teaching Methods

Lecture by chalk & Talk, Power point Presentations, Group discussions, Seminar, Quiz, Assignment.

Text Books

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Soni. P.L.,	Text book of Inorganic Chemistry, 20 th edition	Sultan Chand & Sons	2002
2	Bahl, B.S and Arun Bahl	A textbook of Organic Chemistry, 18 th Edition	Sultan Chand & Sons	2007
3	Soni P.L	Text book of Organic Chemistry, 29 th Revised Edition	Sultan Chand & Sons, New Delhi	2012
4	Puri B.R., Sharma L.R and Madan S. Pathania	Principles of Physical Chemistry, 46 th Edition	Vishal Publishing House, Jalandar	2013

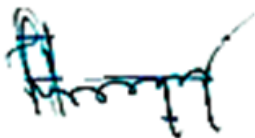
References

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Finar, I.L	Organic Chemistry, Vol. I	Pearson Education, Singapore	2003
2	Morrison, R.T. and Boyd	Organic Chemistry, 6 th Edition	Pearson Education, Singapore	2003

Mapping with Programme Outcomes

PSO CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	S	S	H	S
CO2	H	S	H	S	H
CO3	S	H	S	H	S
CO4	H	H	H	S	H

S-Strong; H-High; M-Medium; L-Low

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 Dr.M.Selladurai	 Dr.A.Ayyasamy	Dr.M.Durairaju	Dr.R.Muthukumaran

Programme code:	B.Sc	Programme Title :	CHEMISTRY	
Course Code:	19UCY406	Title	Batch :	2019-2022
		Core Practical II	Semester	IV
Hrs/Week:	3	Volumetric and Organic Qualitative Analysis	Credits:	5

Course Objective

To develop the analytical skills in volumetric and organic qualitative analysis.

Course Outcome

Knowledge Level	CO Number	CO Statement
K1	CO1	To understand the apparatus used in volumetric analysis and correct titrimetric procedure
K2	CO2	To develop preparative skills in the organic preparations
K3	CO3	To get the idea about organic qualitative analysis
K4	CO4	To analyse the elements and functional groups of organic compounds.

Syllabus

Unit	Content	Hrs
	I) Volumetric Analysis a) Permanganometry: 1. Estimation of Ferrousion. 2. Estimation of Oxalicacid. 3. Estimation of Sodiumnitrite. b) Dichrometry: 1) Estimation of Ferrous ion using internalindicator. 2) Estimation of Ferric ion using externalindicator c) Iodometry: 1) Estimation of Copper.(Demonstrationonly) 2) Estimation of Potassiumdichromate. d) EDTA-Titrations: 1) Estimation ofCalcium. 2) Estimation ofZinc. 3) Estimation ofMagnesium. 4) Estimation of hardness of water-temporary andpermanent	

	Organic Qualitative Analysis a) Systematic qualitative analysis of organic compounds containing one functional group: Aldehydes, Ketones, Primary amines, Nitrocompounds, Amides, Anilides, Carbohydrates, Carboxylic acids and Phenols. b) Organic Preparations: 1) Acetylation of aniline to acetanilide. 2) Hydrolysis of benzamide to benzoic acid. 3) Hydrolysis of ester (ethylbenzoate to benzoic acid). 4) Nitration of acetanilide to p-nitroacetanilide.	
	Total hours/Semester	39

Teaching Methods

Group discussions, Assignment and Experience Discussion.

Text Book

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Venkateswaran, V., R. Veeraswamy and A.R. Kulandaivelu	Basic Principles of Practical Chemistry.	S.Chand Publications, New Delhi	2004

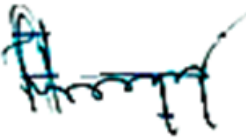
Reference

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Thomas, A.O.	Practical Chemistry	Scientific Book Centre	2003

Mapping with Programme Outcomes

PSO \ CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	S	S	H	S
CO2	S	S	H	S	H
CO3	S	S	S	M	S
CO4	S	H	S	S	H

S-Strong; H-High; M-Medium; L-Low

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
 Dr.M.Amutha	 Dr.A.Ayyasamy	 Dr.M.Durairaju	 Dr.R.Muthukumaran

Programme code:	B.Sc.	Programme Title :	CHEMISTRY	
Course Code:	19UPS3A3/ 19UBY3A4/ 19UZY3A4	Title	Batch :	2019-2022
		Allied Chemistry Paper – I Inorganic, organic and physical chemistry	Semester	III
Hrs/Week:	6		Credits:	4

Course Objective

To develop the skill to aesthetically appreciate General Chemistry

Course Outcome

Knowledge Level	CO Number	CO Statement
K1	CO1	To understand the principles of coordination chemistry and applications to biologically important molecules
K2	CO2	To gain knowledge on industrially important materials and water treatment
K3	CO3	To understand the principles of volumetric analysis
K4	CO4	To know the basic principles of electro chemistry

Syllabus

Unit	Content	Hrs
I	Chemical bonding: Molecular orbital theory - bonding, anti-bonding and non-bonding orbitals, Application of Molecular orbital theory – MO configuration and bond order of H₂, N₂, O₂, F₂. Coordination Chemistry: Ligands—Mono and bidentate ligands; Coordination number. Nomenclature – Mononuclear complexes. Werner & Sidgwick Theories; Chelation and its industrial importance with reference to EDTA. Biological role of Haemoglobin and Chlorophyll. Applications in qualitative and quantitative analyses.	16
II	Volumetric Analysis: Primary and Secondary standards. Principles of volumetric analysis. Preparation of normal, molal and molar solutions. Principle of acid - base titrations. Water treatment: Hardness of water. Temporary and permanent hardness. Units of hardness. Disadvantages of hard water. Softening of hard water – Zeolite process and De-mineralization process – Purification of water for domestic use – Disinfection by Chlorine, Ozone and UV light.	16
III	Organic compounds : Classification-Covalent bond, Orbital overlap, hybridization, geometry of organic molecules – CH₄, C₂H₄, C₂H₂, C₆H₆. Inductive, Electrometric, Mesomeric, Hyperconjugative and Steric effects. Effect in properties of compounds. Aromatic compounds: Electrophilic substitution in benzene. Mechanism of nitration, halogenation, alkylation, acylation and sulphonation.	15
IV	Chemotherapy : Introduction, Sulphadruugs : Mode of action. Antimalarials : Classification and use of chloroquine and Pamaquine. Antiseptics : Definition and uses of chloramines – T, Iodoform and Dettol. Anaesthetics : Classification, characteristics and uses of procaine and pentothal sodium. Antibiotics : Introduction, use of Penicillin, Chloromycetin, Streptomycin and Tetracyclin.	16

	Vitamins : Classifications, occurrence and deficiency diseases caused by Vitamin A, B complex, C, D, E and K. (Note : Structure of the compounds is not required.)	
V	Electrochemistry: Electronic and electrolytic conductors – Faraday’s laws of electrolysis – Arrhenius theory of electrolytic dissociation – Ostwald’s dilution law. Conductance : Specific and molar conductance, Variation of conductance with dilution. Determination of molar conductance of an electrolyte, Kohlrausch law and its applications. <i>pH: Definition, Buffer solutions, Importance of buffer in the living systems. Corrosion and its prevention.</i>	15
	Total contact Hrs/Semester	78

***Italics denotes self study topics**

Teaching Methods

Lecture by Chalk & Talk, Power point Presentations, Group discussions, Seminar, Quiz, Assignment.

Text Books

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Yadav, M.S	Electrochemistry, 2 nd Edition	Anmol Publications	2001
2	Veeraiyan., V. and Vasudevan, A.N.S.	Ancillary chemistry, 1 st Edition	Einstein publishing house	2001
3	Vaidyanathan, K., Venkateswaran, A. and Ramasamy, R	Allied chemistry, 1 st Edition	Priya publications.	2005

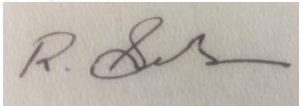
References

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Puri, Sharma and Pathania	Principles of Physical Chemistry	Vishal Publishing House	2007
2	Jain, P.C. and Monica Jain	Engineering Chemistry, 17 th Edition	Dhanpat Rai Publishing Company(P) Ltd.	2005

Mapping with Programme Outcomes

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	S	S	H	S
CO2	H	S	H	S	H
CO3	H	S	S	M	S
CO4	S	H	H	S	H

S-Strong; H-High; M-Medium; L-Low

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
  Dr.M.Selladurai Ms.R.Sudha Ms.C.Umamaheswari	 Dr.A.Ayyasamy	Dr.M.Durairaju	Dr.R.Muthukumaran

Programme Code:	B.Sc.	Programme Title :	CHEMISTRY	
Course Code:	19UPS4A4/	Title	Batch :	2019-2022
	19UBY4A5/ 19UZY4A5	Allied Chemistry Paper – II Inorganic, Organic and Physical Chemistry	Semester	IV
Hrs/Week:	6		Credits:	4

Course Objective

To develop the skill to aesthetically appreciate General Chemistry

Course Outcome

Knowledge Level	CO Number	CO Statement
K1	CO1	To have a basic ideas on synthetic dyes
K2	CO2	To understand the chemistry of biologically important molecules
K3	CO3	To know the common drugs and their use
K4	CO4	To have a basic idea in polymers & Fuels

Syllabus

Unit	Content	Hrs
I	Fuels: Types of fuels. Characteristics of a good fuel. Calorific value of a fuel. Advantages of gaseous fuels. Natural gas, water gas, producer gas, oil gas, <i>LPG and Gobar gas – Composition and uses (manufacturing details not needed)</i> Fertilizers: Manufacture of urea, ammonium sulphate, super phosphate of lime, Triple super phosphate and potassium nitrate. Silicones: Preparation, properties and uses. Glass: Manufacture, types of glass – soft glass, hard glass, flint glass, Pyrex glass and Coloured glass.	16
II	Synthetic Dyes : Definition, classification based on structure and application. Colour and constitution – Chromophore – Auxochrome Theory. Synthesis and uses of the following dyes: Azo dyes – methyl orange Vat dyes – Indigo (from anthranillic acid) Anthraquinone dyes (Alizarin) Phthalein dyes – Phenolphthalein. Synthetic Polymers : Classification – Homo and copolymers – Natural, Synthetic, organic, Inorganic polymers. Thermo plastics and thermosetting plastics. Types of polymerization, PVC, polystyrene, Bakelite, Teflon, Nylon – 6.6, Buna – S rubber – Preparation and uses.	16
III	Amino acids and Protein Classification of amino acids. Preparation and properties of Glycine. Action of heat on amino acids. Peptides. Synthesis of glycylalanine by carbobenzoxy method. Proteins: Classification, simple and conjugated proteins. Denaturation and colour reactions of proteins. Primary and secondary structure. Biological functions.	16
	Carbohydrates: Classification – preparation and properties of Glucose and Fructose. Elucidation of structure of Glucose. Comparison of properties of	

IV	glucose and fructose. Conversion of Glucose to Fructose and Fructose to Glucose. Sucrose: Preparation, properties and structure (Elucidation of structure not necessary) Starch and Cellulose : Properties and uses (Elucidation of structure not necessary).	15
V	Colloidal solution: Types of colloids. Preparation and properties of colloids and applications. Emulsions and gels: Preparation, properties and applications. Catalysis: Characteristics, types, mechanism of catalytic action and Industrial application	15
	Total contact Hrs/Semester	78

***Italics denotes self study topics**

Teaching Methods

Lecture by chalk & Talk, Power point Presentations, Group discussions, Seminar, Quiz, Assignment.

Text Books

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Vaidyanathan, K., Venkateswaran, A. and Ramasamy, R	Allied chemistry, 1 st Edition	Priya publications, Karur	2005
2	Bahl, B.S. and Arun Bhal	Advanced Organic Chemistry 1 st Edition	S.Chand & Company Ltd.	2007

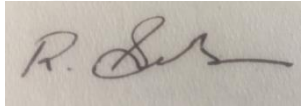
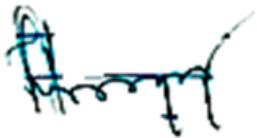
References

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Tyagi, O.D., Yadav, M.	A Text Book of Synthetic Dyes, 1 st Edition	Anmol publications Pvt. Ltd.	2001
2	Soni, P.L.	Text book of Organic Chemistry, 28 th Revised Edition	Sultan Chand & Sons	2002
3	Lubs, H.A.	Chemistry of Synthetic Dyes and Pigments, 1 st Edition	Robert E. Krieger publishing company	1995

Mapping with Programme Outcomes

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	S	S	H	S
CO2	H	S	H	S	H
CO3	M	S	S	S	H
CO4	S	H	H	S	H

S-Strong; H-High; M-Medium; L-Low

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
  Dr.M.Selladurai Ms.R.Sudha Ms.C.Umamaheswari	 Dr.A.Ayyasamy	Dr.M.Durairaju	Dr.R.Muthukumaran

Programme code:	B.Sc.	Programme Title :	CHEMISTRY	
Course Code:	19UPS 4A5/	Title	Batch :	2019-2022
	19UBY4A6/ 19UZY4A6	Ancillary Chemistry Practical	Semester	III & IV
			Credits:	2
Hrs/Week:	2			

Course Objective

To develop analytical skills in volumetric and organic qualitative analysis

Course Outcome

Knowledge Level	CO Number	CO Statement
K1	CO1	To understand the basic concept of volumetric analysis
K2	CO2	To get the idea about organic qualitative analysis
K3	CO3	To distinguish between aliphatic and aromatic, saturated and unsaturated compounds.
K4	CO4	To analyze the functional groups of organic compounds

Syllabus

Unit	Contents	Hours
	Volumetric Analysis: 1. Estimation of sodium carbonate. 2. Estimation of oxalic acid (Acidimetry) 3. Estimation of ferrous ion. 4. Estimation of oxalic acid.(Permanganometry) 5. Estimation of potassium dichromate using sodium thiosulphate 6. Estimation of temporary, permanent and total hardness of water 7. Estimation of Zinc using EDTA. 8. Estimation of Mg using EDTA. Organic analysis: Detection of elements. Nitrogen, Sulphur and Halogens. 1. To distinguish between aliphatic and aromatic, saturated and unsaturated compounds. 2. Functional group tests for : i) Mono and Dicarboxylic acids; ii) Phenols iii) Carbohydrates(Reducing and non reducing) iv) Aromatic primary amines and v) Amides.	
	Total contact Hrs/Semester	26

Teaching Methods

Demonstration, Group discussions, Quiz, Experience discussion.

Text Book

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Venkateswaran. V, Veeraswamy. R and Kulandaivelu. A.R	Basic principles of Practical chemistry, 1 st Edition	Sultan Chand & Sons	1997

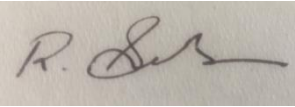
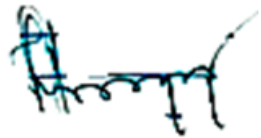
Reference

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Thomas. A.O	Practical Chemistry for B.Sc., Main Students,, 3 rd Edition	Scientific Book Centre	1985

Mapping with Programme Outcomes

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	S	S	H	S
CO2	H	S	H	S	H
CO3	S	S	S	H	H
CO4	H	S	H	S	H

S-Strong; H-High; M-Medium; L-Low

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
  Dr.M.Selladurai Ms.R.Sudha Ms.C.Umamaheswari	 Dr.A.Ayyasamy	Dr.M.Durairaju	Dr.R.Muthukumaran

Course (2018 - 2019)	
Core Paper – V: Nuclear and Co-ordination Chemistry	18UCY507
Core Paper – VI: Organic Chemistry - I	18UCY508
Core Paper – VII: Electro Chemistry	18UCY509
Core Paper- VIII: Dye Chemistry	18UCY510
Core Elective - I: Analytical Chemistry	18UCY511
Core Elective Practical: Application Oriented Practicals	18UCY512
Skill Based Elective – I: Food Chemistry	18UCY5S1
Core Paper – IX: Physical Methods and Chemical Structure	18UCY613
Core Paper – X: Organic Chemistry - II	18UCY614
Core Paper – XI: Chemical Kinetics and Photo Chemistry	18UCY615
Core Elective II: Polymer Chemistry	18UCY616
Core Lab - III: Gravimetric Analysis and Physical Chemistry Experiments	18UCY618
Skill Based Elective - II: Green Chemistry	18UCY6S3

Programme code:	B.Sc	Programme Title :	CHEMISTRY	
Course Code:	18UCY507	Title	Batch :	2018-2021
		Core Paper- V	Semester	V
Hrs/Week:	4	Nuclear chemistry and Co-ordination chemistry	Credits:	4

Course Objective

To develop the skill to aesthetically appreciate Nuclear and Co-ordination chemistry

Course Outcome

Knowledge Level	CO Number	CO Statement
K1	CO1	To understand the theory of radioactivity
K2	CO2	To have knowledge on uses of radio-active elements in various fields
K3	CO3	To understand various theories of bonding in coordination compounds and their importance
K4	CO4	To know the chemistry of carbonyls, basic knowledge on metallic bonding and semiconductors

Syllabus

Unit	Content	Hrs
I	Radio activity. Mass defect, packing fraction. Nuclear binding energy, n/p ratio and stability of the nucleus. Differences between nuclear and chemical reactions. Half- lifeperiod. Applications of artificial radioactivity : Age of the earth and C¹⁴ dating, medical field applications Isotopes: Detection of isotope by Aston Mass Spectrograph. Separation of isotopes by Electromagnetic, Thermal diffusion and Electrolytic techniques. Nuclear fission and fusion. Types of nuclear wastes and different methods of disposal of High and low radioactive wastes.	10
II	Co-ordination chemistry: Double salt and coordination compounds. Definitions of the terms: Ligands and Co-ordination number. Classification of ligands. Nomenclature of Co-ordination compounds. Theories of Co-ordination compounds: Werner's Theory: Designation of Cobalt (III)-ammine complexes. Sidgwick's Theory: Electronic interpretation of Co-ordination bond - Effective atomic number rule. VB theory: Postulates and its applications in the determination of geometry and magnetic property of the complexes.	11
III	Crystal field theory: Postulates. C.F.T- splitting of d-orbital in tetrahedral and Octahedral complexes. C.F.T.stabilization energy. Spectrochemical series. Chelates: Definition, classification, stability factors ,sequestration and sequestering agents. Detection and structure determination of Complexes: Solubility method, change in colour, pH measurements and conductance measurements.	11
	Isomerism in Co-ordination compounds: Structural isomerism: Ionisation, Hydrate and Linkage isomerism. Stereo isomerism: Geometrical isomerism in 4 and 6 - Co-ordination complexes. Optical isomerism in 4 -and 6- Co-ordination compounds.	

IV	Applications of complexes in quantitative analysis: Estimation of Ni^{2+} using DMG and Mg^{2+} using Oxine. Ligands substitution in octahedral complexes: Inert and Labile complexes Nucleophilic ligands substitution reactions, S_{N}^1 and S_{N}^2 mechanisms. Substitution reactions without breaking Metal-Ligand bond. Trans effect in square planar complexes: Definition, trans effect series and uses of trans effect.	10
V	Carbonyls Compounds: Mono and Binuclear carbonyls of $\text{Ni}(\text{CO})_4$, $\text{Fe}(\text{CO})_5$, $\text{Fe}_2(\text{CO})_9$, $\text{Co}_2(\text{CO})_8$, and $\text{Cr}(\text{CO})_6$ - synthesis, properties, structure and EAN. Metallic bond: Electron Sea model, Valence bond theory and Band theory. Semiconductors: <i>Intrinsic and Extrinsic Semi Conductors - n-type and p-type - Properties and uses.</i> Structures of alloys: Interstitial, substitutional and intermetallic alloys	10
	Total contact Hrs/Semester	52

***Italics denotes self study topics**

Teaching Methods

Lecture by chalk & Talk, Power point Presentations, Group discussions, Seminar, Quiz, Assignment.

TextBooks

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Puri and Sharma and Kalia. K.C.	Principles of Inorganic Chemistry, 31 st Edition	Milestone Publishers and Distributors	2013
2	Soni. P.L.	Text book of Inorganic Chemistry, 20 th Edition	Sultan Chand & Sons	2012

3	Madan, Malik and Tuli.	Selected Topics in Inorganic Chemistry	Sultan Chand & Sons	2006
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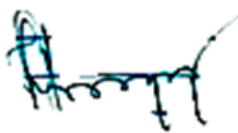
References

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Lee. J.D	Concise Inorganic Chemistry, 5 th Edition	Black Well Science Ltd, London.	2006
2	Jain. P.C. and Monika Jain	Engineering Chemistry, 15 th Edition	Dhanpat Rai Publishing Company	2005
3	Gopalan. R. and Ramalingam V.	Concise Coordination Chemistry, 3 rd Edition	Vikas Publishing house	2006

Mapping with Programme Outcomes

PSO \ CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	S	S	H	S
CO2	H	S	H	S	H
CO3	S	S	S	S	H
CO4	S	H	H	S	H

S-Strong; H-High; M-Medium; L-Low

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
 Dr.M.Amutha	 Dr.A.Ayyasamy	Dr.M.Durairaju	Dr.R.Muthukumaran

Programme code:	B.Sc.	Programme Title :	CHEMISTRY	
Course Code:	18UCY508	Title	Batch :	2018-2021
		Core Paper – VI	Semester	V
Hrs/Week:	4	Organic Chemistry-I	Credits:	4

Course Objective

To make the students to

- understand the mechanisms in molecular rearrangements
- acquire knowledge on heterocyclic compounds
- gain knowledge in carbohydrate chemistry
- acquire knowledge on structural elucidation of natural products

Course Outcome

On the successful completion of the course, students will be able to

Knowledge Level	CO Number	CO Statement
K1, K4	CO1	recollect and interpret the mechanisms of molecular rearrangements
K2	CO2	understand the significance of heterocyclic compounds
K2	CO3	understand the importance of carbohydrate chemistry
K3,K4	CO4	apply and interpret various chemical methods in deducing the structures of natural products

Syllabus

Unit	Content	Hrs
I	Molecular Rearrangements: Pinacol - Pinacolone. Beckmann, Hoffmann, Curtius, Schmidt, Benzidine, Benzilic acid, Fries, Baeyer Villiger, Cope and Claisen rearrangements.	10

II	Heterocyclic Compounds: Chemistry of Furan, Pyrrole, Thiophene, Pyridine, Quinoline, Isoquinoline and Indole. Pyrazole - Preparation and properties	10
III	Carbohydrates: Classification, configuration of Monosaccharides, chemistry and structural elucidation of Glucose and Fructose, interconversion in sugar series [Glucose to Fructose and vice versa, Glucose to Arabinose and vice versa], Mutarotation and epimerization. <i>Sucrose, Maltose, Lactose, and Saccharin – Preparation, Properties and uses [Structural elucidation is not needed].</i>	11
IV	Alkaloids: Definition, occurrence and extraction of alkaloids from plants. General methods of determining structure. Determination of structure of Coniine, Piperine, Papaverine and Nicotine	11
V	Terpenoids: Classification, isoprene rule, special isoprene rule and Gemdialkyl rule, Extraction from plants, structural elucidation of Citral, Camphor, α - terpineol and Menthol.	10
	Total hours/Semester	52

***Italics denotes self study topics**

Teaching Methods

Lecture by chalk & talk, power point presentations, group discussions, seminar, quiz, assignment, experience Discussion, brain storming, Activity, Models.

Text Books

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Finar. I.L.	Organic Chemistry	ELBS Edition	2006
2.	Bahl.B.S. and Arun Bahl	Advanced Organic Chemistry	S.Chand & Company Ltd., New Delhi	2010

3.	Soni. P.L.	Text book of Organic Chemistry	Sultan Chand & Sons, New Delhi	2012
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Reference Books

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Gurtu. J.N. and Kapoor. R.	Organic Reactions and Reagents	S.Chand & Company, Newdelhi	1998
2.	Gurdeep. R. Chatwal	Organic Chemistry of Natural Products, Volume I and II	Goel Publishing House	2004

Mapping with Programme Outcomes

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	H	S
CO2	S	S	S	S	H
CO3	S	S	H	H	S
CO4	S	H	S	H	H

S-Strong; H-High; M-Medium; L-Low

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
 Dr.Indumathy Ramasamy	 Dr.A. Ayyasamy	Dr.M. Durairaju	Dr.R.Muthukumaran

Programme code:	B.Sc.	Programme Title :	CHEMISTRY	
Course Code:	18UCY509	Title	Batch :	2018-2021
		Core Paper – VII	Semester	V
Hrs/Week:	4	Electro Chemistry	Credits:	4

Course Objective

- (i) To understand the concepts between electrochemistry and thermodynamics.
- (ii) To apply electro chemical principles to fuel cells, batteries and mechanism of corrosion.

Course Outcome

Knowledge Level	CO Number	CO Statement
K1	CO1	Able to write balanced half –cell reactions, determine overall cell reactions and calculate the standard reduction potential
K2	CO2	To understand the principles and applications of conductance measurements
K3	CO3	To describe and understand the operation of electrochemical systems for the production of electric energy, i.e. batteries and fuel cells
K4	CO4	To describe general corrosion in terms of electrochemistry and methods for minimizing corrosion

Syllabus

Unit	Content	Hrs
I	Electrolytic Conduction and Electrolysis: Faradays Laws of electrolysis. Measurement of conductivity in electrolytic solution. Variation of specific and equivalent conductances with dilution.	10

	Transport Number: Definition, Determination by the Hittorf's method and the Moving Boundary Method. Arrhenius theory of electrolytic dissociation and the Ostwald's dilution law. Kohlrausch's law of independent migration of ions and its applications. Debye -Huckel theory of strong electrolytes. Debye Huckel Onsager equation for the equivalent conductivity of strong electrolytes (Derivation not required), Wein and Debye Falkenhagen effects.	
II	Applications of conductance measurements: Determination of degree of dissociation of weak electrolytes, determination of ionic product of water, determination of solubility of sparingly soluble salts and conductometric titrations. Electrochemical cells: Nernst Equation, EMF of a cell and it's measurement. Thermodynamic quantities of cell reactions: ΔH, ΔS and ΔG from EMF data. Reversible electrodes and their types: Metal - Metal ion, Metal - insoluble salt, Gas - ion and redox electrodes. Single electrode potentials, standard electrode potentials, electrochemical series, computation of standard EMF and writing cell reactions.	11
III	Electrodes for the measurement of pH: Hydrogen gas electrode, Quinhydrone electrode and glass electrode Buffer solution: Buffer action, Henderson's equation and the evaluation of the dissociation constant. Acid-Base Indicators: Theories of Acid-Base Indicators. Acid-Base Titrations and choice of Indicators. Hydrolysis of Salts: Degree of hydrolysis, Relationship between K_h, K_w and the dissociation constant for salts such as sodium acetate, ammonium chloride and ammonium acetate.	10
IV	Electrochemical cells: Concentration cells with and without transference. Liquid junction potential - Formation and elimination.	11

	Applications of EMF measurements: Calculation of valency of ions in doubtful cases ($\text{Hg}^+/\text{Hg}^{2+}$), equilibrium constant of a electrochemical reaction, determination of transport number, determination of solubility of sparingly soluble salts.	
V	Batteries: Dry Cell, Lead-Acid storage cell and Nickel- Cadmium accumulator. Fuel Cell: Hydrogen - Oxygen fuel cell. Hydrogen over voltage: Measurement and its application to metal deposition. Electrochemical corrosion: Mechanism, Galvanic and differential aeration corrosion. Prevention of corrosion: Proper designing, using pure metal, using metal alloys, cathodic protection, modifying the environment and uses of inhibitor (Brief account only). Metallic coatings: Anodic and cathodic coatings. Method of application of metallic coatings: Hot dipping and electro plating (Nickel and chromium plating).	10
	Total hours/semester	52

***Italics denotes self study topics**

Teaching Methods

Lecture by Chalk & Talk, Power point Presentations, Group discussions, Seminar, Quiz, Assignment.

Text Books

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Puri and Sharma and. Pathania	Principles of Physical Chemistry	Milestone Edition, Vishal Publishing House	2007

2	Soni. P.L., and Dharmarha. O.P.	Text book of Physical Chemistry, 7 th Edition	Sultan Chand & Sons,	2005
3	Jain. P.C. and Monica Jain.,	Engineering Chemistry, 17th Edition	Dhanpat Rai Publishing Company(P) Ltd	2005

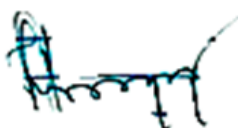
References

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Samuel H.Maroon. and Carl F.Prutton.,	Principle of Physical Chemistry, 4th Edition	Amerind ublishing Co. Pvt.Ltd	1972
2	Negi. A.S. and Anand. S.C	A Text book of Physical Chemistry, 4th Edition	New Age International (P) Ltd.	1995
3	Atkins. P.W.,	Physical Chemistry	ELBS/ Oxford University Press	1987

Mapping with Programme Outcomes

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	S	S	H	S
CO2	H	S	H	S	H
CO3	S	S	S	H	S
CO4	S	H	H	S	H

S-Strong; H-High; M-Medium; L-Low

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
 Dr.M.Amutha	 Dr.A.Ayyasamy	Dr.M.Durairaju	Dr.R.Muthukumaran

Programme code:	B.Sc.	Programme Title:	CHEMISTRY	
Course Code:	18UCY510	Title	Batch:	2018-2021
		Core Paper – VIII	Semester	V
Hrs/Week:	4	Dye Chemistry	Credits:	4

Course Objective

To encourage the students to opt their career as dye chemists in dyeing and textile industry

Course Outcome

Knowledge Level	CO Number	CO Statement
K1	CO1	To learn the basic concepts and theories of colour and its constitution
K2	CO2	To understand the preparation and properties of various types of dyes
K3	CO3	To know the classification and application of different dyes
K4	CO4	To acquire knowledge in process and applications of dyes

Syllabus

Unit	Content	Hrs
I	Electromagnetic spectrum: Various regions. Relationship of colour observed to wavelength of light absorbed. Complementary colours. Terms used in dye chemistry - Chromophores, Auxochrome, Bathochromic shift, Hypsochromic shift, Hypochromic shift and Hyperchromic shift. Requisites of a true dye: Classification of dyes according to their chemical constitution and mode of applications. Theories of colour and constitution: Otto Witt's theory, Quinonoid theory and Molecular orbital theory of various transitions.	10
	Nitro dyes: Picric acid, Martius yellow, Naphthol Yellow S – synthesis and applications.	

II	Nitroso dyes: Fast Green O, Naphthol Green Y - synthesis and applications Azo dyes: Diazotisation, Mechanism of diazotization, Effects of substituent on diazotization. Diazo coupling and coupling with phenols and Amines. Classification of azo dyes as monoazo and bisazo dyes. Synthesis and applications of important azo dyes: Methyl orange, Orange I, Orange II, Metanil yellow, Eriochrome Black – T, Bismark brown and Congo red.	10
III	Diphenyl methane dyes: Auramine O and Auramine G - synthesis and uses. Triphenyl methane dyes: Malachite green, Rosaniline, and Crystal violet - Synthesis and uses. Phthalein and Xanthene dyes: Phenolphthalein, and Rhodamine B - Synthesis and uses. Indigoid dyes: Indigotin – Synthesis and application to fibre. Indigosol O – Synthesis.	11
IV	Anthroquinone dyes: Anthraquinone acid dyes – Alizarin cyanine green and Solway ultra blue B, Mordant dyes – Alizarin and Alizarin Blue, Vat dyes- CI Vat Blue 43 and Carbazole and Disperse dyes - Disperse Red 15. Organic Pigments: Characteristics of pigments, uses of pigments. Types of Pigments - Lakes, Toners. Ionic and non-ionic Pigments. Phthalocyanines. Fluorescent brightening agents. Classification and properties. Fluorescent brighteners for a. cellulosic fibers b. acrylic fibers.	10
V	Types of textile fibres: Natural, Semisynthetic and Synthetic fibres – Cotton, Wool, Silk, Cellulose acetate, Viscose rayon, polyamides, polyacrylonitrile and polyester. Binding of dye with fibre- Ionic forces, Hydrogen bonds, Vander Waals forces, Covalent bonds. Selection of dyes for different fibres, Fastness properties of dyes. Process of dyeing: A simple treatment, various methods of dyeing - Direct dyeing, Mordant dyeing, Vat dyeing, Disperse dyeing. Formation of dye on the fibre. <i>Pollution problems in dyeing industry.</i> Non-textile uses of dyes: Uses of dyes in leather, paper, foods and drugs, colour	11

	photography and indicators.	
	Total contact Hrs/Semester	52

***Italics denotes self study topics**

Teaching Methods

Lecture by chalk & Talk, Power point Presentations, Group discussions, Seminar, Quiz, Assignment.

Text Books

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Tyagi. O.D. and Yadav. M.A.	Text Book of Synthetic Dyes	Anmol publications Pvt. Ltd.	2001
2	Bahl and Arun Bhal B.S.	Advanced Organic Chemistry	S.Chand & Company Ltd.	2007

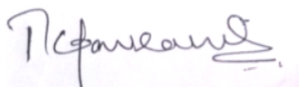
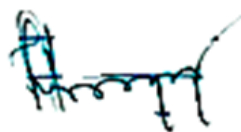
References

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1	Rao. R.S., Vidya Chawathe and Shah. S.J.	An Introduction to Synthetic Drugs and Dyes	Himalaya publishing House	1997
2	Lubs. H.A.	The Chemistry of Synthetic Dyes and Pigments	Robert E.Krieger Publishing Company	1997
3	Arora. M.G.	A Text Book of Synthetic Dyes	Anmol publication	1996

Mapping with Programme Outcomes

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	S	S	H	S
CO2	H	S	H	S	H
CO3	H	S	S	S	S
CO4	S	S	H	S	H

S-Strong; H-High; M-Medium; L-Low

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
 Dr.T.Gowrani	 Dr.A.Ayyasamy	Dr.M.Durairaju	Dr.R.Muthukumaran

Programme code:	B.Sc.	Programme Title :	CHEMISTRY	
Course Code:	18UCY511	Title	Batch :	2018-2021
		Core Elective Paper – I	Semester	V
Hrs/Week:	4	Analytical chemistry	Credits:	4

Course Objective

To develop the skill to aesthetically appreciate Analytical chemistry

Course Outcome

Knowledge Level	CO Number	CO Statement
K1	CO1	To learn instrumentation and basic principles and applications of modern analytical tools such as thermogravimetry and polarography
K2	CO2	To have knowledge on uses of nephelometry and flame photometry
K3	CO3	To understand the polarography, electrogravimetry and chromatography
K4	CO4	To acquire knowledge and applications of various analytical tools

Syllabus

Unit	Content	Hrs
I	Data Analysis: Definition and terms – absolute and relative error. Precision and accuracy. Classification of errors. Sources and minimisation of errors. Significant figures. Gravimetric Analysis: Precipitation methods. Conditions of precipitation, co-precipitation and post precipitation. Precipitation from homogeneous solution. Washing of the precipitate. Organic precipitants – DMG, Cupron, Cupferron, oxine and salicylaldehyde.	10

II	Thermogravimetric Analysis (TGA): Principle, factors affecting thermogravimetric curves. Applications: Evaluation of gravimetric precipitation, curie point determination and study of organic compounds. Electrogravimetry- principle only. Differential thermal analysis (DTA): Principle, factors affecting the DTA curve. Applications: heat of reaction, specific heat and quality control. Thermometric titrations (TTA): Principle and applications.	10
III	Polarimetry: Theory and instrumentation. Comparison of acid strength using polarimeter. Nephelometry and Turbidimetry: Theory, principles and applications in Inorganic analysis, turbidimetric titrations and phase titrations. Flame photometry: Theory, principle and applications in Qualitative and Quantitative analyses.	10
IV	Polarography: Principle, dropping mercury electrode – advantages and disadvantages. Experimental assembly, current – voltage curves. Significance of Ilkovic equation (derivation not required). Half wave potential. Applications in qualitative and quantitative analyses. Amperometric Titrations: Principle, apparatus and technique. Dead stop end point method. Advantages and disadvantages of amperometric titrations.	11
V	Chromatographic techniques: Paper Chromatography: Principle, RF value and experimental details. Applications in qualitative and quantitative analyses. Thin Layer Chromatography: Principle, brief account of experimental details and its advantages. Applications in the separation of amino acids. Column Chromatography: Principle, experimental details, factors affecting the column efficiency and applications. Ion Exchange Chromatography: Principle, types of resins, action of resins and applications in softening of hard water.	11
	Total contact Hrs/Semester	52

***Italics denotes self study topics**

Teaching Methods

Lecture by Chalk & Talk, Power point Presentations, Group discussions, Seminar, Quiz, Assignment.

Text Books

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Chatwal and Anand	Instrumental Methods of Chemical Analysis, 5 th Edition	Himalaya publishing House	2005
2	Arthur. I.Vogel	Inorganic Quantitative Analysis, 3 rd Edition	Longmans	1964
3	Khopkar	Basic concepts of Analytical Chemistry, 3 rd Edition	Wiley Eastern Ltd	1992

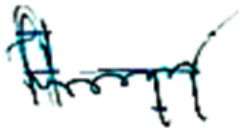
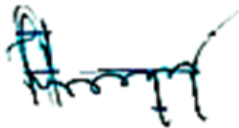
Reference

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Usharani. S.	Analytical Chemistry, 1 st Edition	Macmillan India Ltd	2000

Mapping with Programme Outcomes

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	H	S
CO2	H	S	H	S	S
CO3	H	S	S	S	H
CO4	S	H	H	S	H

S-Strong; H-High; M-Medium

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
 Dr.A.Ayyasamy	 Dr.A.Ayyasamy	Dr .M.Durairaju	Dr.R.Muthukumaran

100% Skill Development

Programme code:	B.Sc.	Programme Title :	CHEMISTRY	
Course Code:	18UCY512	Title	Batch :	2018-2021
Hrs/Week:	2	Core Elective Practical :	Semester	V
		Application Oriented Practicals	Credits:	02

Course Objective

- To develop the theoretical knowledge acquired in analytical chemistry
- To enable the students to acquire the quantitative skills in the preparation of inorganic complexes and dyes

Course Outcome

Knowledge Level	CO Number	CO Statement
K1	CO1	To understand the basic concept of analytical chemistry
K2	CO2	To apply the theoretical knowledge in the preparation of inorganic metal complexes and dyes
K3	CO3	To enable the students to acquire analytical skills (qualitative and quantitative skills)
K4	CO4	To develop hands on training in instruments like Melting point apparatus and spectrophotometer

Syllabus

Unit	Content	Hrs
I	1. Determination of melting point of organic substances (Acetanilide, meta-dinitrobenzene, benzoic acid, benzanilide, urea nitrate) 2. Preparation of Tetramminecopper(II) complex 3. Preparation of Hexamminecobalt(II) Chloride 4. Preparation of Potassium trioxalatochromate(III) 5. Preparation of Methyl orange 6. Preparation of para- nitrobenzene-azo- β -naphthol 7. Preparation of Malachite Green 8. Colorimetric estimation of Ferric ion with ammonium thiocyanate 9. Colorimetric estimation of Nickel as Nickeldimethylglyoximate	

	10. Determination of saponification value of an oil	
	Total contact Hrs/Semester	26

Teaching Methods

Lecture by chalk & Talk, Power point Presentations, Group discussions, Seminar, Quiz, Assignment.

Text Book

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Venkateswaran. V, Veeraswamy. R and Kulandaivelu. A.R	Basic principles of Practical chemistry, 1 st Edition	Sultan Chand & Sons	1997

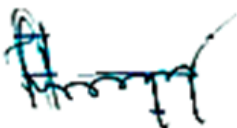
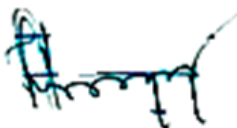
Reference

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Thomas. A.O	Practical Chemistry for B.Sc., Main Students,. 3 rd Edition	Scientific Book Centre	1985

Mapping with Programme Outcomes

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	S	S	H	S
CO2	H	H	H	S	H
CO3	S	S	S	M	H
CO4	S	H	H	H	H

S-Strong; H-High; M-Medium; L-Low

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
 Dr.A. Ayyasamy	 Dr.A.Ayyasamy	Dr.M.Durairaju	Dr.R.Muthukumaran

Programme code:	B.Sc.	Programme Title :	CHEMISTRY	
Course Code:	18UCY5S1	Title	Batch :	2018-2021
		Skill Based Elective-I	Semester	V
Hrs/Week:	1	Food Chemistry	Credits:	02

Course Objective

To develop the skill to aesthetically appreciate Food Science

Course Outcome

Knowledge Level	CO Number	CO Statement
K1	CO1	To learn about the importance and the basic principles of food processing
K2	CO2	To understand the practical methods of home preservation of foods
K3	CO3	To know about awareness on safety of food supply
K4	CO4	To encourage the students to opt their career as Food chemists in Food industry

Syllabus

Unit	Content	Hrs
I	Food: Definition for food and nutrition. Functions of food and nutrients. Energy values of foods. Recommended dietary intake, functions and deficiency of the following: Carbohydrate, fat, proteins, vitamins, minerals.	2
II	Food Preservation: Principles and importance of food preservation. Methods of food preservation: Bacterostatic Methods: Dehydration, pickling and salting Bacterocidal Methods: Canning and cooking.	3
III	Milk Processing - Pasteurisation. Brief account of dairy products- Butter, cream, cheese, condensed milk and milk powder. Food Additives: Food preservatives, food colours, food enzymes and antioxidants.	3
IV	Food adulteration: Adulterants and their effects. Incidental and intentional adulterants, metallic contamination. Simple physical and chemical tests for detection of food adulterants. Packaging hazards. Food poisoning and food borne diseases.	2
	Packaging hazards. Food Laws: FSSAI	

V	Food Standard: ISI standards and the Agmark standards. <i>Functions of Food Corporation of India.</i> Outlines of Preparation and bottling of Fruit squashes, fruit juices, pickles, jams and jellies.	3
	Total contact Hrs/Semester	13

*Italics denotes self study topics

Teaching Methods

Lecture by chalk & Talk, Power point Presentations, Group discussions, Seminar, Quiz, Assignment.

Text Books

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Swaminathan M	Essentials of Food and Nutrition	Ganesh Publishers, Madras	1977
2	Sumati R. Mudambi and Rajagopal M.V	Fundamentals of Foods and Nutrition	Wiley Eastern Ltd., New Delhi.	–

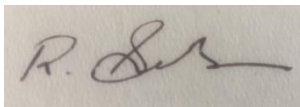
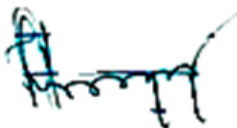
References

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1	Subbulakshmi.G. and Shobha A. Udipi	Food Processing and Preservation	New Age International Publishers, New Delhi	–
2	Jayashree Ghosh	Applied Chemistry	S.Chand and company Ltd., New Delhi	2006
3	Mahindru S.N	Food Additives	Tata Mc Graw Hill Publishing Company Ltd	2000

Mapping with Programme Outcomes

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	S	S	H	S
CO2	H	H	H	S	H
CO3	S	S	S	M	H
CO4	S	H	H	H	H

S-Strong; H-High; M-Medium; L-Low

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
 Ms.R.Sudha	 Dr.A.Ayyasamy	Dr.M.Durairaju	Dr.R.Muthukumaran

Programme code:	B.Sc.	Programme Title :	CHEMISTRY	
Course Code:	18UCY613	Title	Batch :	2018-2021
		Core Paper – IX	Semester	VI
Hrs/Week:	4	Physical Methods and Chemical Structure	Credits:	5

Course Objective

To make the students to

- acquire knowledge on basic concepts in spectroscopy
- gain basic knowledge in various spectroscopic techniques like rotational, vibrational, Raman, UV-visible, NMR and EPR
- understand the electrical and magnetic properties of molecules

Course Outcome

On the successful completion of the course, students will be able to

Knowledge Level	CO Number	CO Statement
K1, K2	CO1	recollect and understand the basic theoretical concepts in various types of spectroscopy
K4	CO2	interpret the structure of the unknown molecules from the given spectra
K4	CO3	evaluate various parameters like bond length, vibrational frequency from spectroscopic techniques
K3	CO4	apply electrical and magnetic properties in solving the structures of the molecules

Syllabus

Unit	Content	Hrs
I	Molecular Spectroscopy: Basic concepts of molecular spectroscopy, types of changes induced by the interaction of electromagnetic radiation with matter, regions of Electromagnetic spectrum. Microwave Spectroscopy: Theory, Rigid and non-rigid rotor models, patterns of spectral lines, Determination of bond length and accurate mass of atom. IR spectroscopy: Theory, Molecular vibrations, vibrational degrees of freedom, Harmonic and anharmonic oscillator models. Force constant, Vibrational frequency, factors affecting carbonyl stretching frequency (inductive and mesomeric effects) and hydrogen bonding. Overtones, combination bands, Fermi resonance and fingerprint region.	10
II	Raman spectroscopy: Origin of Raman lines - stokes and anti-stokes lines. Characteristics of Raman lines, Mechanism of Raman effect, Differences between Raman and Infrared spectra. UV and Visible Spectroscopy: Theory, types of electronic transitions, chromophore, auxochrome, intensity shifts, absorption bands and intensity. Franck – Condon principle, pre-dissociation spectra, Birge-Spoooner method of evaluation of dissociation energy from electronic spectra. Woodward Fischer rule for calculation for absorption maxima in dienes.	11
III	NMR Spectroscopy: Theory and principles, chemical shift, factors affecting chemical Shift, Anisotropy and inductive effect, reference (TMS) and solvents used. Splitting of signals, spin-spin coupling, coupling constant (elementary ideas). Application of NMR in the study of simple molecules (Ethanol, Ethyl bromide, Benzene, Toluene, Xylene and Mesitylene). ESR: Theory, 'g' factor, derivative curves. Hyperfine splitting, line width. Applications of $\cdot\text{CH}_3$ and Mn^{2+} ion.	10
IV	Solid State Chemistry:	11

	Unit Cell, crystal systems, Bravais Lattice, Law of rational indices, Miller indices. Geometrical requirement in close packed structures. Packing in ionic crystals. Simple cubic (SC), body centered cubic (BCC) and hexagonal close packed (HCP) structures, crystal structures of NaCl, ZnS, diamond and graphite. Defects in crystals: Point defects, Schottky defects, Frenkel defects, metal excess defects and metal deficiency defects. The radius-ratio rule. X-ray examination of crystals by Debye-Scherrer method.	
V	Electrical properties of Molecules: <i>Polar and non-polar molecules, Dipolemoment, Meaning of the terms – total molar polarisation, orientation polarisation and distortion polarisation. Effect of temperature on Molar polarization. Determination of dipolemoment of polar gas, Application of dipolemoment in the study of simple molecules.</i> Magnetic properties of molecules: Meaning of the terms – magnetic susceptibility, magnetic permeability and magnetic moment. Diamagnetism, Paramagnetism and Ferromagnetism. Curie-Weiss Law. Determination of magnetic susceptibility of paramagnetic substance using Guoy balance. Application of magnetic properties in identifying the geometry of simple and complex molecules.	10
	Total hours/Semester	52

***Italics denotes self study topics**

Teaching Methods

Lecture by chalk & talk, power point presentations, group discussions, seminar, quiz, assignment, experience Discussion, brain storming, in-house lab Activity, Models.

Text Books

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Puri, Sharma and	Principles of Physical	Millennium	2007

	Pathania	Chemistry	Edition, Vishal Publishing House	
2.	Sharma. Y.R.	Elementary Organic Absorption Spectroscopy	Sultan Chand & Sons	2007
3.	Gurdeep Chatwal & Sham K.Anand	Instrumental Methods of Analysis	Himalaya Publishing House	2005

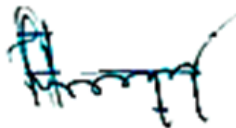
Reference Books

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Soni. P.L.	Text book of Organic Chemistry	Sultan Chand & Sons	2002
2.	William kemp	Organic Spectroscopy	ELBS edition	1985
3.	Manas Chanda	Atomic Structure and Chemical bonding	Tata Mc Graw Hill Company	1988

Mapping with Programme Outcomes

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	S
CO2	H	S	H	S	H
CO3	S	S	S	S	S
CO4	S	H	S	S	H

S-Strong; H-High; M-Medium; L-Low

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
 Dr.Indumathy Ramasamy	 Dr.A. Ayyasamy	Dr.M. Durairaju	Dr.R.Muthukumaran

Programme code:	B.Sc.	Programme Title :	CHEMISTRY	
Course Code:	18UCY614	Title	Batch :	2018-2021
		Core Paper – X	Semester	VI
Hrs/Week:	4	Organic chemistry-II	Credits:	4

Course Objective

To develop the skill to aesthetically appreciate Organic chemistry

Course Outcome

Knowledge Level	CO Number	CO Statement
K1	CO1	To develop the knowledge in solving the problems in organic chemistry
K2	CO2	To understand the structure and properties of proteins, DNA, vitamins and lipids
K3	CO3	To create awareness regarding chemotherapy
K4	CO4	To help the students to opt their career as biotechnologists, pharmacologists or medical representative

Syllabus

Unit	Content	Hrs
I	i) Solving problems of structures of organic compounds based on reactions of the following: Aldehydes, Ketones, Amines, Nitro-compounds, Phenols and Acids. ii) Polynuclear hydrocarbons: Condensed systems – Naphthalene, Anthracene and phenanthrene-Preparation, properties and uses. Structural elucidation of Naphthalene and Anthracene.	11
	Amino acids: Classification, Glycine and Alanine: Properties and synthesis by the following methods: Amination of α - halo acids, Gabriel's phthalimide synthesis	

II	and Strecker synthesis. Synthesis of polypeptides by carbobenzoxy method.(Bergmann method) ii) Proteins: Classification, primary and secondary structures of proteins, denaturation and biological functions of proteins.	10
III	Nucleic Acids: Carbohydrates present in nucleic acids. Nitrogen bases present in nucleic acids. Nucleosides and Nucleotides with examples. Functions of nucleotides. Nucleotide as energy carriers. Structure, replication and functions of DNA. ii) Lipids: Classification according to Bloor. Sources, extraction. Properties and analysis of oils and fats.	11
IV	Vitamins: Definition and classification as fat and water soluble vitamins, occurrence, deficiency diseases. Synthesis of the following: Vitamin A1(retinol), Vitamin B1, Pyridoxine and Ascorbic acid	10
V	Chemotherapy: Introduction, Definition and classification of drugs. i) Sulphadugs: Structure and uses of sulphanilamide, sulphapyridine, sulphadiazine, sulphaacetamide, sulphathiazole and sulpha guanidine. Mode of action. <i>ii) Antimalarials: Classification, structure and uses of chloroquine and pamaquine.</i> <i>iii) Antiseptics: Definition, structure and uses of chloramine-T and Iodoform .</i> iv) Anaesthetics: characteristics, structure and uses of Procaine and Pentothal sodium. v) Antibiotics: Introduction, structure and uses of Penicillin and Tetracycline. (Note: Structural elucidation of drugs not required)	10
	Total contact Hrs/Semester	52

***Italics denotes self study topics**

Teaching Methods

Lecture by Chalk&Talk, Power point Presentations, Group discussions, Seminar, Quiz, Assignment.

Text Book

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Soni.P.L. and Chawla	Text Book of Organic Chemistry	Sultan Chand & Sons, New Delhi	1992
2	Gurdeep R. Chatwal	Organic Chemistry of Natural Products, Volume II. Edition	Himalaya Publishing House	2006
3	Bahl. B.S and Arun Bhal	Advanced Organic Chemistry, 1 st Edition	Advanced Organic Chemistry	2007

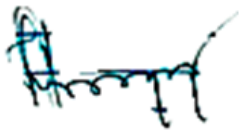
Reference

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Finar I.L	Organic Chemistry., Volume I	Longmans	2006

Mapping with Programme Outcomes

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	H	S
CO2	H	S	H	S	S
CO3	H	S	S	S	H
CO4	S	H	H	M	H

S-Strong; H-High; M-Medium; L-Low

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
 Dr.A.Ayyasamy	 Dr.A.Ayyasamy	Dr.M.Durairaju	Dr.R.Muthukumaran

100 % skill development

Programme code:	B.Sc.	Programme Title :	CHEMISTRY	
Course Code:	18UCY615	Title	Batch :	2018-2021
Hrs/Week:	4	Core Paper – XI	Semester	VI
		Chemical kinetics and photochemistry	Credits:	5

Course Objective

To develop the skill to aesthetically appreciate Chemical Kinetics and Photochemistry

Course Outcome

Knowledge Level	CO Number	CO Statement
K1	CO1	To understand the concept of rate of reaction
K2	CO2	To derive rate equations of various orders
K3	CO3	To understand the effect and consequence of radiation on molecular level
K4	CO4	To get basic knowledge in adsorption theories

Syllabus

Unit	Content	Hrs
I	The concept of Reaction Rate, Rate law and Rate equation. Factors influencing rates of chemical reactions. Order and Molecularity of a reaction. Setting and solving simple differential equations for first order, Second order and Zero order reactions. Pseudounimolecular reactions. Half-life time of a reaction – Expressions for $t_{1/2}$ - for first, second and n^{th} order reactions. Experimental techniques for measuring reaction kinetics – Volumetry and Polarimetry.	11
II	Methods of determining order of a reaction – Differential rate expressions, Integral rate expressions and Half-life method. Equilibrium approximation and Steady state approximation. Effect of Temperature on reaction rates – Temperature co-efficient, The Arrhenius equation – Derivation, activation energy and its determination. Theories of reaction rates: Lindemann's theory of Unimolecular reactions, Collision theory and Absolute reaction rate theory. Comparison of ARRT with Collision theory.	11
III	Catalysis: General characteristics of Catalytic reactions. Types of catalysis – Theories of Homogeneous and Heterogeneous catalysis- Kinetics of acid – base catalysed reactions. Enzyme catalysis: Kinetics of enzyme-catalysed reactions – Michaelis-Menten equation. Effect of Temperature and pH on enzyme catalysis. Adsorption: Chemisorption and physisorption, Adsorption of gases by solids. Factors affecting adsorption – Types of adsorption isotherms – Freundlich adsorption isotherm and Langmuir adsorption isotherms.	10
	Photochemistry: Consequence of light absorption – The Jablonski diagram, Laws of Photochemistry - Lambert and Lambert-Beer's laws, Grothus-Draper law, The Stark-Einstein law of photochemical equivalence, Quantum efficiency and its determination. The photochemical rate law: Kinetics of H_2 - Cl_2 reaction, Kinetics of H_2 - Br_2 reaction, Comparison of thermal and	

IV	photochemical reactions. Photosensitization and Quenching, Chemiluminescence. Lasers and their uses (Elementary idea only).	10
V	<i>Colloids: Classification, preparation and application of colloids</i> Properties of colloids: <i>Optical and kinetic properties: Tyndall effect and Brownian movement</i> Electrical properties: Charge on colloidal particle, Electrical double layer and Zetapotential. Electrokinetic properties: Electroosmosis and Electrophoresis. Emulsions: Preparation, Properties and Applications. Gels: Properties and Applications.	10
	Total contact Hrs/Semester	52

***Italics denotes self study topics**

Teaching Methods

Power point Presentations, Group discussions, Seminar, Quiz, Assignment.

Text Books

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Puri. B.R., Sharma. L.R. and Madan S.Pathania	Principles of Physical Chemistry, Millennium Edition	Vishal Publishing House	2007
2	Gurdeep Raj	Chemical Kinetics, 6 th Revised Edition	Goel publishing house	1997
3	Jain and Jain	Engineering Chemistry, 5 th Edition	Dhanpat Rai Publishing Company (P) Ltd.	2005

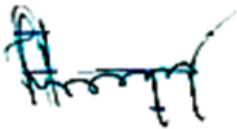
References

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Samuel H.Marion and Carl F.Prutton	Principles of PhysicalChemistry, MillenniumEdition	Amerind publishing Co. Pvt.Ltd.	1972
2	Negi. A.S. and Anand.S.C	A Text book of Physical chemistry,4 th Edition	New Age International (P) Ltd	1995
3	Chakrabarty. D.K	An introduction to Physical Chemistry	NarosaPublishing House	1996

Mapping with Programme Outcomes

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	S	S	H	S
CO2	H	S	H	S	H
CO3	S	S	S	S	S
CO4	S	H	H	S	H

S-Strong; H-High; M-Medium; L-Low

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
 Dr.M.Amutha	 Dr.A.Ayyasamy	Dr.M.Durairaju	Dr.R.Muthukumaran

Programme code:	B.Sc.	Programme Title :	CHEMISTRY	
Course Code:	18UCY616	Title	Batch :	2018-2021
		Core Elective – II	Semester	V I
Hrs/Week:	4	Polymer Chemistry	Credits:	5

Course Objective

- (i) To highlight the commercially important polymers and their various forms
- ii) To understand various industrial polymerization processes

Course Outcome

Knowledge Level	CO Number	CO Statement
K1	CO1	To recognize the principles of polymer recycling and can select appropriate recycle or reuse methods to balance economics and environmental responsibility
K2	CO2	To describe the mechanisms of chain polymerizations, and can predict reaction rates
K3	CO3	To identify the repeat units of particular polymers and specify the isomeric structures which can exist for those repeat units
K4	CO4	To estimate the number- and weight-average molecular masses of polymer samples given the degree of polymerisation and mass fraction of chains present

Syllabus

Unit	Content	Hrs
I	Basic Concepts: Monomers, Polymers, Polymerization, Degree of polymerization. Classification of polymers: Plastics: Definition – Thermoplastic, Thermosetting plastics and Reinforced Plastic. Elastomers: Definition – Natural & synthetic rubber – smoked rubber Reclaimed rubber – Foam rubber – Spongy rubber – Laminate rubber.	11

	Adhesives: Definition – thermosetting – thermoresins. Fibres: Definition –Natural and synthetic. Classification: comfort – safety – Industrial fibres. Thermal stabilisers- Antioxidants-photostabilisers. Polymerization Techniques: Bulk, Solution, Suspension and Emulsion Polymerization.	
II	Types of polymerization reactions: Addition Polymerization and Condensation polymerization. Types of Initiators. Inhibitors. Chain transfer agents. Addition Polymerization – Free radical Mechanism Ionic Polymerisation: Anionic and Cationic Polymerizations. Step growth of polymerisation (Condensation polymerisation) Co-Polymerisation: Random - Alternating – Block and Graft co polymers.	10
III	Stereo Regular Polymers: Isotactic, syndiotactic & Atactic. Geometrical isomers. Factors influencing Structural regularity. Ziegler – Natta Catalysts – Bi metallic and Mono metallic mechanisms. Glass transition temperature (T_g) and T_m. Determination of T_g by differential scanning calorimeter. Factors affecting T_g, T_g of copolymers. Degradation - Types of degradation - Thermal, Photo, High energy radiation and Oxidative method.	11
IV	Molecular weights of polymers: Number-Average, Weight-Average, Sedimentation-Average & Viscosity-Average molecular weights. Molecular weight distribution – GPC method .Determination of Average molecular weight: Ebulliometry method, Cryoscopy method, osmometry method, Light Scattering method and Viscosity method	10
V	Polymer processing techniques: Calendaring, film casting, compression moulding, injection moulding, blow moulding, extrusion moulding foaming and filament winding technique Preparation and uses of the following polymers: <i>Polyethylene (LDPE & HDPE), P.V.C, Teflon, polystyrene, Nylon-6, Nylon-66, Polyester, Phenol formaldehyde resins and Polycarbonates.</i>	10
	Total hours/Semester	52

***Italics denotes self study topics**

Teaching Methods

Power point Presentations, Group discussions, Seminar, Quiz, Assignment.

Text Books

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Gowariker.V.R. Viswanathan. N.V, Jeyadev Sreedhar	Polymer Science, 13th reprint	New Age International (P) Limited, Publishers	1999
2	Fred.W.Billmeyer, Jr	Text Book of Polymer Science, 2nd edition	Wiley –Interscience and Sons.Inc	2011
3	Madan.R.L., and Tuli.G.D.	Physical chemistry, I edition	S.Chand and Company Ltd	1999

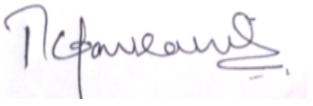
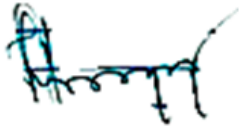
References

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Misra. G.S.	Polymer Chemistry, 2nd Reprint	New age International(P) Ltd	1989
2	Charles G.Geberlein, Brown. Wm.C	Chemistry and Our World	Publishers(Singapore), ISBN 069716574-4	1997
3	M.Gopala Rao and Marshall Sitig	Drydens Outlines of Chemical Technology for the 21 st Century, 3 rd Edition	East-West Press	1997

Mapping with Programme Outcomes

PSO CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	S	S	H	S
CO2	H	S	H	S	H
CO3	S	S	S	H	S
CO4	S	H	H	S	H

S-Strong; H-High; M-Medium; L-Low

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
 Dr.T.Gowrani	 Dr.A.Ayyasamy	Dr.M.Durairaju	Dr.R.Muthukumaran

Programme code:	B.Sc.	Programme Title :	CHEMISTRY	
Course Code:	18UCY618	Title	Batch :	2018-2021
		Core Practical – III	Semester	VI
Hrs/Week:	6	Gravimetric analysis and physical chemistry	Credits:	5

Course Objective

To develop analytical skills in gravimetric analysis and Physical Chemistry

Course Outcome

Knowledge Level	CO Number	CO Statement
K1	CO1	To understand the basic concept of gravimetric analysis
K2	CO2	To get the idea about Physical chemistry experiments
K3	CO3	To enable the students to acquire analytical skills (qualitative and quantitative skills)
K4	CO4	To develop practical skills in analytical and Physical chemistry experiments

Syllabus

Unit	Content	Hrs
	I: Gravimetric Estimations: - Lead as Chromate - Barium as Chromate - Barium as Sulphate - Nickel as dimethyl glyoxime complex - Calcium as Calcium oxalate. II: Physical Chemistry: Heterogeneous Equilibria: - Determination of transition temperature (thermometric method) - Sodium acetate - Sodium thiosulphate - Strontium chloride - Sodium bromide - Eutectic systems : - Naphthalene and diphenyl - Naphthalene and diphenylamine - Naphthalene and benzophenone - Naphthalene and p-nitrotoluene - Critical solution temperature: - Phenol – Water system. - Effect of NaCl on C.S.T. (between 1 to 2.0%) - Effect of Succinic acid on C.S.T. (between 1 to	

	2.0%) iv) Molecular weight: Rast's method Solvents – Naphthalene and diphenyl. 2. Kinetics: a) Acid catalysed hydrolysis of methyl acetate b) Potassium persulphate oxidation. 3. Conductivity Experiments: a) Cell constant b) Verification of Debye – Huckel Onsager Equation. c) Conductometric Acid – Base titrations (HCl x NaOH). 4. Potentiometric Titrations a) Acid – Base titration (HCl x NaOH). b) Redox titrations (FeSO₄x K₂Cr₂O₇)	
	Total Hrs/semester	78

Teaching Methods

Demonstration, Seminar, discussions, Assignment

Text Book

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Venkateswaran. V., Veeraswamy. R.and Kulandaivelu. A.R	Basic principles of Practical chemistry	Sultan Chand & Sons	1997

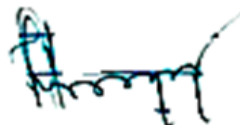
Reference

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Thomas. A.O.	Practical Chemistry for B.Sc., Main Students	Scientific Book Centre	1985

Mapping with Programme Outcomes

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	S	S	H	S
CO2	H	S	S	S	H
CO3	S	S	S	H	S
CO4	S	H	S	H	S

S-Strong; H-High; M-Medium; L-Low

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
 Dr. Indumathy Ramasamy	 Dr. A. Ayyasamy	Dr. M. Durairaju	Dr. R. Muthukumaran

Programme code:	B.Sc.	Programme Title :	CHEMISTRY	
Course Code:	18UCY6S3	Title	Batch :	2018-2021
		Skill Based Elective –II	Semester	VI
Hrs/Week:	1	Green Chemistry	Credits:	2

Course Objective

To develop the skill to aesthetically appreciate Green Chemistry

Course Outcome

Knowledge Level	CO Number	CO Statement
K1	CO1	To recollect the principles of green chemistry
K2	CO2	To understand the awareness on environment friendly technologies and working conditions
K3	CO3	To apply eco-friendly and less wasteful manufacturing process for the sustainable development of our country
K4	CO4	To acquire awareness about research in the field of green chemistry

Syllabus

Unit	Content	Hrs
I	The need for green chemistry: Sustainability and cleaner production. Green chemistry and Eco- efficiency. Environmental Protection Laws. Challenges ahead for a chemist. Green chemistry education.	3
II	Twelve Principles of Green Chemistry- Explanation with examples. Awards for Green Chemistry.	2
III	Water as greener solvent. An alternative approach to solvent chemistry: Solvent free reactions . Solvent free microwave assisted organic synthesis. Ionic Liquids: Prospects and retrospects	3
IV	Super critical fluid extraction: Supercritical fluids . Advantages and applications of super fluid extraction technology. Carbon dioxide as a super critical fluid: Advantages and industrial applications.	2
V	Green Techniques: Use of Bio- catalysis, Transition metal catalysts, Supported metal catalysts for green synthesis. Solventless synthesis. Oxidation technology for waste water treatment. Agrochemicals from nature. Chitin – Green polymer.	3
Total contact Hrs/Semester		13

***Italics denotes self study topics**

Teaching Methods

Lecture by Chalk & Talk, Power point Presentations, Group discussions, Seminar, Quiz, Assignment.

Text Book

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Rashmi Sanghi and M.M. Srivastava	Green Chemistry, (Environment Friendly Alternatives), First Edition	Narosa Publishing House, New Delhi.	2007

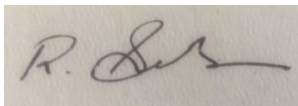
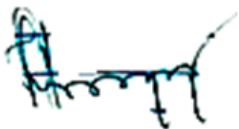
References

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	V.K. Ahluwalia	Green Chemistry, (Environmentally Benign Reaction), First Edition	Ane Books Pvt.Ltd., New Delhi	2006
2	Samuel Delvin	Green Chemistry, First Edition	IVY Publishing House, New Delhi.	2006
3	Asim K. Das	Environmental Chemistry with Green Chemistry, First edition	Books and Allied (P) Ltd., Kolkata.	2010

Mapping with Programme Outcomes

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	S	H	H	S
CO2	H	S	H	S	H
CO3	S	H	M	S	H
CO4	S	H	H	S	H

S-Strong; H-High; M-Medium; L-Low

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
 Ms.R.Sudha	 Dr.A.Ayyasamy	Dr.M.Durairaju	Dr.R.Muthukumaran