



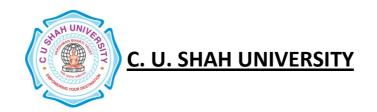
# C. U. SHAH UNIVERSITY WADHWAN CITY FACULTY OF SCIENCES

B.Sc.

CHEMISTRY

SEM-V

Syllabi (CBCS) of Chemistry WEF June 2016



COURSE: B.Sc. SEMESTER: V

SUBJECT NAME: Inorganic Chemistry-III SUBJECT CODE: 4SC05ICH1

#### **Teaching & Evaluation Scheme:-**

Tea	ching	hours	s/week	Credit	Evaluation Scheme/semester							
					Theory				Practical			
Th	Tu	Pr	Total			Sessional Exam		University Exam		ernal	University	Total Marks
					Marks	Hrs	Marks	Hrs	Pr	TW		
4	0	0	4	4	30	1.5	70	3				100

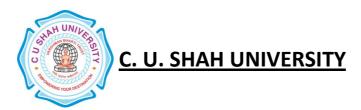
# **Objectives:-**

- To understand molecular symmetry which can used to predict molecule's properties such as its dipole moment and it's allowed spectroscopic transitions.
- To learn splitting of orbitals, magnetic properties, hydration enthalpies and spinal structures of transition metal complexes from CFT.
- To gain an appreciation for how inorganic chemistry influences your everyday life.

#### **Prerequisites:-**

Before studying Inorganic chemistry, all students have basic knowledge of inorganic and organic compounds, molecular structure, Molecular orbital theories and knowledge related to UG level chemistry.

Sr.	Course Contents
No.	
1	Molecular symmetry
	Introduction, symmetry operation and symmetry elements: $C_n$ , $\sigma$ , $S_n$ , i and E, Point
	groups for the molecules (excluding $S_{2n}$ and $I_h$ ), Use of multiplication tables of $C_{2\nu}$ , $C_{2h}$
	and C <sub>3v</sub> point groups
2	Inorganic Polymers: Classification of inorganic polymers, polymers containing boron and
	silicon: methods of preparation, physical and chemical properties, structures and their
	use.
	Metal Clusters: Metal clusters, carbonyl clusters, lownuclearity carbonyl clusters, high
	nuclearity carbonyl cluster, electron counting scheme for HNCCS, Wade's rules, Halides
	type clusters, Chevrel phases, Zinti ions.



3	Acids and Bases: Arhenius concept, Lowry-Bronsted Acid-Base concept, solvent system
	concept, Luxfloodconcept, Lewis Acid-Base concept, classification of Lewis Acids and
	Bases, Pearson's Soft and Hard Acid-Base principle (HSAB), application of HSAB principle,
	Levelling effect.

**Non-Aqueous Solvents:** Classification of Solvents, general properties of ionizing solvents, liquid  $NH_3$  as non-aqueous solvent, merits and demerits of Liquid  $NH_3$  as solvent, Liquid  $SO_2$  as a solvent, Liquid Hydrogen Flouride.

**Crystal Field Theory:** Introduction, concept of crystal field theory, splitting of d-orbital in octahedral and tetrahedral crystal field with CFSE concept, factors affecting splitting energy, weak field and strong field ligands, high spin and low spin complexes with pairing energy, magnetic behaviour of transition metal complexes, orbital angular momentum contribution to magnetic momentum of complexes, examples based on CFSE, pairing energy and magnetic momentum.

#### **Learning Outcomes:-**

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

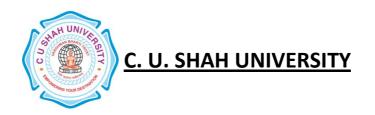
- Learn basic concepts of acids and bases and non-aqueous solvents.
- Understanding symmetry element, point group of the molecules.
- They can get idea of pairing energy, magnetic properties of metal complexes and splitting of orbitals.

#### **Books Recommended:-**

- 1. Principles of Inorganic Chemistry: Puri, Sharma and Kalia.
- 2. Concise Inorganic Chemistry: J.D.Lee; Wiley India, 5<sup>th</sup> Edition (1996).
- 3. 'Shriver and Atkins' Inorganic Chemistry: Atkins, Overton, Rourke, Weller, Armstrong; Oxford University Press, 5<sup>th</sup> Edition (2011).
- 4. Advanced Inorganic Chemistry: F.A. Cotton and Wilkinson G.; John Wiley, 5<sup>th</sup> Edition (1988).
- 5. Advanced Inorganic chemistry: (Vol. 1) Satya Prakash, Tuli, Basu and Madan; S. Chand

#### E-Resources:-

- 1. en.wikipedia.org/wiki/Molecular symmetry
- 2. en.wikipedia.org/wiki/Cluster chemistry
- 3. www.chemtutor.com/acid.htm
- 4. www.britannica.com/EBchecked/topic/3719/acid.../Nonaqueous-solvents
- 5. <a href="mailto:chemwiki.ucdavis.edu/.../Crystal">chemwiki.ucdavis.edu/.../Crystal</a> Field Theory



COURSE: B.Sc. SEMESTER: V

SUBJECT NAME: Organic Chemistry-III SUBJECT CODE: 4SC05OCH1

# **Teaching & Evaluation Scheme:-**

Teaching hours/week Credit					Evaluation Scheme/semester							
		Theory Practical				ictical						
Th	Tu	Pr	Total		Sessional University Exam Exam		Internal		University	Total Marks		
					Marks	Hrs	Marks	Hrs	Pr	TW		
4	0	0	4	4	30	1.5	70	3				100

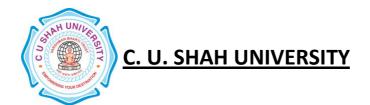
# **Objectives:-**

- Study of carbohydrates, basic concepts of reactive intermediates and the reactions involving active methylene compounds.
- To understand name reactions and rearrangement with their mechanisms.

# **Prerequisites:-**

 Before learning organic chemistry, student should be aware of basic principles and theories of name reactions, rearrangements, carbohydrates and other UG level chemistry.

Sr.	Course Contents
No.	
1	Reactive intermediates
	Homo and heterolytic fission, carbocations, carbanions, free radicals, carbenes, nitrenes,
	benzynes, ylides and enamines.
2	Name reactions and rearrangements
	Ullmann reaction, Meerwein-pondorfvarley reaction, Knorr-pyrole reaction, Skraup
	synthesis, Hantzsch-pyridine synthesis, Neber rearrangement, Stevens rearrangement,
	Pinacol-Pinacolone rearrangement.



#### 3 Carbohydrates

Introduction, classification and nomenclature, general reactions of monosaccharides (with reference to glucose and fructose), conversion of aldose to corresponding ketose, conversion of aldose to next higher ketose (Wolform method), conversion of aldose to ketose having two more carbon atoms (Sowden method), conversion of ketose to corresponding aldose. Step-up reactions: Kiliani reaction and Swoden nitromethane reaction, Step-down reactions: Ruff method, configuration of monosaccharides, ring structure of aldoses, determination of ring size of glucose by methylation method and periodic oxidation method, mutarotation of D(+) glucose.

# 4 Active methylene compounds

Introduction, synthesis of Ethyl acetoacetate (EAA) and Diethylmalonate Acidic and ketonichydrolysis of  $\beta$ -dicarbonyl compounds, Synthetic applications of  $\beta$ -dicarbonyl compounds. (i) Crotonic acid from EAA (ii) Valeric Acid from diethyl malonate.

# **Learning Outcomes:-**

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

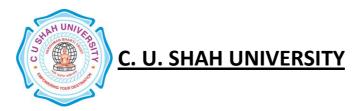
- Understand organic reactions with proper mechanisms.
- Determine reactions related to active methylene compounds, carbohydrates, etc.

#### **Books Recommended:-**

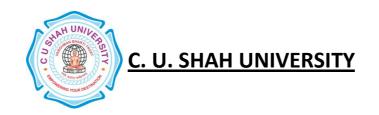
- 1. 'Organic Chemistry, The fundamental priniciples', I. L. Finar. Pearson.
- 2. 'Organic Chemistry, Stereochemistry and the chemistry of Natural Products', **I. L. Finar**, *Pearson.*
- 3. 'Organic Chemistry', S. M. Mukherji, S. P. Singh and R. P. Kapoor, New Age International (P) Limited.
- 4. 'A textbook of organic chemistry', ArunBahl, B. S. Bahl, S. Chand.
- 5. 'Organic Chemistry', **Robert Thornton Morrison and Robert Neilson Boyd**, *Prentice-Hall of India Private Limited*.
- 6. 'March's Advanced Organic Chemistry Reactions, Mechanism and Structure', Michael B Smith and Jerry March, Wiley.
- 7. 'Reaction Mechanisms and Reagents in Organic Chemistry', Gurudeep R. Chatwal,
- 8. 'Organic chemistry, reaction mechanism', V.K. Ahluvalia, R.K. Parashar, Narosa.

### **E-Resources:**

- 1. <a href="http://www.organic-chemistry.org/">http://www.organic-chemistry.org/</a>
- 2. <a href="http://www.organicdivision.org/?nd=p">http://www.organicdivision.org/?nd=p</a> organic web links
- 3. <a href="https://en.wikipedia.org/wiki/Reactive">https://en.wikipedia.org/wiki/Reactive</a> intermediate
- 4. www.eufic.org/article/en/expid/basics-carbohydrates/
- 5. <a href="http://www.masterorganicchemistry.com/resource-guide/">http://www.masterorganicchemistry.com/resource-guide/</a>
- 6. http://orgchem.iisc.ernet.in/chemlink.html



- 7. www.chem.ucalgary.ca/courses/351/Carey5th/Ch21/ch21-1-2.html
- 8. <a href="http://www.mpcfaculty.net/ron-rinehart/organic.htm">http://www.mpcfaculty.net/ron-rinehart/organic.htm</a>
- 9. <a href="http://web.usca.edu/chemistry/NewStudentInfo/helpful-websites-for-studying-organic-chemistry.dot">http://web.usca.edu/chemistry/NewStudentInfo/helpful-websites-for-studying-organic-chemistry.dot</a>
- 10. <a href="http://pubs.rsc.org/en/journals/journalissues/oc#!recentarticles&all">http://pubs.rsc.org/en/journals/journalissues/oc#!recentarticles&all</a>
- 11. http://www.chem.ox.ac.uk/vrchemistry/iom/#
- 12. <a href="http://ocw.mit.edu/courses/#chemistry">http://ocw.mit.edu/courses/#chemistry</a>
- 13. http://www.stolaf.edu/depts/chemistry/courses/toolkits/247/
- 14. http://iverson.cm.utexas.edu/courses/310M/MainPagesSp06/GoldenRules.html



COURSE: B.Sc. SEMESTER: V

SUBJECT NAME: Physical Chemistry-III SUBJECT CODE: 4SC05PCH1

# **Teaching & Evaluation Scheme:-**

Tea	ching	hours	/week	Credit		Evaluation Scheme/semester Theory Practical						
Th	Tu	Pr	Total		Sessional Exam		University Exam		Internal		University	Total Marks
					Marks	Hrs	Marks	Hrs	Pr	TW		
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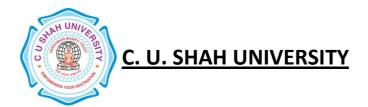
# **Objectives:-**

- To understand concept and theories of physical chemistry.
- To get idea about thermodynamics, Phase rule and electro chemical cells.
- To understand applications of phase change and colloids.
- To generate interest and curiosity about physical chemistry.

# **Prerequisites:-**

 Before learning physical chemistry, student should aware about basic principles and theories of physical chemistry, thermodynamics, solutions, electrochemical cells and other UG level chemistry.

Sr.	Course Contents
No.	
1	Second Law of Thermodynamics
	Spontaneous process, entropy, cyclic process, Carnot cycle, derivation of energy from
	carnot cycle, physical significance of entropy, entropy change in an ideal gas, Gibbs
	Helmholtz equations, Clapeyron equation, Clausious-Clapeyron Equation, Free energy
	and work function, Vant-hoff isotherm, Fugacity and activity.



#### 2 Solutions

Solution-homogenous mixture, composition of solution, solution of gases in gases, Henry's law, Solution of Gases in liquids, The ideal Solutions, Roults Law of solution, vapour pressure of ideal solution, vapour pressure of non-ideal solution, theory of fractional distillation, Azeotropic mixtures, distillation of immiscible liquids, Steam distillation, solubility of partially miscible liquids, Phenol-water system, Triethylamine-water system, Nicotine-water system, Critical Solution temperature, Solution of solids in liquids, solubility of solids in solids.

#### 3 Phase Rule

Phase, Components, degree of Freedom, phase rule, derivation of Phase rule, one component System, phase diagram, two component system, Silver-Lead System, Zn-Cd System, KI-Water System, Sodium Sulphate water System.

#### **Colloids**

Colloidal System, Lyophilic & Lyophobic sol, characteristics of Lyophilic & Lyophobic sol, preparation of sol, dispersion method, agrigation method, purification of sols, optical properties of sol, Tyndal effect, kinetic properties of sols, Brownian motion, electric properties of sols, Electrophoresis, Gold number, Application of Colloids.

#### 4 Electro Chemistry

Concentration cells: definition, Electrode Concentration Cell, electrolyte concentration cell, Concentration cell without transference, Concentration cell with transference, Liquid Junction potential, Elimination of liquid junction potential, Application of EMF measurement in determination of: Solubility of sparingly soluble salt, valency of metal ion, dissociation constant of weak acid, Transport number of ion, Ionic product of water, Degree of hydrolysis, pH by different electrodes.

# **Learning Outcomes:-**

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

- Understand Thermodynamics and its applications.
- Understand about solutions, its properties and vapuor pressure curves.
- Concept of Electrochemistry and various applications
- Understand phase rule and colloidal systems

#### **Books Recommended**

- 1. 'Essentials of Physical Chemistry', B.S.Bahl, ArunBahl and G.D.Tuli, S.Chand&Company.
- 2. 'Textbook of Physical chemistry' P. L. Soni, O. P. Dharmaraha, U. N. Dash, Sultan
- 3. 'A Textbook of Engineering Chemistry' **Shashi Chawla**, Dhanpat rai & Co.
- 4. 'Principles of Physical chemistry' Puri, Sharama&Pathani, Vishal Publications
- 5. 'Thermodynamics for chemist' **S. Glastone**, East west Publications
- 6. 'Physical Chemistry' B. K. Sharma, Goel Publishing House
- 7. 'A Textbook of Physical Chemistry', K. L. Kapoor, Macmillan.



- 8. 'Principles of physical Chemistry', Maron Samuel, Carl Prutton, Oxford Press
- 9. 'Elements of Physical Chemistry', Atkins Petter, Oxford Press.

#### **E-resources**

- 1. http://en.wikipedia.org/wiki/Second law of thermodynamics
- 2. <a href="http://chemwiki.ucdavis.edu/Physical Chemistry/Thermodynamics/Laws of Thermodynamics/Second Law of Thermodynamics">http://chemwiki.ucdavis.edu/Physical Chemistry/Thermodynamics/Laws of Thermodynamics</a>
- 3. <a href="http://chemwiki.ucdavis.edu/Physical Chemistry/Physical Properties of Matter/Solutions and Mixtures/Colloid">http://chemwiki.ucdavis.edu/Physical Chemistry/Physical Properties of Matter/Solutions and Mixtures/Colloid</a>
- 4. http://en.wikipedia.org/wiki/Electrochemistry



COURSE: B.Sc. SEMESTER: V

SUBJECT NAME: Analytical Chemistry-II SUBJECT CODE: 4SC05ACH1

# **Teaching & Evaluation Scheme:-**

Teaching hours/week Credit					Evaluation	Evaluation Scheme/semester						
			Theory Practical									
Th	Tu	Sessional University Internal			Total							
In	Tu	Pr	Total		Exam	Exam Internal University		University	Marks			
					Marks	Hrs	Marks	Hrs	Pr	TW		
4	0	0	4	4	30	1.5	70	3				100

# **Objectives:-**

- To understand concept and theories of analytical chemistry.
- To get idea about instrumentation techniques.
- To understand applications of error and statistics and various volumetric concepts.
- To generate interest and curiosity about analytical chemistry.

# **Prerequisites:-**

Before learning analytical chemistry, student should aware about basic principles and theories of analytical chemistry, Basics of volumetric analysis, and other UG level chemistry.

Sr.	Course Contents
No.	
1	Errors and statistics
	Introduction, explanation of errors and mistakes, classification of errors, determinant and indeterminant error, operational and personal errors, instrument error and reagent error, additive and proportional error, Accuracy and precision, minimization of error, Explanation of significant figure and its law with complete interpretation, Mean and standard deviation, variance and coefficient of variance, Absolute error and relative error, mean value deviation and relative mean deviation, Importance of Q-test and T-test (Student-T test), Examples on errors, significant figures, Q-test and T-test.



#### 2 Basic principles of qualitative analysis

Separations of following species in presence of each other

1. Cl<sup>-</sup>, Br<sup>-</sup>, l<sup>-</sup> 2. NO<sup>-2</sup>, NO<sup>-3</sup>, Br<sup>-</sup> 3. S<sup>-</sup>, SO<sup>-2</sup>, SO<sup>-2</sup>4. PO<sub>4</sub><sup>-3</sup>, AsO<sub>3</sub><sup>-3</sup>, AsO<sub>4</sub><sup>-3</sup>5. CO<sub>3</sub><sup>-2</sup>, SO<sub>3</sub><sup>-2</sup>, S

### Colourimetry

Introduction, Lambert-Beer's Law Derivation and applications

Spectrophotometric titration graphically, Deficit of absorbance by product, titrant and reagent

# 3 Calculation based on pH, normality, molarity, solubility product constant (K<sub>sp</sub>) etc.

Ostwald's law-regarding indicator necessary derivation and formula of indicator used in neutralization, redox, precipitation titration.

#### **Neutralization titration**

Primary and secondary standard explanation, Strong acid-Strong Base, Weak acid – Strong base, Strong Acid – Weak base, Poly protic acid-Strong base titration

#### **Redox Titration**

Principle of external and internal indicators in redox titrations, lodometry and lodimetry titration

#### **Precipitation titration**

Argentometric titration (I) Mohr's method (II) Fazan's method (III) Volhard's method with use of proper indicator, graph and its principle.

# 4 Electro-chemical methods (Conductometry)

Electric transport, conductance in metals and in electrolyte solution, specific conductance, equivalent conductance, Importance of conductivity electrodes and platinization of electrodes, Variation of specific conductance with dilution as well as area of cross section of dip type electrodes and distance between two plates of electrodes etc., Kohlrausch law and its importance, cell constant and its importance.

**Conductometric Titration:**Strong acid – Strong base, Strong acid – Weak base, Weak base – strong base, weak acid – Weak base

Precipitation Titration:AgNO<sub>3</sub> – NaCl, BaCl<sub>2</sub> – K<sub>2</sub>SO<sub>4</sub>, Ba(OH)<sub>2</sub> – MgSO<sub>4</sub>

Degree of Hydrolysis and Hydrolysis constant: Importance of conductivity water and temperature for the measurement of conductivity.

#### **Learning Outcomes:-**

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

- Understand various concepts of Errors and statistics.
- Concept of Colorimetry and Cunductometry.
- Understand about various principles of volumetric and qualitative analysis.
- They can be able to apply basics into their experiment as well as their routine life.

#### **Books Recommended**

- 1. 'Instrumental Methods of Chemical Analysis', **ChatwalGurdeep R**., Himalaya Pub. House
- 2. 'Instrumental methods of chemical analysis', **B. K. Sharma**, Krishna prakashanMerut.

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- 3. 'Principles of instrumental analysis', **Skoog. D. A.**, Thomason, Brooke/Cole
- 4. 'Quantitative analysis', R.A. Day Jr. A.L. Underwood, 5th edition, Prentice Hall of India
- 5. Private Ltd., New Delhi.
- 6. 'Basic concept of Analytical Chemistry', **S. M. Khopkar**, New Age International Publishers, New Delhi.
- 7. 'Analytical Chemistry: An Introduction', **D.A. Skoog, D.M**. **West and F.J. Holler**,5<sup>th</sup> *Edition, Saunders college publishing*.

#### E-resource

- 1. http://en.wikipedia.org/wiki/Errors and residuals in statistics
- 2. <a href="http://www.wiredchemist.com/chemistry/instructional/laboratory-tutorials/volumetric-analysis">http://www.wiredchemist.com/chemistry/instructional/laboratory-tutorials/volumetric-analysis</a>
- 3. http://www.britannica.com/EBchecked/topic/632594/volumetric-analysis
- 4. <a href="http://books.google.co.in/books/about/Conductometric analysis.html?id=GrM6AAAMAAJ">http://books.google.co.in/books/about/Conductometric analysis.html?id=GrM6AAAMAAJ</a> &redir esc=y
- 5. <a href="http://www.monzir-pal.net/Lab%20Manuals/Practical%20Quantitative%20Analysis/main Pract Quant/Precipit ation titrations.htm">http://www.monzir-pal.net/Lab%20Manuals/Practical%20Quantitative%20Analysis/main Pract Quant/Precipit ation titrations.htm</a>



COURSE: B.Sc. SEMESTER: V

SUBJECT NAME: Industrial Chemistry-II SUBJECT CODE: 4SC05IDC1

# **Teaching & Evaluation Scheme:**

Teac	Teaching hours/week Credit Evaluation Scheme/semester											
		Theory Practical										
Th	Tu	Pr Total Sessional University Internal			Total							
III	ıu	PI	TOLAI		Exam	Exam Exam Inter		IIIai	University	Marks		
					Marks	Hrs	Marks	Hrs	Pr	TW		
4	0	0	4	4	30	1.5	70	3				100

# **Objectives:-**

- To understand Industrial chemistry reaction pathways and reaction types.
- To learn basic principle of Unit process and operation.
- To understand the gases and oil fats manufacturing.

# **Prerequisites:-**

Before studying Industrial chemistry, all students have basic knowledge of types of reaction, condition, unit operation, unit operation and perfumes.

Sr.	Course Contents								
No.									
1	Unit Process and Unit Operation:								
	Unit process: Basic principle and introduction, Nitration, Sulphonation, halogenation,								
	Oxidation, amination, hydrogenation, calcinations, Condensation, alkylation,								
	esterification, hydrolysis, hydrolysis, polymerization.								
	Unit Operation: Basic principle, introduction, Distillation, filtration, Crystallizationand								
	Extraction.								
2	Industrial organic Synthesis:								
	Introduction, Raw material and basic process, Chemical process used in industrialorganic								
	synthesis, Petrochemicals								
	Industrial synthesis of Methanol, Ethanol, Phenol, Acetic acid, Ethylene glycol, Glycerine,								
	Ethyl acetate, Formaldehyde, Acetone, Propenone.								



3	Industrial gases:
	Introduction, Hydrogen cell, Source of hydrogen, hydrogen from microbes, Industrial
	production of hydrogen, Industrial uses of hydrogen.
	Manufacturing and uses of following gases:
	Oxygen Nitrogen, Carbon dioxide, Acetylene, Ammonia and Nitric Acid
4	Oil, Fat and Perfumes:
	Oil and Fat
	Introduction, Difference between oil and fats, physical and chemical properties.
	Classification, manufacturing of Soybean oil by solvent extraction, Mineral oil, Animal
	oil, Silicon oil, Ester oil, Iodine oil
	Synthetic perfumes:
	Introduction, Esters, Alcohols, Ketones, Ionones, Nitro masks, Aldehydes, Production of

# **Learning Outcomes:-**

After the successful completion of the course, students will be able to understand

- Industrial process in large scale.
- Esterification, Nitration, gases, sulfonation and oil and fats.

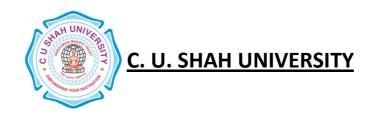
natural perfumes. Flower, fruits and artificial perfumes.

#### **Books Recommended:-**

- 1. 'Industrail Chemistry' by B.K. Sharma.
- 2. 'Advanced Organic Chemistry, Part B', F. A. Carey & R. J. Sundberg, Plenum Press.
- 3. 'A Text Book of Organic Chemistry', R.K.Bansal, New Age International (P) ltd.
- 4. 'Advanced Organic Chemistry', Jerry March.
- 5. 'Reaction Mechanism and Problems in Organic Chemistry', **P. Chattopadhyay**, Asian Book Pvt Ltd, New Delhi.
- 6. 'Principles of Organic Synthesis', R.O.C Norman, J.M. Coxon, CRC Press.
- 7. 'Organic Chemistry', J. Clayden, N. Greeves, S. Warren, P. Wothers, Oxford University Press.
- 8. 'Organic Chemistry', J. Mcmurry, Asian Books Pvt. Ltd.

#### **E** recourses

- 1. <a href="http://www.engineering.unsw.edu.au/chemical-engineering/industrial-chemistry">http://www.engineering.unsw.edu.au/chemical-engineering/industrial-chemistry</a>
- 2. <a href="http://en.wikipedia.org/wiki/Unit operation">http://en.wikipedia.org/wiki/Unit operation</a>
- 3. <a href="http://www.essentialchemicalindustry.org/processes.html">http://www.essentialchemicalindustry.org/processes.html</a>
- 4. <a href="http://www.avu.org/Chemistry/chm-4101-industrial-chemistry.html">http://www.avu.org/Chemistry/chm-4101-industrial-chemistry.html</a>
- 5. <a href="http://www.petrochemistry.eu/about-petrochemistry/what-are-petrochemicals.html">http://www.petrochemistry.eu/about-petrochemistry/what-are-petrochemicals.html</a>
- 6. http://chemicals.nic.in/MLCPCSTAT14.pdf
- 7. <a href="http://en.wikipedia.org/wiki/Industrial">http://en.wikipedia.org/wiki/Industrial</a> gas
- 8. http://nzic.org.nz/ChemProcesses/production/1K.pdf
- 9. <a href="http://www.betterhealth.vic.gov.au/bhcv2/bhcarticles.nsf/pages/fats">http://www.betterhealth.vic.gov.au/bhcv2/bhcarticles.nsf/pages/fats</a> and oils



COURSE: B.Sc. SEMESTER: V

SUBJECT NAME: Applied Chemistry SUBJECT CODE: 4SC05APC1

# **Teaching & Evaluation Scheme:-**

Teaching hours/week				Credit	Evaluation Scheme/semester							
					Theory				Practical			
Th	Tu	Pr	Total		Sessional		Universit	ty	Internal			Total
III	ıu	PI	TOLAI		Exam	kam Exam Internal Universit		University	Marks			
					Marks	Hrs	Marks	Hrs	Pr	TW		
4	0	0	4	4	30	1.5	70	3				100

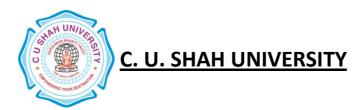
# **Objectives: -**

• To provide basic knowledge of applied chemistry.

# Prerequisites:-

• Knowledge of basics of chemistry is essential.

	T
Sr.	Course Contents
No.	
1	Medicinal Chemistry
	Introduction, Classification and Nomenclature of Drugs, Mechanism of Drug Action and
	Metabolism of Drugs, Causes of Common Diseases and their Treatment by Drugs, Some
	Medicinally Important Inorganic Compounds, Biological Role of Some Inorganic
	Compounds,
2	Biological Chemistry
	Nutrients Digestion and Absorption, Enzymes, Hormones, Micro Nutrients and their
	Biological Role
3	Dairy Chemistry
	Sampling of milk, butter, and cheese, Qualitative exercises and tests, Extraction of fat
	from milk, Microscopic examination of milk and butter, Examination of milk fat, Oxidised
	taint in milk, Kreis test for oxidised fat, Detection of the presence of peroxides in
	oxidised fat, Separation and examination of casein, Film formation, Albumin and
	globulin, Preparation and examination of milk ash, Action of rennet on milk, Tests for
	some preservatives and colouring agents in milk, Estimation of fat in milk.



4 Agriculture Chemistry

Soil Chemistry, Insecticides, Fungicides And Herbicides, Fertilizers, Manures, Compost And Saw Dust

# **Learning Outcomes:-**

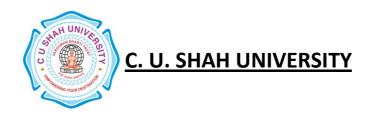
 At the end of the course the student would have sufficient knowledge of basics of pharmaceutical chemistry, biological chemistry, agriculture chemistry and about milk and milk products.

#### **Books Recommended:-**

- 1. Fundamental concepts of applied chemistry by Jayashree Ghosh, S. Chand
- 2. Medicinal Chemistry: An Introduction By Gareth Thomas, Wiley
- 3. Fundamentals of Dairy Chemistry by **Elmer H. Marth**, Springer Science & Business Media, 30-Sep-1988
- 4. Elements of Agricultural Chemistry By Thomas Anderson MD, Betmillard USA

#### E-resources

- 1. <a href="http://krishikosh.egranth.ac.in/bitstream/1/22039/1/BPT4178.pdf">http://krishikosh.egranth.ac.in/bitstream/1/22039/1/BPT4178.pdf</a>
- 2. <a href="http://en.wikipedia.org/wiki/Agricultural chemistry">http://en.wikipedia.org/wiki/Agricultural chemistry</a>
- 3. <a href="http://en.wikipedia.org/wiki/Medicinal chemistry">http://en.wikipedia.org/wiki/Medicinal chemistry</a>
- 4. http://chemwiki.ucdavis.edu/Biological Chemistry



COURSE: B.Sc. SEMESTER: V

SUBJECT NAME: Environmental Chemistry SUBJECT CODE: 4SC05EVC1

# **Teaching & Evaluation Scheme:-**

Teaching hours/week				Credit	Evaluation Scheme/semester							
			Total		Theory			Practical				
Th	Tu	Pr			Sessional		Universi	ty	Internal			Total
In	ıu	Pi	TOLAI		Exam Exam Internal		University	Marks				
					Marks	Hrs	Marks	Hrs	Pr	TW		
4	0	0	4	4	30	1.5	70	3				100

# **Objectives: -**

To provide basic knowledge of environmental protection and improvement.

# Prerequisites:-

Environmental Science chemistry plays a key role in understanding the environment and preserving its quality.

Sr.	Course Contents
No.	
1	Environment
	Environment, nature of environmental threats and the role of chemistry, Chemistry of
	the air, water and soil environment, Factors affecting environment, Types of
	environment, Structure and composition of atmosphere, Air as an ecological factor,
	Biosphere, Current environmental problems, Importance of clean air.



#### 2 Air pollution

Pollution, origin of pollution, Classification of pollutants, Air pollutants – Oxides of carbon, sulphur, nitrogen, hydrocarbons, VOC and SPM, Persistent organic pollutants, Chlorofluorocarbons, Dioxins, automobile exhaust, Alternate refrigerants, Health and environmental effects of pollutants.

#### Water pollution

Importance of water, self-purification capacity of the water body, visible signs of water pollution, sources of water pollution, fate of pollutants in aquatic systems, effects of water pollution, Water quality standards, Detection of fluoride, chloride, sulphate, nitrate, phosphate, acidity and alkalinity of water, Biological magnification and bioaccumulation.

#### 3 Industrial waste water treatment

Method to control water pollution, Aerobic and anaerobic oxidation, Sedimentation, coagulation, filtration, disinfection, desalination and ion exchange, Primary treatment, secondary treatment - trickling filters, activated sludge process, sludge digestion, Tertiary treatment, USAB process and deep well injection, Sewage, sewage anlysis-total solids, settable solids, suspended solids, dissolved oxygen, BOD (winklers titration method and dissolved oxygen metre) and COD.

#### 4 Soil pollution and Soil analysis

Types, sources and consequences. Sampling Methods. Specifications for disposal of sewage & effluent on land for irrigation & ground water recharge. Methodology of wastewater disposal on land in India. Impact of usage of land for solid waste disposal both municipal solid waste & industrial solid wastes (fly ash from thermal power station, lime sludge from pulp & paper mills). Determination of moisture, pH

#### **Learning Outcomes:-**

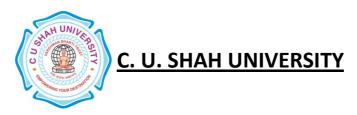
 At the end of the course the student would have sufficient knowledge of basics become familiar with chemical processes that occur in the environment and have developed means of directing chemical science towards environmental improvement.

#### **Books Recommended:-**

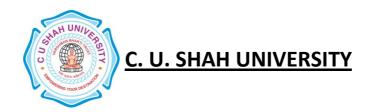
- 1. **A. K. Dee**., Environmental Chemistry, 6th Edition, New Age International.
- 2. **P.K.Goel**, Water Pollution, Causes, Effects and Control, New Age International
- 3. **B. K. Sharma**, Analytical Chemistry: (Comprehensively Covering the UGC Syllabus).
- 4. **Kochu Baby Manjooran**, Modern Engineering Chemistry (Kerala University), Kannatheri Publications.
- 5. Shashi Chowla, Engineering Chemistry, Dhanpat Rai Publishing Company.
- 6. P.C. Jain and Moniika Jain, Engineering Chemistry, Dhanpat Rai Publishing Company.
- 7. T. D. Biswas and S. K. Mukherjee, A. Text-Book of Soil Sciences

#### **E-resources**

1. www.epa.gov/airtrends/2010/report/airpollution.pdf



- 2. www.euro.who.int/ data/assets/pdf file/0006/74715/E86650.pdf
- 3. <a href="www.unwater.org/downloads/water\_quality.pdf">www.unwater.org/downloads/water\_quality.pdf</a>
- 4. <a href="http://waterandme.tamu.edu/WaterPollution/waterpollution.pdf">http://waterandme.tamu.edu/WaterPollution/waterpollution.pdf</a>
- 5. www.eolss.net/sample-chapters/c09/e4-11-02-02.pdf
- 6. www.arlington-tx.gov/cityattorney/wp-content/.../INDUSChapter.pdf
- 7. <a href="http://agricoop.nic.in/dacdivision/mmsoil280311.pdf">http://agricoop.nic.in/dacdivision/mmsoil280311.pdf</a>



COURSE: B.Sc. SEMESTER: V

SUBJECT NAME: Chemistry Practical-V SUBJECT CODE: 4SC05PRC1

# **Teaching & Evaluation Scheme:-**

Teaching hours/week				Credit	Evaluation Scheme/semester							
					Theory				Practical			
Th	Th Tu Pr Tota		Total		Sessional		University		Internal Universit			Total
111	ıu	Pi	TOLAI		Exam Exam		University	Marks				
					Marks	Hrs	Marks	Hrs	Pr	TW		
0	0	12	12	6					20	10	70	100

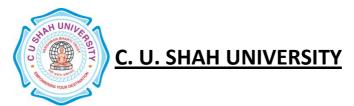
# **Objectives:-**

- To understand organic compounds and identification
- To learn practical principles related to organic chemistry and physical chemistry
- To create interest in students in learning basic chemistry.

# **Prerequisites:-**

Before studying practical of analytical chemistry, all students have basic knowledge of inorganic and organic compounds, properties, molecular structure and knowledge related to UG level chemistry.

Sr.	Course Contents
No.	
1	Conductometry
	1. To determine normality and g/lit of xNHCl and also determine specific
	conductance by conductometry.
	2. To determine normality and g/lit of the mixture of HCl+CH <sub>3</sub> COOH by
	conductometry.
	3. To determine the normality of weak acid by conductometry.
	pH metry
	1. To determine normality of xNHCl by pH metry.
	2. To determine normality and dissociation constant of weak acid (xN CH <sub>3</sub> COOH) by
	pH metry.
	3. To determine normality and dissociation constant of dibasic acid (xN oxalic



	acid/malonic acid/maleic acid) using 0.1N NaOH solution.
	Colourimetry
	1. Find out the amount of Ni <sup>+2</sup> in the given solution by colourimetry method.
	2. Find out the amount of Fe <sup>+3</sup> in the given solution by colourimetry method.
	Viscosity
	1. To determine relative and absolute viscosity of pure liquid A, B, C, D.
	2. Prepare three different 10%, 5%, 2.5% aqueous solution of Glycerin. Find
	viscosity of these three solutions as well as unknown concentration solution.
2.	Organic qualitative analysis:
	Identification ofternary mixture of organic compounds containing at least one
	liquid.

# Learning outcomes:-

After the successful completion of the course, students will be able to:

- Understand basic principal of chemistry practical's
- Understand Qualitative Analysis of an organic mixture by separation method
- Understand pH metry, colorimetry and conductometry

#### **Books for References:**

- 1. 'Textbook of quantitative analysis, A. I. Vogel.
- 2. 'Textbook of qualitative analysis, A. I. Vogel.
- 3. Experimental physical chemistry by **R. C. Das & B. Bahera** 'Practical in inorganic chemistry & analytical chemistry', **H.G. Raval,** Nirav&RupalPrakashan.

#### E-Resources:-

- 1. http://pubs.acs.org/journal/inocaj
- 2. http://www.chemlin.de/chemistry/inorganic\_chemistry.htm
- 3. <a href="http://www.anorg.chem.uu.nl/home/index.html">http://www.anorg.chem.uu.nl/home/index.html</a>
- 4. http://www.springer.com/chemistry/inorganic+chemistry/journal/11502
- 5. http://libguides.stanford.edu/content.php?pid=149720&sid=1271547
- 6. <a href="http://www.science.uwaterloo.ca/~cchieh/cact/applychem/inorganic.html">http://www.science.uwaterloo.ca/~cchieh/cact/applychem/inorganic.html</a>