

CODE	COURSE TITLE
18CHUC305	CORE CHEMISTRY - V

Category	CIA	ESE	L	T	P	Credit
CORE	25	75	41	4	-	4

Preamble

The course enables the students to understand about metals, phenols, amines, phase rule and phase diagram.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1.	Acquire knowledge in Boron family and compounds of Boron	K2, K3
CO2.	Apprehend the metallurgy of Germanium and Transition metals	K1, K3
CO3.	Assist to understand the Chemistry of Phenols	K1, K2, K3
CO4.	Procure the reactions of Aliphatic and aromatic amines	K1, K2, K3
CO5.	Apply the concept of Phase rule to one and two component systems	K2, K3

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1.	M	L	M	S	S
CO2.	S	S	M	S	S
CO3.	M	S	M	S	S
CO4.	M	S	M	S	S
CO5.	L	M	L	M	S

S- Strong; M-Medium; L-Low

Syllabus

UNIT I

(9 hrs.)

Chemistry Of Boron Family: General characteristics – Electronic configuration – Similarities in

Physical properties – Similarities in Chemical properties – Formation of Oxides and Hydroxides - Formation of Trihalides - Formation of Hydrides – Comparison of B and Al – Diagonal relationship between B and Si – Position of Boron in the Periodic table – Diborane – Preparation – Properties – Structure of Diborane - Preparation – Properties – Uses of Sodium borohydride – Borazole.

UNIT II

(9 hrs.)

Occurrence, Extraction, Properties And Uses Of Metals: Germanium – Titanium – Zirconium – Vanadium – Molybdenum - Tungsten And Their Important Compounds Such As $GeCl_4$, GeO_2 , $TiCl_4$, $ZrOCl_2$, V_2O_5 , Ammonium Molybdate And WO_2 .

UNIT III

(9 hrs.)

Phenols: Monohydric Phenols - Preparation And Properties – Reaction Of Monohydric Phenols With Mechanism – Alkylation – Esterification – Nitration – Sulphonation –Halogenation- Coupling With Diazonium Salts - Dihydric Phenols – Resorcinol - Preparation – Properties And Uses - Alpha And Beta Naphthols - Preparation And Properties.

UNIT IV

(9 hrs.)

Amines: Aliphatic amines – Preparation of 1°, 2°, 3° amines – Separation of mixture of Amines – Basicities of Amines – Reactions of 1°, 2°, 3° amines – With Mineral acids – Alkylation – Acylation – Sulphonylation – Hinsberg Test – With nitrous acid – Aromatic amines – Aniline – Preparation – Basicity of Aniline – Properties - Acylation – Sulphonylation – Diazotization – Ring Substitution reactions – Bromination – Nitration – Sulphonation.

UNIT V

(9 hrs.)

Phase Rule And Phase Equilibria: The Equilibrium Condition – Derivation Of Phase Rule – Phase Equilibria In One Component System - Phase Diagram For Sulphur And Water System - Phase Diagram For Two Component System - Construction Of The Phase Diagram - Bi-Cd, Zn-Mg, Na-K System.

Text Books

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Puri B.R., Sharma L.R.	Principles of Inorganic Chemistry	Vishal Publishing Company, Jalandhar	2016, Revised Edition
2.	Bhal B.S. & Arun Bahl	Advanced Organic Chemistry	S. Chand & co., New Delhi	2016, 1 st Edition
3.	Puri B.R., Sharma L.R. & Pathania M.S.	Principles of Physical Chemistry	Sobanal Nagin chand & co., New Delhi	2016, 47 th Edition

Reference Books

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Bahl B.S. & Tuli G.D.	Essentials of Physical Chemistry	S. Chand & Co., New Delhi	2014, 27 th Edition
2.	Soni P.L.	Text Book of Inorganic Chemistry	Sultan Chand & Sons, New Delhi	2003, 20 th Edition
3.	Madan R.D.	Modern Inorganic Chemistry	S. Chand & Co, New Delhi	2011, 3 rd Revised Edition
4.	Morrison R.T and Boyd. R.W.	Organic Chemistry	Prentice-Hall of India, New Delhi	1997, 6 th Edition
5.	Glasstone S. and Lewis D.	Elements of Physical chemistry	McMillan, New Delhi	1970, 2 nd Edition
6.	Kundu N. S. and Jain S.K.	Physical chemistry	Chand & Co., New Delhi	1984, 1 st Edition

Website Sources

- [https://chem.libretexts.org/Bookshelves/Organic_Chemistry/Supplemental_Modules_\(Organic_Chemistry\)/Phenols/Properties_of_Phenols/Physical_Properties_of_Phenol](https://chem.libretexts.org/Bookshelves/Organic_Chemistry/Supplemental_Modules_(Organic_Chemistry)/Phenols/Properties_of_Phenols/Physical_Properties_of_Phenol)
- <https://www.quora.com/Why-are-aliphatic-amines-more-basic-than-aromatic-amines>
- https://www.researchgate.net/publication/265602607_Phase_Rule_CHAPTER-6_Phase_Rule

Pedagogy

- Lecture, PPT, Quiz, Assignment, Group Discussion, Seminar

CODE	COURSE TITLE
18CHUC406	CORE CHEMISTRY - VI

Category	CIA	ESE	L	T	P	Credit
CORE	25	75	41	4	-	4

Preamble

To promulgate the better understanding of fundamental organic chemistry, dyes, iron group metals, adsorption, solutions and colligative properties.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO6.	Recognise the Purification and Estimation techniques in organic chemistry and its applications	K2
CO7.	Illuminate the perception of dye chemistry	K2,K3
CO8.	Perceive the metallurgy of iron group metals and their uses	K2,K3
CO9.	Understand the ideal, nonideal solutions and colligative properties	K2,K3
CO10.	Describe the adsorption isotherms	K1,K2

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO6.	S	S	S	S	M
CO7.	S	S	M	S	M
CO8.	M	S	M	S	M
CO9.	M	M	S	S	M
CO10.	M	S	S	S	M

S- Strong; M-Medium; L-Low

Syllabus

UNIT I

(9 hrs.)

Purification and Estimation techniques in Organic Chemistry: Purification– Crystallization– Sublimation – Distillation – Fractional Distillation Distillation – Under Reduced Pressure – Steam Distillation – Extraction With The Solvent –Chromatography – Column Chromatography – Gas Liquid Chromatography – Tests Of Purity – Melting Point – Mixed Melting Point – Boiling Point – Detection Of Carbon, Hydrogen, Oxygen, Nitrogen, Sulphur, Halogens, Phosphorous – Estimation Of Carbon Nitrogen (Kjeldahl Method) – Halogens(Carius Method) – Sulphur, Phosphorous, Oxygen – Calculation Of Empirical Formula – Molecular Formula – Importance Of Organic Chemistry In Modern Life.

UNIT II

(9 hrs.)

Dyes: Terms Used In Color Chemistry – *Chromophores* – *Auxochromes* -Bathochromic Shift - Hypsochromic Shifts – Relationship Of Color Observed To Wavelength Of Light Absorbed - Color Of A Substance - Quinonoid Theory - Molecular Orbital Approach – Classification Of Dyes According To Chemical Constitution: Azo Dyes - Methyl Orange - *Bismark Brown* - Congo Red - Triphenyl Methane Dyes-Malachite Green - Crystal Violet - Phthalein Dyes – Phenolphthalein - Xanthene Dyes-Fluorescein - Anthraquinone Dyes - Mordant Dye – Alizarin – Vat Dye – Indigo..

UNIT III

(9 hrs.)

Iron Group metals: Iron - Occurance - Passivity Of Iron - Theories Of Passivity - Smith And Rusel Theory -Oxide Film Theory - Rusting Of Iron - Theories Of Rusting - Acid Theory -Electrochemical Theory - Production From Rusting - Commercial Forms Of Iron - Cast Iron: Manufacture From Haematite Ore -Properties And Uses - Wrought Iron: Manufacture From Cast Iron -Properties -Uses - Steel: Manufacture From Bessemer Process- Annealing - Hardening - Tempering - Uses Of Alloy Steel - Extraction - Properties And Uses Of Platinum - Important Alloys Of Platinum - Platinum Black - Spongy Platinum - *Platinised Asbestos*.

UNIT IV

(9 hrs.)

Solutions: Ideal And Non-Ideal –Raoult's Law - Henry's Law – *Solubility Of Partially Miscible Liquids* – **Colligative Properties** : Relative Lowering Of Vapour Pressure - Elevation Of Boiling Point - *Depression Of Freezing Point* – Osmotic Pressure - Their Applications Nernst Distribution

Law And Its Application.

UNIT V

(9 hrs.)

Adsorption: Types Of Adsorption -Adsorption Isotherms - Freundlich Adsorption Isotherm - Langmuir Adsorption Isotherm -BET Equation - (Elementary ideas only) Adsorption By Solids From Solutions - Gibbs Equation (Derivation Excluded) - Adsorption Isobars - Adsorption Isostere - Applications of Adsorption.

Text Books

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Puri B.R., Sharma L.R.	Principles of Inorganic Chemistry	Vishal Publishing Company, Jalandhar	2016, Revised Edition
2.	Bhal B.S. & Arun Bahl	Advanced Organic Chemistry	S. Chand & co., New Delhi	2016, 1 st Edition
3.	Puri B.R., Sharma L.R. & Pathania M.S.	Principles of Physical Chemistry	Sobanal Nagin chand & co., New Delhi	2016, 47 th Edition

Reference Books

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Arora M.G.,	<i>Text Book Of Dyes</i>	Anmol Publications, New Delhi	1996, 1 st Edition
2	Mughergee, S.M., Singh S.P., Kapoor R.P	<i>Organic Chemisty Vol – 1,2,3</i>	Wiley Eastern, New Delhi	1992, 1 st Edition
3	Soni P.L.	Text Book of Inorganic Chemistry	Sultan chand & sons, New Delhi	2003, 20 th Edition
4	Madan R.D.	Modern Inorganic Chemistry	S. Chand & Co, New Delhi	2011, 3 rd Revised Edition
5	Kheterpal Dr. S.C	<i>Physical Chemistry Vol. I & II</i>	Pradeep Publications, Jalandhar,	2011, 2 nd Edition

Website Sources

1. https://chem.libretexts.org/Bookshelves/Organic_Chemistry/Book%3A_Basic_Principles_of_Organic_

Chemistry_(Roberts_and_Caserio)/28%3A_Photochemistry/28.4%3A_Color_and_Constitution

2. <https://www.emedicalprep.com/study-material/chemistry/surface-chemistry/adsorption/>

3. <https://opentextbc.ca/chemistry/chapter/11-4-colligative-properties/>

Pedagogy

- Lecture, PPT, Quiz, Assignment, Group Discussion, Seminar

SEMESTER - IV

CODE	COURSE TITLE
18CHUCP02	CORE PRACTICAL II- VOLUMETRIC AND ORGANIC ANALYSIS

Category	CIA	ESE	L	T	P	Credit
CORE	60	90	-	-	45	4

Preamble

The course aims to impart the knowledge of the principles and skill for quantitative analysis of solutions containing inorganic ions, qualitative analysis organic functional groups and preparation of organic derivatives.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Perform quantitative analysis of solutions containing inorganic substances	K1
CO2	Carryout skillfully the qualitative and quantitative analysis of solutions	K2, K3
CO3	Identify and detect various organic functional groups and special elements present in organic compounds.	K2
CO4	Analyze the aliphatic/aromatic, saturated unsaturated character of organic compounds	K3
CO5	Prepare derivatives of organic compounds	K3

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	S	S
CO2	S	L	M	S	S
CO3	M	M	M	S	S
CO4	M	M	M	S	S
CO5	M	S	S	S	S

S- Strong; M-Medium; L-Low

Syllabus

I VOLUMETRIC ANALYSIS:

A. Acidimetry & Alkalimetry

1. Estimation Of Sodium Carbonate

B. Permanganometry

1. Estimation Of Ferrous Sulphate
2. Estimation of Oxalic Acid
3. Estimation Of Calcium-Direct Method

C. Dichrometry

1. Estimation Of Ferrous Iron Using Internal Indicator.

D. Iodimetry

1. Estimation Of Potassium Dichromate
2. Estimation Of Copper
3. Estimation Of Arsenious Oxide

II ORGANIC ANALYSIS

Systematic Analysis Of An Organic Compound - Preliminary Testes - Detection Of Elements Present - Aromatic Or Aliphatic - Saturated Or Unsaturated - Nature Of The Functional Group - Confirmatory Tests And Preparation Of Derivatives

Compunds to be given: Aldehydes – Amines – Amides – Carbohydrates – Phenols- Acids – Esters - Nitro Compounds.

III Preparation:

Preparation involving bromination, acetylation, hydrolysis and oxidation.

Pedagogy

Demonstration ,PPT, Experimental work