

# **YADAVA COLLEGE**

(An Autonomous Co-Educational Institution)

**Govindarajan Campus, Thiruppalai,  
Madurai- 625014**



**DEPARTMENT OF CHEMISTRY**

**2022-2023**

### **Programme Specific Outcome:**

After completing the B.Sc Chemistry course the students can

PSO1	Have sound knowledge about the fundamentals and applications of chemical and scientific theories through theory and practical's.
PSO2	Every branch of Science and Technology is related to chemistry.
PSO3	Apply appropriate techniques for the qualitative and quantitative analysis of chemicals in laboratories and in Industries.
PSO4	Easily assess the properties of all elements discovered.
PSO5	Will become familiar with the different branches of chemistry like analytical, organic, inorganic, Physical, polymer, environmental and biochemistry.
PSO6	Develop analytical skills and problem solving skills requiring application of chemical principles.
PSO7	Acquire the ability to synthesise, separate and characterize compound using laboratory and instrumentation techniques.
PSO8	Explain nomenclature, stereochemistry, structures reactivity and mechanism of chemical reactions.
PSO9	Identify chemical formula, fractional group and solve numerical problems.
PSO10	Know structure – activity relationship
PSO11	Understand good laboratory practices and safety.
PSO12	Develop research oriented skills.
PSO13	Make aware and handle the sophisticated instruments / equipments.

**DEPARTMENT OF CHEMISTRY  
YADAVA COLLEGE, MADURAI -14.  
CBCS (2022-2023)**

**COURSE CONTENT  
B.SC., Chemistry Major with Mathematics Ancillary**

**SEMESTER - I**

Sem	Part	Subject	Code	Title of the paper	Teach. Hours/Week	Credits	Evaluation			Exam hours
							Int	Ext	Total	
<b>I</b>	I	Lang I		Paper I-Tamil	5	3	25	75	100	3
	II	Lang II		Paper I- English	5	3	25	75	100	3
	III	Core		Paper I- Fundamentals of Inorganic Chemistry	4	4	25	75	100	3
				Paper II- Fundamentals of Organic Chemistry	4	4	25	75	100	3
				Major practical I* - Semi micro qualitative Analysis	3	--	--	--	--	--
	Allied I		Paper I- Physics	3	2	25	75	100	3	
			Practical I*- Physics	2	--	--	--	--	--	
	IV	ENS		Environmental Science	2	2	25	75	100	3
		SBE		Communicative English-I	2	2	25	75	100	3
					Total	30	20	--	--	700

## SEMESTER-II

Sem	Part	Subject	Code	Title of the paper	Teac. Hour/ Week	Credits	Evaluation			Exam hours
							Int	Ext	Total	
II	I	Lang I		Paper II-Tamil	5	3	25	75	100	3
	II	Lang II		Paper II- English	5	3	25	75	100	3
	III	Core		Paper III- Inorganic Chemistry	4	4	25	75	100	3
				Paper IV- Organic and Physical Chemistry	4	4	25	75	100	3
				Major practical I* - Semi micro qualitative Analysis	3	3	40	60	100	3
	Allied I		Paper II- Physics	3	2	25	75	100	3	
			Practical I*- Physics	2	2	40	60	100	3	
	IV	VAE		Value Education	2	2	25	75	100	3
		SBE		Communicative English-II	2	2	25	75	100	3
	V	NSS/ NCC/ PET/ EXT			---	1	---	---	---	---
				Total	30	26	--	--	900	--

### SEMESTER -III

Sem	Part	Subject	Code	Title of the paper	Teac. Hours/Week	Credits	Evaluation			Exam hours	
							Int	Ext	Total		
III	I	Lang I		Paper III-Tamil	5	3	25	75	100	3	
	II	Lang II		Paper III- English	5	3	25	75	100	3	
	III	Core		Paper V- General Chemistry - I	4	4	25	75	100	3	
				Major practical II* - Volumetric Analysis	2	--	--	--	--	--	
		Allied I		Paper III- Physics	3	2	25	75	100	3	
				Practical II*- Physics	2	--	--	--	--	--	
	Allied II		Paper I - Maths/ Botany	3(B)/5 (M)	2(B)/ 2(M)	25	75	100	3		
			Practical I*- Botany	2	--	--	--	--	--		
	IV	NME		Dairy Science	2	2	25	75	100	3	
		SBE		Communicative English -III	2	2	25	75	100	3	
					Total	30	18	--	--	700	--
	Self Study -I				Food Chemistry	--	3 (extra credit)	25	75	100	3

### SEMESTER IV

Sem	Part	Subject	Code	Title of the paper	Teac. Hour/Week	Credits	Evaluation			Exam hours	
							Int	Ext	Total		
IV	I	Lang I		Paper IV-Tamil	5	3	25	75	100	3	
	II	Lang II		Paper IV- English	5	3	25	75	100	3	
	III	Core		Paper VI- General Chemistry - II	4	4	25	75	100	3	
				Major practical II* - Volumetric Analysis	2	2	40	60	100	3	
		Allied I		Paper IV- Physics	3	2	25	75	100	3	
				Practical II*- Physics	2	2	40	60	100	3	
	Allied II		Paper II Maths/ Botany	3(B)/ 5(M)	2(B)/ 3(M)	25	75	100	3		
			Practical I*- Botany	2	1	40	60	100	3		
	IV	NME		Small Scale Industrial Chemicals	2	2	25	75	100	3	
		SBE		Communicative English -IV	2	2	25	75	100	3	
					Total	30	23	--	--	900 (M) / 1000 (B)	--
	Self Study-II				Forensic Chemistry	--	3 (extra credit)	25	75	100	3

### SEMESTER V

Sem	Part	Subject	Code	Title of the Paper	Teach. Hours/Weak	Credit	Evaluation			Exam hours	
							Int	Ext	Total		
V	III	Core		Paper VII - Physical Chemistry -I	5	5	25	75	100	3	
		Major Elective-I		Paper I - Organic Chemistry -I	5	5	25	75	100	3	
		Major Elective-II		Paper II - Applied Chemistry	5	5	25	75	100	3	
				Major Practical III – Gravimetric Estimation and Organic Preparation	5	5	40	60	100	6	
				Practical IV* – Organic Analysis, & Estimation	3	--	--	--	--	--	
		Allied II		Paper III-Maths /Botany	5(M)/3(B)	2(B)/2(M)	25	75	100	3	
			Practical II*- Botany	2	--	--	--	--	3		
	IV	SBE		Soft skills	2	2	25	75	100	3	
					Total	30	24	--	--	600 (B) / (M)	--
	Self Study-III				Non Conventional and Renewable Sources of Energy	--	3 (extra credit)	25	75	100	3

### SEMESTER VI

Sem	Part	Subject	Code	Title of the Paper	Teach. Hours/Week	Credit	Evaluation			Exam hours	
							Int	Ext	Total		
VI	III	Core		Paper VIII- Organic Chemistry -II	3	3	25	75	100	3	
				Paper IX - Physical Chemistry -II	4	4	25	75	100	3	
				Paper X- Computer in Chemistry	3	3	25	75	100	3	
			Major Elective III		Paper III-Green and Nano Chemistry	5	5	25	75	100	3
					Major Practical IV* – Organic Analysis, & Estimation	3	4	40	60	100	6
					Major Practical V – Physical Chemistry	5	4	40	60	100	6
			Allied II		Paper IV-Maths /Botany	5(M)/3(B)	2(B)/3(M)	25	75	100	3
					Practical II*- Botany	2	2	40	60	100	3
			IV	SBE		General Knowledge	2	2	25	75	100
					Total	30	29	--	--	900 (B) / 800 (M)	--
		Self Study-IV			Medicinal Chemistry	--	3 (extra credit)	25	75	100	3

\*Exams Conducted at the end of even semester



**DEPARTMENT OF CHEMISTRY  
YADAVA COLLEGE, MADURAI-14  
CBCS (2022-2023)  
COURSE CONTENT**

**B.Sc., Chemistry Major with Botany Ancillary**

**SEMESTER -I**

Sem	Part	Subject	Code	Title of the paper	Teach. Hours/ Week	Credits	Evaluation			Exam hours
							Int	Ext	Total	
<b>I</b>	I	Lang I		Paper I-Tamil	5	3	25	75	100	3
	II	Lang II		Paper I- English	5	3	25	75	100	3
	III	Core		Paper I- Fundamentals of Inorganic Chemistry	4	4	25	75	100	3
				Paper II- Fundamentals of Organic Chemistry	4	4	25	75	100	3
				Major practical I - Semi micro qualitative Analysis	3	--	--	--	--	--
	Allied I			Paper I- Physics	3	2	25	75	100	3
				Practical I*- Physics	2	--	--	--	--	--
	IV	ENS		Environmental Science	2	2	25	75	100	3
		SBE		Communicative English-I	2	2	25	75	100	3
					Total	30	20	--	--	700

## SEMESTER -II

Sem	Part	Subject	Code	Title of the paper	Teac. Hour/ Week	Credits	Evaluation			Exam hours
							Int	Ext	Total	
II	I	Lang I		Paper II-Tamil	5	3	25	75	100	3
	II	Lang II		Paper II- English	5	3	25	75	100	3
	III	Core		Paper III- Inorganic Chemistry	4	4	25	75	100	3
				Paper IV- Organic and Physical Chemistry	4	4	25	75	100	3
				Major practical I* - Semi micro qualitative Analysis	3	3	40	60	100	3
	Allied I		Paper II- Physics	3	2	25	75	100	3	
			Practical I*- Physics	2	2	40	60	100	3	
	IV	VAE		Value Education	2	2	25	75	100	3
		SBE		Communicative English-II	2	2	25	75	100	3
	V	NSS/ NCC/ PET/ EXT			---	1	---	----	----	----
				Total	30	26	--	--	900	--

### SEMESTER - III

Sem	Part	Subject	Code	Title of the paper	Teac. Hour/Week	Credits	Evaluation			Exam hours	
							Int	Ext	Total		
III	I	Lang I		Paper III-Tamil	5	3	25	75	100	3	
	II	Lang II		Paper III- English	5	3	25	75	100	3	
	III	Core		Paper V- General Chemistry - I	4	4	25	75	100	3	
				Major practical II* - Volumetric Analysis	2	--	--	--	--	--	
		Allied I		Paper III- Physics	3	2	25	75	100	3	
				Practical II*- Physics	2	--	--	--	--	--	
	Allied II		Paper I- Botany	3	2	25	75	100	3		
			Practical I*- Botany	2	--	--	--	--	--		
	IV	NME		Dairy Science	2	2	25	75	100	3	
		SBE		Communicative English –III	2	2	25	75	100	3	
					Total	30	18	--	--	700	--
	Self Study-I			Food Chemistry	--	3 (extra credit)	25	75	100	3	

### SEMESTER IV

Sem	Part	Subject	Code	Title of the paper	Teac. Hour/Week	Credits	Evaluation			Exam hours	
							Int	Ext	Total		
IV	I	Lang I		Paper IV-Tamil	5	3	25	75	100	3	
	II	Lang II		Paper IV- English	5	3	25	75	100	3	
	III	Core		Paper VI- General Chemistry - II	4	4	25	75	100	3	
				Major practical II* - Volumetric Analysis	2	2	40	60	100	3	
		Allied I		Paper IV- Physics	3	2	25	75	100	3	
				Practical II*- Physics	2	2	40	60	100	3	
	Allied II		Paper II- Botany	3	2	25	75	100	3		
			Practical I*- Botany	2	1	40	60	100	3		
	IV	NME		Small Scale Industrial Chemicals	2	2	25	75	100	3	
		SBE		Communicative English -IV	2	2	25	75	100	3	
					Total	30	23	--	--	1000	--
	Self Study-II				Forensic Chemistry	--	3 (extra credit)	25	75	100	3

### SEMESTER V

Sem	Part	Subject	Code	Title of the Paper	Teach. Hours/Weak	Credits	Evaluation			Exam hours	
							Int	Ext	Total		
V	III	Core		Paper VII- Physical Chemistry -I	5	5	25	75	100	3	
		Major Elective - I		Paper I- Organic Chemistry -I	5	5	25	75	100	3	
		Major Elective- II		Paper II-Applied Chemistry	5	5	25	75	100	3	
				Major Practical III – Gravimetric Estimation and Organic Preparation	5	5	40	60	100	6	
				Major Practical IV* – Organic Analysis, & Estimation	3	--	--	--	--	--	
		Allied II		Paper III-Botany	3	2	25	75	100	3	
			Practical II*- Botany	2	--	--	--	100	3		
	IV	SBE		Soft skills	2	2	25	75	100	3	
					Total	30	24	--	--	700	--
	Self Study-III				Non Conventional and Renewable Sources of Energy	--	3 (extra credit)	25	75	100	3

### SEMESTER VI

Sem	Part	Subject	Code	Title of the Paper	Teach. Hours/Weak	Credits	Evaluation			Exam hours	
							Int	Ext	Total		
VI	III	Core		Paper VIII- Organic Chemistry -II	3	3	25	75	100	3	
				Paper IX - Physical Chemistry -II	4	4	25	75	100	3	
				Paper X- Computer in Chemistry	3	3	25	75	100	3	
		Major Elective III		Paper III-Green and Nano Chemistry	5	5	25	75	100	3	
				Major Practical IV* – Organic Analysis, & Estimation	3	4	40	60	100	6	
				Major Practical V – Physical Chemistry	5	4	40	60	100	6	
		Allied II		Paper IV-Botany	3	2	25	75	100	3	
				Practical II*- Botany	2	2	40	60	100	3	
		IV	SBE		General Knowledge	2	2	25	75	100	3
					Total	30	29	--	--	900	--
	Self Study-IV				Medicinal Chemistry	--	3 (extra credit)	25	75	100	3

\*Exams Conducted at the end of even semester

**DEPARTMENT OF CHEMISTRY**  
**YADAVA COLLEGE, MADURAI -14.**

**CBCS (2022-2023)**

**COURSE CONTENT**

**Chemistry Ancillary for Physics and Zoology Major**

**SEMESTER I TO IV**

Sem	Part	Subject	Code	Title of the paper	Teach. Hours/ Week	Credits	Evaluation			Exam hours
							Int	Ext	Total	
<b>I</b>	III	Anc -I		Paper I- General Chemistry -I	3	2	25	75	100	3
		Pra -I*		Qualitative Analysis	2	--	--	--	--	--
<b>II</b>	III	Anc -II		Paper II- General Chemistry -II	3	2	25	75	100	3
		Pra -I*		Qualitative Analysis	2	1	40	60	100	3
<b>III</b>	III	Anc -III		Paper III- General Chemistry -III	3	2	25	75	100	3
		Pra -II*		Volumetric Analysis	2	--	--	--	--	--
<b>IV</b>	III	Anc -IV		Paper IV- General Chemistry -IV	3	2	25	75	100	3
		Pra -II*		Volumetric Analysis	2	1	40	60	100	3
		Total			20	10	--	--	600	--

Anc – Ancillary Chemistry  
Pra - Practical

\*Exams conducted at the end of the semester

**DEPARTMENT OF CHEMISTRY  
YADAVA COLLEGE, MADURAI-14  
CBCS (2022-2023)  
COURSE CONTENT**

**B.Sc., Chemistry Major with Ancillary Physics, Maths/Botany**

Sem	Part	Subject	Code	Title of the Paper	Teach. Hours/Weak	Credits	Evaluation			Exam hours
							Int	Ext	Total	
I	III	Allied I		Paper I – Physics	3	2	25	75	100	3
				Practical I* – Physics	2	--	--	--	--	--
II	III	Allied I		Paper II – Physics	3	2	25	75	100	3
				Practical I* – Physics	2	1	40	60	100	3
III	III	Allied I		Paper III – Physics	3	2	25	75	100	3
				Practical II* – Physics	2	--	--	--	--	--
		Allied II		Paper I – Botany/ Maths	3(B)/ 5 (M)	2	25	75	100	3
				Practical I* – Botany	2	--	--	--	--	--
IV	III	Allied I		Paper IV – Physics	3	2	25	75	100	3
				Practical II* – Physics	2	1	40	60	100	3
		Allied II		Paper II – Botany/Maths	3(B)/ 5 (M)	2(B)/ 3(M)	25	75	100	3
				Practical I* – Botany/Maths	2	1	40	60	100	3
V	III	Allied II		Paper III – Botany/Maths	3(B)/ 5 (M)	2	25	75	100	3
				Practical II* – Botany	2	--	--	--	--	--
VI	III	Allied II		Paper IV – Botany/Maths	3(B)/ 5 (M)	2(B)/ 3(M)	25	75	100	3
				Practical II* – Botany	2	1	40	60	100	3

\*Exams Conducted at the end of even semester



**CONSOLIDATED DISTRIBUTION OF NUMBER OF PAPERS,  
HOURS OF TEACHING AND CREDITS**

Part	Subject	Number of papers		Total no.of papers	Total no.of hours	Credits
		Theory	Practical			
Part I	Tamil	4	--	4	20	12
Part II	English	4	--	4	20	12
Part III	Core	10	5	15	65	60
	Major Elective	3	--	3	15	15
	Allied –I	4	2	6	20	10
	Allied –II	4(M/B)	2(B)	4(M)6(B)	20	10
Part IV	SBE	6	--	6	12	12
	VAE	1	--	1	02	2
	NME	2	--	2	04	4
	ENS	1	--	1	02	2
Part V	NSS/NCC/PE/EXT	--	--	--		1
Grand Total		39	9	46(M)* 48(B)*	180	140

Self Study Paper Extra credit - 12

\*M- Maths

\*B- Botany

**DEPARTMENT OF CHEMISTRY**

**Yadava College, Madurai -14**

Self study paper for brilliant students to earn extra credits  
Under graduate course (B.Sc)

S.NO	Sem	Sub code	Subject	Credit	Evaluation			Total Marks
					Duration Hours	Int.	Ext.	
1	III		Food Chemistry	3	--	25	75	100
2	IV		Forensic Chemistry	3	--	25	75	100
3	V		Non conventional & Renewable sources of energy	3	--	25	75	100
4	VI		Medicinal Chemistry	3	--	25	75	100

**DEPARTMENT OF CHEMISTRY**

**Yadava College, Madurai -14**

Certificate course – Analytical Chemistry

Under graduate course (B.Sc)

S.NO	Sem	Sub code	Subject	Credit	Evaluation			Total Marks
					Duration Hours	Int.	Ext.	
1	VI		Paper – I: Instrumental Methods of Chemical Analysis	--	45	25	75	100
2	VI		Paper – II: Clinical Chemical Analysis	--	45	25	75	100

**DEPARTMENT OF CHEMISTRY**

**YADAVA COLLEGE**

**MADURAI -14**

**QUESTION PAPER PATTERN**

**Undergraduate courses**

**(Both Major and Allied Papers)**

**Time: 3 hrs**

**Maximum marks: 75**

**SECTION- A**

**(10 X 2 = 20)**

**Answer any TEN questions only**

**TEN questions to be answered out of *fifteen* questions**

**(THREE questions from each unit)**

**SECTION- B**

**(5 X 5 = 25)**

**Answer all FIVE questions**

**FIVE questions (either or) One question from each unit.**

**SECTION- C**

**(3 X 10 = 30)**

**Answer any THREE questions only**

**THREE questions to be answered out of *five* questions**

**(One question from each Unit)**

**The serial number of the questions has to be continuous from 1 to 25 from Section A to Section C.**

**YADAVA COLLEGE (Autonomous), Madurai -14**  
**DEPARTMENT OF CHEMISTRY**  
**B.Sc., Chemistry**

<b>Semester : I</b>	<b>Paper-I: Fundamentals of Inorganic Chemistry</b>	<b>Hours / Week : 4</b>
<b>Sub-Code :</b>		<b>Credit : 4</b>

**Objectives :**

*This course covers the basic and detailed aspects of atomic structure, periodic classification, chemical bonding, basic knowledge of Laboratory hygiene and safety.*

**Unit-I: Atomic Structure (12 hours)**

Brief introduction of history of structure of atom – Thomson’s model of atom - Rutherford’s nuclear model of an atom - Defects of Rutherford’s model - Postulates of Bohr’s model of an atom - limitations of Bohr’s theory - Electronic configuration and quantum numbers- orbitals-Shapes of s, p and d orbitals - Pauli’s exclusion principle – uses of Pauli’s exclusion principle - Hund’s rule of maximum multiplicity-Aufbau principle-Stability of orbitals.

<b>CO-1</b>	<b>Students update the fundamental knowledge of atomic models quantum numbers, atomic models and filling up of orbitals on the basis of principle.</b>
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**Unit-II: Periodic Classification (12 hours)**

(i) Brief history of periodic classification – Dobereiner’s Triads - Newlands Law of octaves. Lothar mayers arrangement – Mendeleev’s periodic table, modern periodic law, long form of the periodic table - structural features of the long form of the periodic table.

**(ii) Electronic configuration and periodic table:**

- a) Electronic configuration in periods
- b) Electronic configuration in groups

**(iii) Types of Elements:** s, p, d and f block elements

**(iv) Periodicity of Property:** Atomic and ionic radii, Ionization energy, Electron affinity, Electronegativity

**(v) Anomalous periodic properties** in terms of screening constant, stability.

CO-2	Students know the periodic classification, periodic table and periodicity of properties and its variation over the periodic table can be used to rationalize the nature of bonding in substances.
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**Unit-III: Chemical Bonding -I (12 hours)**

**a) Types of bonds:**

- i) Ionic bond – definition – factors affecting the ionic bond – NaCl and CsCl.
- ii) Covalent bond – definition with examples - Fajan’s rule.
- iii) Co-ordinate covalent bond – definition with examples.
- iv) Hydrogen bond – definition with examples and its types.
- v) Metallic bond – definition with examples.

**b) Some important bond characteristics:** bond length, bond angle and bond energy.

**c) Distinction between ionic bond covalent bond and co-ordinate bond.**

CO-3	Students gain knowledge about the common themes running through types of bond and bond characteristics.
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**Unit-IV: Chemical Bonding-II (12 Hours)**

**i) Valence bond theory:** Postulates of valence bond theory- types of overlapping viz s-s, s-p and p-p overlapping –sigma and pi-bonds- differences between sigma and pi-bonds.

**ii) Molecular orbital theory:** Linear combination of atomic orbital-bonding and antibonding molecular orbitals. MO diagram of simple homonuclear molecules like H<sub>2</sub>, He<sub>2</sub>, O<sub>2</sub>, F<sub>2</sub> and heteronuclear molecules like CO and NO. Comparison between VBT and MOT.

**iii) VSEPR Theory:** A detailed study of VSEPR theory and its applications –  
BeCl<sub>2</sub>, BF<sub>3</sub>, NH<sub>3</sub> and H<sub>2</sub>O.

**iv) Hybridization:** Definition - conditions of hybridization- types of hybridization sp-C<sub>2</sub>H<sub>2</sub>, sp<sup>2</sup>-C<sub>2</sub>H<sub>4</sub> and sp<sup>3</sup>-CH<sub>4</sub>.

CO-4	Students get idea behind the theories of bond, molecular orbital diagram for some molecules and hybridization.
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**Unit-V: Semi micro Qualitative Analysis****(12 hours)****a) Laboratory hygiene and safety:**

Storage and handling of chemicals – carcinogenic chemicals – Toxic and poisonous chemicals – Waste disposal – Fume disposal – General precautions for avoiding accidents – First aid techniques – Hazards in laboratory - poisoning – methods to avoid poisoning – Treatment for specific poison – laboratory safety measures.

**b) Principles and techniques of semi micro methods:**

Aims of semi micro qualitative analysis – Types of reactions involved in qualitative analysis – Dry reactions – precipitation reactions – Applications of solubility product principle in qualitative analysis – Complexation reaction – Oxidation and reduction reactions – Spot tests – preparation of solution for cation testing on semi micro scale – Removal of interfering ions in the analysis of cations – oxalate, tartrate, borate, fluoride, chromate, phosphate and arsenite.

<b>CO-5</b>	<b>Students get idea basic knowledge of laboratory hygiene and safety, principles and techniques of semi micro qualitative analysis.</b>
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**Text Books:**

1. P.L. Soni, "Text Book of Inorganic Chemistry", Sultan Chand & Co, New Delhi; 2004. [U – I- 41-82, U-II&IV – 205-261]
2. P.R.Puri, L.R. Sharma, K.C . Kalia, "Principles of Inorganic Chemistry", 33<sup>rd</sup> Edition, Vishal Publications, Jalandhar, 2001. [ U-II- 1-58]
3. Satya prakash, G.D Tuli, S.K.Basu, R.D Madan "Advanced Inorganic Chemistry", S.Chand & Co, New Delhi- 2008. [U-II: 1-10, U-III: 102-147]
4. Wahid U.Malik, G.D Tuli, R.D Madan "Selected topics in Inorganic Chemistry", Volume I, S.Chand & Co, New Delhi- 2002. [U-IV – 92-142]
5. R.D.Madan, " Modern Inorganic Chemistry", Revised Edition,S.Chand & Co, New Delhi, 2004. [U – IV: 92- 142]
6. R. Gopalan, P.S. Subramanian, K. Rengarajan, "Elements of Analytical Chemistry", S. Chand & Sons New Delhi, 2005. [U-V: 1-10,82-97]

**Reference Books:**

1. J. D. Lee, "Concise Inorganic Chemistry:, Fifth Edition, Blackwell Science, USA, 2003. [U-II: 1-10]
2. J. D. Lee, "Concise Inorganic Chemistry:, Second Edition, Blackwell Science, USA, 1964.
3. Wahid U.Malik, G.D Tuli, R.D Madan "Selected topics in Inorganic Chemistry", S.Chand & Co, New Delhi- 2002.

**Web Resources:**

1. <https://byjus.com>
2. <https://www.practically.com>
3. <https://www.pearson.com>
4. <https://ehs.ucsc.edu>.

**Pedagogy:** Chalk & Talk, Assignments, Group Exercises, PPT, Models and group discussion.

**Name of the Course Designer:**

1. **Dr. A. Krishnaveni, Asst. Prof. & Head**
2. **Mrs. K. Manimekalai, Asst. Prof**



**YADAVA COLLEGE (Autonomous), Madurai -14**  
**DEPARTMENT OF CHEMISTRY**  
**B.Sc., Chemistry**

<b>Semester : I</b>	<b>Paper-II: Fundamentals of Organic Chemistry</b>	<b>Hours / Week : 4</b>
<b>Sub-Code :</b>		<b>Credit : 4</b>

**Objectives:**

*This course covers the basic and detailed aspects of fundamental concept of organic chemistry like nomenclature of organic compounds, purification techniques, composition of organic compounds, reaction mechanisms and applications of mechanistic concepts and types of organic reactions.*

**Unit –I: Introduction to Organic chemistry (12 hours)**

- (i) Organic chemistry- Introduction – characteristics of organic compounds – differences between organic and inorganic compounds-sources and importance of organic compounds - classification of organic compounds – functional groups – homologous series.
- (ii) Nomenclature of organic compounds: Common name and IUPAC names of alkanes, Alkenes, alkynes, alkyl halides, alcohols, ether, aldehyde, ketone, carboxylic acid, derivatives of carboxylic acids, amines and nitro compounds.
- (iii) IUPAC rules for naming multifunction compounds.

<b>CO-1</b>	<b>Students learn about organic compound with various functional groups and naming of organic compounds.</b>
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**Unit -II: Purification of Organic Compounds (12 hours)**

- i) Crystallization and Sublimation
- ii) Distillation – Fractional distillation – distillation under reduced pressure – Steam Distillation
- iii) Extraction with a solvent: soxhlet extraction
- iv) Chromatography: Introduction - Column chromatography, Thin layer chromatography
- v) Tests of Purity: Melting point – determination of melting point, mixed melting point – Boiling point – determination of boiling point (distillation method, capillary tube method).

<b>CO-2</b>	<b>Students learn about purification of organic compounds with various purification techniques and tests of purity.</b>
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(ii) Polymerization reaction: Definition - addition and condensation polymerisation reaction with an example.

(iii) Reduction reaction: Definition - Clemmensen and Wolff-Kishner reduction, Meerwein Ponndorf-Vrley reduction.

(iv) Oxidation reaction: Definition - Oppenauer oxidation reaction, Oxidation number – rules for calculating oxidation number.

(v) Redox reaction: Definition - Oxidation numbers involved in redox reactions.

<b>CO-5</b>	<b>After completion of this unit students learn mechanism and types of reaction.</b>
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#### **Text Books:**

1. B.S.Bahl & Arun Bahl, “Advanced Organic Chemistry”, S.Chand & Co. New Delhi-2008. [Unit I: 1-5, 146-183, Unit II: 6-17, Unit –III: 18-36, Unit –IV: 80-95, Unit – V: 99-114]
2. P.L.Soni, H.M.Chawla, “Text Book of Organic Chemistry”, Sultan Chand & Sons. New Delhi-1990. [Unit I: 1.108-1.133, Unit II: 1.16-1.25, Unit –III: 1.26-1.41 & 1.49 1.55, Unit –IV: 1.138-1.148, Unit – V: 1.148-1.156]
3. Bhupinder Mehta & Mnju Mehta, “Organic Chemistry”, PHI Learning PVT, New Delhi-2008. [Unit I: 1-4, Unit II: 22-25, Unit –IV: 80-95, Unit – V: 130-132]
4. R.L. Madan, “Simplified Course in Organic Chemistry”, S.Chand & Co. New Delhi-2001. [Unit IV: 69- 80]

#### **Reference Books:**

1. K.S.Tewari, S.N.Mehrotra, N.K.Vishnoi, “A Text Book of Organic Chemistry” Vikas Publishing House Pvt Ltd, New Delhi-1987
2. I.L.Finar, “Organic Chemistry”, Vol-I, Pearson Education-2003.
3. V.K.Ahluwalia, Madhuri goyal, “A Text Book of Organic Chemistry” Narosa Publishing House Pvt Ltd, New Delhi-110 009.
4. Morrison, Boyd, “Organic Chemistry”, Sixth Edition, Prentice, Hall of India Pvt Ltd, New Delhi-110 001, 2003.

#### **Web Resources:**

1. <https://www.cliffsnotes.com>
2. <https://classnotes.org.in>
3. <https://www.ncbi.nlm.nih.gov>
4. <https://brilliant.org>
5. [https:// www.vedantu.com](https://www.vedantu.com)

**Pedagogy:** Chalk & Talk, Assignments, Group Exercises and PPT

**Name of the Course Designer**

- 1. Dr. A. Krishnaveni, Asst. Prof. & Head**
- 2. Mrs. K. Manimekalai, Asst. Prof**

**YADAVA COLLEGE (Autonomous), Madurai -14**  
**DEPARTMENT OF CHEMISTRY**  
**B.Sc., Chemistry**

<b>Semester : I&amp;II</b>	<b>Semi – micro Qualitative Analysis</b>	<b>Hours / Week : 2</b>
<b>Sub-Code :</b>		<b>Credit : 2</b>

(At the end of the semester I & II)  
**MAJOR PRACTICAL-I**

**Course Objectives:**

- (i) To make the students analyze a simple salt containing one cation (basic radical) and one anion (acid radical) by macro method.*
- (ii) Analysis of a simple salt (By macro method)*

**Cations (Basic radicals):** Lead, Copper, Iron, Aluminium, Nickel, Manganese, Zinc, Barium, Strontium, Calcium, Magnesium and Ammonium.

**Anions (Acid radicals):**

Simple: Carbonate, Nitrate, Sulphate, Chloride and Sulphate.

Interfering: Borate, Phosphate, Fluoride, Chromate and Oxalate.

**Course Outcome:**

- i) Students describe the types of interfere and non-interfere anions (acid radicals). How to eliminate the interfere anions.
- ii) Students analyse a simple salt containing cations and group separation
- iii) Students analyse a salt, which have cations and anions.
- iv) Students confirm the cations and anions by the spot test
- v) Students analyse a simple salt containing one basic and one acid

**Total Marks = 100 (Internal 40 + External 60)**

**Internal Marks Distribution:**

Acid radical	= 10
Basic radical	= 10
Confirmatory test	= 05
Procedure	= 05
Record	= 10
	-----
Total	= 40
	-----

**External Marks Distribution:**

Record	= 10
Acid radical	= 15
Basic radical	= 15
Confirmatory test	= 10 (5+5)
Procedure	= 10 (5+5)
	-----
Total	= 60
	-----

**Web Resources:**

1. <https://byjus.com>
2. <https://www.isenagpur.ac.in>
3. <https://en.m.wikipedia.org>

**Pedagogy:** Chalk & Talk and Group discussion

**Name of the Course Designer**

1. **Dr. P. Muthuraman, Asst. Prof**
2. **Mrs. K. Manimekalai, Asst. Prof**

**YADAVA COLLEGE (Autonomous), Madurai -14**  
**DEPARTMENT OF CHEMISTRY**  
**B.Sc., Physics & Zoology**

<b>Semester : I</b>	<b>General Chemistry – I</b>	<b>Hours / Week : 3</b>
<b>Sub-Code :</b>		<b>Credit : 2</b>

**Objectives:**

*To enable the students to understand the fundamental concepts in Nature of bonding and reaction mechanism in organic chemistry, Isomerism in organic compounds, Principles and process of metallurgy and Modern field of radioactivity, Problems in oxidation and reduction.*

**Unit- I: Fundamental Concepts of Organic Chemistry (9 hours)**

**i) Types of Reaction:** Substitution reaction ( $SN^1$  &  $SN^2$ ) - electrophilic and nucleophilic addition reactions- elimination reaction ( $E_1$  &  $E_2$ )- addition and condensation polymerization reactions with suitable examples.

**ii) Homolytic and heterolytic cleavage of carbon-carbon bond:** carbonium ion and carbanion –free radicals; nucleophilic and electrophilic reagents.

<b>CO-1</b>	<b>After end of unit students understand the types of reaction and reaction mechanism in organic chemistry</b>
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**Unit-II: Isomerism in Organic Compounds (9 hours)**

**i) Isomerism:** Definition - types and examples of structural and stereo isomerisms.

**ii) Optical isomerism:** Optical activity-definition-condition for optical activity-isomerism of lactic and tartaric acids-racemization-resolution of racemic mixtures, Walden inversion, asymmetric synthesis.

<b>CO-2</b>	<b>Students learn the isomerism, classification of isomerism and isomerism in organic compounds</b>
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**Unit-III: Principles and Process of Metallurgy (9 hours)**

**i) Ores and minerals:** Definition-examples -various steps of metallurgy-Gravity separation – Froth-flotation process – Magnetic separation - crushing, pulverizing concentration of the ore- calcination and roasting- reduction into metals Alumino-thermic process

**ii) Refining of metals:** Electrolytic refining, Zone refining and Van-Arkel process

<b>CO-3</b>	<b>Students to get information about the basics of metallurgy, process of metallurgy and refining of metals.</b>
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#### **Unit-IV: Radioactivity**

**(9 hours)**

- i) Radioactivity - Comparison of properties of  $\alpha, \beta, \gamma$  rays-detection & measurements of radioactivity- GM counter.a
- ii) Fajan's -Russel-Soddy's group displacement law -illustration- law of radioactivity disintegration constant -average life; half-life period-radioactive series - nuclear fission - atom bomb - nuclear fusion - hydrogen bomb - comparison of nuclear fission and fusion - applications of radioactive isotopes - medicine, agriculture and industry.

<b>CO-4</b>	<b>Students gain knowledge about properties of radioactive rays and modern field of radioactivity</b>
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#### **Unit- V: Oxidation and Reduction**

**(9 hours)**

Electronic concept of oxidation and reduction -oxidation number-definition of oxidation and reduction in terms of oxidation number-calculation of oxidation numbers of Cr, Mn, Fe, Cu, & halogens-problems -oxidizing and reducing agents- redox reactions- oxidation numbers involved in redox reactions.

<b>CO-5</b>	<b>Students gain knowledge of concept of oxidation and reduction and solve the problems in oxidation and reduction</b>
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#### **Text Books:**

1. B.S. Bahl & Arun Bahl, "Advanced Organic Chemistry", S. Chand & Co, Ramnagar, New Delhi, 2004
2. P.L. Soni, H.M. Chawla, "Text Book of Organic Chemistry", Sultan & Sons, New Delhi, 2004
3. B.R.Puri, L.R.Sharma, Madan S.Pathania, "Principles of Physical Chemistry", Shoban Lal Nagin Chand & Co, Jalandhar, 1998.



**Reference Books:**

1. Wahid U.Malik and G.D.Tuli,R.D.Madan, “Selected Topics in Inorganic Chemistry”, S. Chand & Co., New Delhi in 2002
2. J. D. Lee, “Concise Inorganic Chemistry:, Fifth Edition, Blackwell Science, USA, 2003. [U-II: 1-10]
3. J. D. Lee, “Concise Inorganic Chemistry:, Second Edition, Blackwell Science, USA, 1964.

**Web Resources:**

1. <https://profiles.uonbi.ac.ke.com>
2. <https://www.britannica.com>
3. <https://www.compound chem.com>
4. <https://pratibha.eenadu.net.com>

**Pedagogy:** Chalk & Talk, Group discussion, Assignments and PPT.

**Name of the Course Designer**

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2. **Mrs. K. Manimekalai, Asst. Prof**

**YADAVA COLLEGE (Autonomous), Madurai -14**  
**DEPARTMENT OF CHEMISTRY**  
**B.Sc., Physics & Zoology**

<b>Semester : I&amp;II</b>	<b>Qualitative Analysis</b>	<b>Hours / Week : 2</b>
<b>Sub-Code :</b>		<b>Credit : 2</b>

(At the end of the semester I & II)

**Objectives:**

- (i) To make the students analyze a simple salt containing one cation (basic radical) and one anion (acid radical) by macro method.*
- (ii) Analysis of a simple salt (By macro method)*

**ANCILLARY PRACTICAL-I**

**Cations:** Lead, copper, iron, aluminium, zinc, manganese, nickel, calcium, barium, strontium, magnesium and ammonium.

**Anions:** Carbonate, chloride, fluoride, nitrate, oxalate, borate, phosphate, and sulphate.

**Course Outcome:**

- i) Students describe the types of interfere and non-interfere anions (acid radicals). How to eliminate the interfere anions.
- ii) Students analyse a simple salt containing cations and group separation
- iii) Students analyse a salt, which have cations and anions.
- iv) Students confirm the cations and anions by the spot test
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Total	= 60
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**Web Resources:**

1. <https://byjus.com>
2. <https://www.isenagpur.ac.in>
3. <https://en.m.wikipedia.org>

**Pedagogy:** Chalk & Talk and Group discussion

**Name of the Course Designer**

1. **Mrs. K. Manimekalai, Asst. Prof**
2. **Dr. P. Muthuraman, Asst. Prof**

**DEPARTMENT OF CHEMISTRY**  
**B.Sc., Chemistry**

<b>Semester : II</b>	<b>III: Inorganic Chemistry</b>	<b>Hours / Week : 4</b>
<b>Sub-Code :</b>		<b>Credit : 4</b>

**Objectives:**

*To enable the students to study the basic and detailed aspects of s-block, p-block, d-block and f-block elements and also metallurgy and various process of metallurgical process.*

**Unit-I: Group 1s and 2s-Block elements (12 hours)**

(i) Hydrogen-Position of hydrogen in the periodic table-Isotopes of hydrogen- ortho and para hydrogen-Heavy water-Hydrogen peroxide-Liquid hydrogen as a fuel.

(ii) **Group 1s-Block elements:** Alkali metals-General characteristics-Gradation in physical properties-Density-Atomic volume, melting and boiling points-Ionisation energy-Electropositive character-Oxidation state-Reducing properties.

(ii) **Group 2s-Block elements:** Electronic configuration-Metallic properties-Melting and boiling points-Atomic radius, ionic radius-Atomic volume-Ionisation energy-Oxidation state-Flame colouration-Diagonal relationship between Be and Al.

(iv) **Compounds of alkaline earth metals:** Preparation, properties and uses of Magnesium sulphate (Epsom salt)-Calcium oxide (quick lime) Calcium sulphate (Plaster of Paris)

<b>CO-1</b>	<b>Students cover the position of hydrogen in the general periodic table, characteristics of 1s and 2s block elements and some important compounds.</b>
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**Unit-II: p-Block Elements-I (12 hours)**

**p-Block elements:** General characteristics – nature of oxide – nature of hydride – nature of halides.

**Group -13:** Boron group (B,Al,Ga,I,Te) - Electronic configuration – compounds of boron (borax) – borax bead test.

**Group -14:** Carbon group (C,Si,Ge,Sn,Pb) - Electronic configuration – allotropic forms of carbon – structure of diamond – structure of graphite – structure of buckminster fullerenes – amorphous forms of carbon – uses of carbon and its compounds.

**Group-15:** Nitrogen group ( N,P,As,Sb,Bi) - Electronic configuration - fixation of nitrogen – nitrogen cycle – uses of nitrogen compounds.

<b>CO-2</b>	<b>Students learn the general characteristics of group 13, 14 and group 15 elements.</b>
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**Unit-III: p-Block Elements – II (12 hours)**

**Group 16:** Oxygen group(O,S,Se,Te,Po) - Electronic configuration – importance of molecular oxygen – nascent oxygen – oxides and its types – ozone – structure – ozone layer – uses of ozone.

**Group 17:** halogen group ( F,Cl,Br,I,At) - General characteristics in terms of physical and chemical properties-Interhalogen compounds-Structure, hybridization and shapes, ICl, BrF<sub>3</sub>, ClF<sub>5</sub>, IF<sub>7</sub>.

Hydrochloric acid-Lab preparation,its acidic nature-reaction with ammonia,carbonates and sulphites, formation of aqua regia and its uses.

**Group 18:** Noble gases-General characteristics-state, low reactivity, formation of Xenon compounds with fluorine and oxygen-equation, hybridization, shape and structure of compounds-Uses of noble gases.

<b>CO-3</b>	<b>Students discuss the general characteristics of group 16, 17 and group 18 elements.</b>
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**Unit-IV: Transition Elements and Inner Transition Elements (12 hours)**

Introduction- general characteristics of d- block elements of 3d, 4d and 5d series-atomic radii, ionic radii, ionization potential, oxidation state, color, magnetic properties and catalytic activity of transition elements.

**Compounds:** Preparation properties and uses of silver nitrate – potassium permanganate - potassium dichromate.

Introduction- general characteristics of f- block elements of 4f and 5f series-atomic radii, oxidation state, color and magnetic properties. Lanthanide contraction and its consequences.

Differences between transition and inner transition elements.

<b>CO-4</b>	<b>Students learn about the general characteristics and important properties of d and f block elements</b>
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**Unit-V: Principles and Process of Metallurgy****(12 hours)**

**a) Occurrence of metals:** Ores and minerals-Definition-examples-various steps of metallurgy-crushing, pulverizing concentration of the ore- calcination and roasting

**b) Reduction into metals:** Alumino-thermic process- Refining of metals - Electrolytic refining, Zone refining and Van-Arkel process.

**c) Ores-occurrence- extraction of the following metals and their uses:** - vanadium, molybdenum, platinum and uranium.

**d) Preparation and uses:** Vanadium pentoxide, ammonium molybdate, chloroplatinic acid and uranium hexafluoride.

<b>CO-5</b>	<b>Students to get information about the basics of metallurgy, various process of metallurgy and refining of metals.</b>
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**Text Books:**

1. P.R.Puri, L.R. Sharma, K.C . Kalia, “Principles of Inorganic Chemistry”, Vishal Publications, Jalandhar, 2001. [U-I: 360-382]
2. J. D. Lee, “Concise Inorganic Chemistry”, Fifth Edition, Blackwell Science, USA, 2003. [U-II: 402,532,582,635]
3. Sathya prakash, G.D Tuli,S.K.Basu, R.D Madan, “ Advanced Inorganic Chemistry”, S.Chand & Co, New Delhi, 2008. [U-III: 962-972, 980-983]
4. R.D.Madan, “Modern Inorganic Chemistry”, S.Chand & Co, New Delhi, 2004. [U-IV: 1347, U-V: 1358]

**Reference Books:**

1. P.L. Soni, “Text Book of Inorganic Chemistry”, Sultan Chand & Co, New Delhi; 2004.
2. Wahid U.Malik, G.D Tuli, R.D Madan “Selected topics in Inorganic Chemistry”, S.Chand & Co, New Delhi- 2002.
3. J. D. Lee, “Concise Inorganic Chemistry:., Second Edition, Blackwell Science, USA 1964.
4. J. D. Lee, “Concise Inorganic Chemistry:., Fifth Edition, Blackwell Science, USA 2003.

**Web Resources:**

1. <https://ncert.nic.in>
2. <https://byjus.com>
3. <https://pratibha.ecnadu.net>
4. [https:// www.vedantu.com](https://www.vedantu.com)

**Pedagogy:** Chalk & Talk, Assignments, Group Exercises and PPT

**Name of the Course Designer**

1. **Mrs. K. Manimekalai, Asst. Prof**
2. **Dr. P. Muthuraman, Asst. Prof**

**YADAVA COLLEGE (Autonomous), Madurai -14**  
**DEPARTMENT OF CHEMISTRY**  
**B.Sc., Chemistry**

<b>Semester : II</b>	<b>IV : Organic and Physical Chemistry</b>	<b>Hours / Week : 4</b>
<b>Sub-Code :</b>		<b>Credit : 4</b>

**Objectives:**

*Students undergoing this course acquire knowledge and understanding of aliphatic and aromatic hydrocarbons, hydroxy compounds, alkyl and aryl halides. The students also acquire an in-depth knowledge about gaseous state and Basic principles of volumetric analysis.*

**Unit-I: Aliphatic and aromatic hydrocarbons**

**(12 hours)**

**a) Aliphatic Hydrocarbons:**

**i) Alkanes:** Introduction: methods of preparation- by reduction of alkyl halides- by Wurtz reaction.

**Reactions of Alkanes:** halogenation, nitration and aromatisation [no mechanisms]

**ii) Alkenes:** Introduction; methods of preparation- by dehydrohalogenation of alkyl halides [Saytzeff's rule] - by heating quaternary ammonium hydroxide [Hofmann rule] - and by pyrolysis (cracking) of alkanes.

**Reactions of alkenes:** catalytic hydrogenation [Sabatier-Sendersen's reduction], addition of halogen acids, addition to unsymmetrical alkenes [Markovnikov rule] - Anti Markovnikov addition [Kharash Peroxide Effect], ozonolysis [no mechanism]

**iii) Alkynes:** Introduction- methods of preparation: by dehydrohalogenation of 1, 2-dihalides- by electrolysis of salts of unsaturated dicarboxylic acid

**Reactions of alkynes:** Acidity of alkynes- oxidation reaction with strong alkaline  $\text{KMnO}_4$ , ozonolysis and polymerization reaction

**b) Aromatic hydrocarbons:**

**i) Aromaticity-** Huckel's rule- method of preparation from petroleum, from toluene - by hydrodealkylation and structural elucidation of benzene.

**ii) Toluene:** Preparation from n-heptane



**Reactions:** - electrophilic substitution reactions [with  $\text{Cl}_2$ ,  $\text{H}_2\text{SO}_4$ ,  $\text{HNO}_3$ ] - substitution in  $\text{CH}_3$  group (reaction with chlorine)

**ii) Styrene:** Preparation from benzene

**Reactions:** addition reaction with  $\text{Br}_2$  - oxidation with  $\text{KMnO}_4$

**iii) Xylenes:** Isolation of xylenes from naphtha, Oxidation of xylene with alkaline  $\text{KMnO}_4$

**iv) Polynuclear fused Hydrocarbon:**

Naphthalene: preparation by Haworth synthesis

Reactions: sulphonation- ozonolysis- Friedel-Craft's alkylation- oxidation reactions; uses of naphthalene.

CO-1	Students acquire knowledge of preparation and properties of aliphatic and aromatic hydrocarbon.
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## Unit-II: Hydroxy compounds

(12 hours)

a) Classification - General formula and structure

**i) Aliphatic alcohol:** -Methods of preparation from hydration of alkenes-Direct hydration-Hydroboration oxidation-From Grignard's reagent-Hydrolysis of alkyl halides-Reduction of carboxylic acids-Manufacture of methanol by Bosch process and ethanol by fermentation of carbohydrates-Acidity of alcohol-Esterification with mechanism-Reaction with Hydrogen halides-Reaction with  $\text{PCl}_3$ ,  $\text{PCl}_5$  and  $\text{SOCl}_2$ -Reaction with acid chlorides and acid anhydrides-Oxidation-Dehydration with Mechanism-

**ii) Ethane 1,2-diol (Glycol):** Preparation of ethane-1,2 diol from ethane-Physical properties-Chemical properties-Oxidation to oxalic acid and reaction with  $\text{HCl}$ -

**iii) Propane-1,2,3-triol (Glycerol):** -preparation from soap-Physical properties-Chemical properties-Oxidation with  $\text{KMnO}_4$  and reaction with oxalic acid.

**iv)** Difference between primary, secondary and tertiary alcohols

**a) Aromatic alcohol:**

**i)** Phenols - Preparation of Phenol from diazonium salt, Chlorobenzene (Dow's Process) and benzene sulphonic acid-Manufacture from cumene-Physical properties-Acidic character of phenol-Chemical properties: Reaction with sodium hydroxide-Reaction with sodium, zinc, acetyl chloride, acetic anhydride and phosphorus penta chloride-

Bromination, nitration and sulphonation-Kolbe's reaction-Reimer-Tiemann reaction-Test for phenol.

ii) **Nitro phenol:** Picric acid only, preparation, properties and uses.

iii) **Dihydric phenol:**

(a) Catechol-Preparation from o-chloro phenol-Reactions with Fehling's solution, phthalic anhydride and uses.

(b) Resorcinol-Preparation from 1,3-benzene disulphonic acid-Reactions with phthalic anhydride and uses.

(c) Quinol-Preparation from p-benzoquinone-Oxidation reactions with ferric chloride and uses.

iv) **Trihydric phenol:** Pyragallol, phloroglucinol and hydroxyl quinol-Preparation and uses.

<b>CO-2</b>	<b>Students understand the preparation and properties of aliphatic and aromatic alcohol</b>
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### **Unit-III: Alkyl and Aryl halides**

**(12 hours)**

**a) Alkyl halides:**

i) Preparation from alkane and halogen, alkene and hydrohalide, alcohols with  $\text{PCl}_3$ ,  $\text{PCl}_5$  and  $\text{SOCl}_2$ -Reactions with Sodium nitrite, silver nitrite, aq.sodium hydroxide and alcoholic potassium hydroxide-Uses of halogen derivatives of alkanes.

ii) Preparation, properties and uses of the following: ethyl bromide, chloroform, iodoform and haloform reaction.

**b) Aryl halides:**

i) Chlorobenzene-Preparation from aniline-Physical properties-Electrophilic substitution (Chlorination, nitration and sulphonation)-Nucleophilic substitution- Replacement of chlorine with  $-\text{OH}$ ,  $-\text{NH}_2$ -Reduction to benzene-Wurtz-Fittig reaction-Fittig reaction-Addition reaction with Magnesium-Formula of DDT-Organometallic compounds.

ii) Organometallic compounds including Grignard's reagent, preparation and their uses. Wilkinson and Ziegler-Natta catalyst.

<b>CO-3</b>	<b>Students learn the preparation and properties of alkyl and aryl halide and basic concept of organometallic compounds.</b>
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**Unit-IV: Gas and liquid State****(12 hours)****Gaseous State:**

- i) Four important measurable properties of gases- Pressure effect – Temperature effect – Volume effect – Number of moles of effect.
- ii) The gas laws – Boyle’s law – Charle’s law.
- iii) The equation of state for an ideal gas – standard temperature and pressure.
- iv) Numerical values of gas constant – in litre – atmospheres – in C.G.S system – in M.K.S. system.
- v) Daltons law of partial pressure – Graham’s law of dilution – Causes for deviation of real gas from ideal behavior – VanderWall’s equation of state – Critical phenomena – Derivation of critical constants from VanderWall’s constants.

**Liquid state:**

- i) Physical properties – vapour pressure – Trouton’s rule – surface tension – Effect of temperature on surface tension – viscosity – effect of pressure and temperature.
- ii) Refraction – refractive index – specific and molar refraction – vapour pressure temperature diagram.

<b>CO-4</b>	<b>Students know the concept of gas law, derivation of critical constant Physical properties of liquid state, surface tension, viscosity and refraction.</b>
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**Unit-V: Principles of Volumetric analysis****(12 hours)****Volumetric methods of analysis:**

- i) Introduction- principle- terminology: molality, molarity, normality, mole fraction - titration- end point- indicator - types of indicators.  
Standard solution- types of standard solution- requirements of primary standard solution – limitation of volumetric analysis,

**ii) Acid-base titration:**

Types- titration curves and choice of indicators- Ostwald’s theory- Quinonoid theory - theory of acid- base indicators.

**iii) Redox titration:**

Definition with examples- theory of redox indicators.

#### iv) Complexometric titration:

Definition with examples- stability of complexes – titration involving EDTA – estimation of hardness of water.

<b>CO-5</b>	<b>Students know the concept of volumetric methods, acid-base titration, redox titration and complexometric titration.</b>
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#### Text Books:

1. B.S.Bahl & Arun Bahl, “Advanced Organic Chemistry”, S.Chand & Co. New Delhi- 2008. [U-I: 188-217,890-929,U-II: 351-407,1042-1080,U-III: 309-335,945-962]
2. B.R.Puri, L.R.Sharma, Madan S.Pathania, “Principles of Physical Chemistry”, Shoban Lal Nagin Chand & Co, Jalandhar, 1998. [U-IV: 426-445,U-V: 725-747]
3. P.L.Soni, O.P Dharmarha and U.N.Dash, “Text Book of Physical Chemistry”, Sultan Chand & Sons, New Delhi-1990. [U-IV: 1.269& 1.328-1.36, U-V: 2.41-2.80]
4. Gurdeep Raj, “Advanced Physical Chemistry”, Goel Publishing House, Delhi, 32 edition 2006.

#### Reference Books:

1. K.S.Tewari, S.N.Mehrotra, N.K.Vishnoi, “A Text Book of Organic Chemistry” Vikas Publishing House Pvt Ltd, New Delhi-1987
2. I.L.Finar, “Organic Chemistry”, Vol-I, Pearson Education-2003. [U-I:195,U-II:381-414]
3. R.L. Madan,“Simplified Course in Organic Chemistry”, S.Chand & Co. New Delhi- 2001
4. M.K.Jain, S.C,Sharma,“Modern Organic Chemistry”, Visshal Publishing House, First Edition 1967.

#### Web Resources:

1. [https:// www.vedantu.com](https://www.vedantu.com)
2. [https:// www.selfstudys.com](https://www.selfstudys.com)
3. [https:// collegedunia.com](https://collegedunia.com)
4. [https:// chem.libretexts.org](https://chem.libretexts.org)
5. [https:// www.shodex.com](https://www.shodex.com)

**Pedagogy:** Chalk & Talk, Assignments, Group Exercises and PPT

#### Name of the Course Designer

1. Mrs. K. Manimekalai, Asst. Prof
2. Dr. P. Muthuraman, Asst. Prof

**YADAVA COLLEGE (Autonomous), Madurai -14**  
**DEPARTMENT OF CHEMISTRY**  
**B.Sc., Chemistry**

<b>Semester : I&amp;II</b>	<b>Semi – micro Qualitative Analysis</b>	<b>Hours / Week : 2</b>
<b>Sub-Code :</b>		<b>Credit : 2</b>

(At the end of the semester I & II)  
**MAJOR PRACTICAL-I**

**Course Objectives:**

- (i) To make the students analyze a simple salt containing one cation (basic radical) and one anion (acid radical) by macro method.*
- (ii) Analysis of a simple salt (By macro method)*

**Cations (Basic radicals):** Lead, Copper, Iron, Aluminium, Nickel, Manganese, Zinc, Barium, Strontium, Calcium, Magnesium and Ammonium.

**Anions (Acid radicals):**

Simple: Carbonate, Nitrate, Sulphate, Chloride and Sulphide.

Interfering: Borate, Phosphate, Fluoride, Chromate and Oxalate.

**Course Outcome:**

- i) Students describe the types of interfere and non-interfere anions (acid radicals). How to eliminate the interfere anions.
- ii) Students analyse a simple salt containing cations and group separation
- iii) Students analyse a salt, which have cations and anions.
- iv) Students confirm the cations and anions by the spot test
- v) Students analyse a simple salt containing one basic and one acid

**Total Marks = 100 (Internal 40 + External 60)**

**Internal Marks Distribution:**

Acid radical	= 10
Basic radical	= 10
Confirmatory test	= 05
Procedure	= 05
Record	= 10
	-----
Total	= 40
	-----

**External Marks Distribution:**

Record	= 10
Acid radical	= 15
Basic radical	= 15
Confirmatory test	= 10 (5+5)
Procedure	= 10 (5+5)
	-----
Total	= 60
	-----

**Web Resources:**

1. <https://byjus.com>
2. <https://www.isenagpur.ac.in>
3. <https://en.m.wikipedia.org>

**Pedagogy:** Chalk & Talk and Group discussion

**Name of the Course Designer**

1. **Dr. P. Muthuraman, Asst. Prof**
2. **Mrs. K. Manimekalai, Asst. Prof**

**YADAVA COLLEGE (Autonomous), Madurai -14**  
**DEPARTMENT OF CHEMISTRY**  
**B.Sc., Physics & Zoology**

<b>Semester : II</b>	<b>General Chemistry – II</b>	<b>Hours / Week : 3</b>
<b>Sub-Code :</b>		<b>Credit : 2</b>

**Objectives :**

*To impart fundamental knowledge related to Atomic Structure, Periodic Table & Periodic Properties, Colloidal State, Polymers and Medicinal Chemistry.*

**Unit- I: Atomic Structure**

**(9 Hours)**

Quantum numbers –atomic orbitals-shapes of orbitals- filling up of orbitals- Aufbau principle- Hund's rule-Pauli's exclusion principle- electronic configuration of all elements in the periodic table.

<b>CO-1</b>	<b>Students update the fundamental knowledge of quantum numbers, atomic models and filling up of orbitals on the basis of principle.</b>
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**Unit- II: Periodic table & Periodic properties**

**(9 Hours)**

i) Long form of periodic table-classification of elements into s,p,d and f blocks.

ii) Atomic radii, ionic radii, ionization potential, electron affinity, electro negativity and metallicity and non-metallicity and their periodic variations-interpretation of these variations based upon their electronic configuration.

<b>CO-2</b>	<b>Students gain basic knowledge of elements into s,p,d and f block elements, periodic properties and understand the concept of electronegativity and their periodic variations.</b>
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**Unit-III: The colloidal state**

**(9 Hours)**

i) Introduction: Phases of colloids-classification of colloidal solutions- preparation (Dispersion methods only), purification, properties- optical property-Tyndal effect, Kinetic property-Brownian movement; Electrical properties-Electrical double layer, Electrophoresis and Electro osmosis.

ii) Applications of colloids: Colloidal medicine, smoke precipitation, artificial kidney machine, sewage disposal, purification of water, artificial rain.

<b>CO-3</b>	<b>Students study knowledge about classification, preparation, properties and applications of colloids.</b>
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**Unit-IV: Polymers**

**(9 Hours)**

Definition-classification of polymers- properties of polymers- addition and condensation polymerization reactions with examples- natural rubber- synthetic rubber - vulcanization of rubber- preparation and applications of polystyrene, urea- formaldehyde resin, Teflon and buna-S-rubber, neoprene and Bakelite.

<b>CO-4</b>	<b>Students gain knowledge about classification, preparation, properties and applications of polymers.</b>
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**Unit-V: Medicinal chemistry**

**(9 Hours)**

**Chemotherapy:** Introduction;

- i) **Drug:** Definition – requirements of drugs – history of drugs.
- ii) **Terminology** in Drug Chemistry: Medicinal Chemistry – pharmacy – pharmacology – pharmacodynamics – pharmacophore – antimetabolite – bacteria – virus and fungi.
  - a) Anesthetics: Definition-classification with examples
  - b) Analgesics: Definition- classification with examples
  - c) Antibiotics-Definition- structure and uses of penicillin, streptomycin, tetracycline and chloramphenicol
  - d) Antimalarial Drugs-Definition- mode of action- examples.

<b>CO-5</b>	<b>Students acquire basic knowledge of drug, terminology in drug chemistry, anesthetics, analgesics, antibiotics and antimalarial drugs.</b>
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**Text Books:**

1. B.S. Bahl & Arun Bahl, "Advanced Organic Chemistry", S. Chand & Co, Ramnagar, New Delhi, 110055, 2004
2. P.L. Soni, O.P.Dharmarha, U.N.Dash, "Text Book of Physical Chemistry", Sultan & Sons, New Delhi, 2001
3. B.R.Puri, L.R.Sharma, Madan S.Pathania, "Principles of Physical Chemistry", Shoban Lal Nagin Chand & Co, Jalandhar, 1998
4. Jayasree ghosh," Fundamental concepts of Applied Chemistry", S. Chand & Co, Ramnagar, New Delhi, 110055, 2000.
5. K.Bagavathi Sundari," Applied Chemistry", MJP Publishers, Chennai 600 005.

**Reference Books:**

- 1.R.D. Madan, "Modern Inorganic Chemistry", S. Chand & CO, New Delhi, 2004.
2. P.L. Soni, H.M. Chawla, "Text Book of Organic Chemistry", Sultan & Sons, New Delhi, 2004.

**Web Resources:**

1. <https://byjus.com>
2. <https://chem.libretexts.org>
3. <https://cool.culturalheritage.org>
4. <https://www.britannica.com>
5. <https://en.m.wikipedia.org>

**Pedagogy:** Chalk & Talk, Assignments, Group Exercises and PPT  
Unit-II: Chalk & Talk, Assignments, Group discussion and PPT

**Name of the Course Designer**

1. **Dr. A. Krishnaveni, Asst. Prof. & Head**
2. **Mrs. K. Manimekalai, Asst. Prof**

**YADAVA COLLEGE (Autonomous), Madurai -14**  
**DEPARTMENT OF CHEMISTRY**  
**B.Sc., Physics & Zoology**

<b>Semester : I&amp;II</b>	<b>Qualitative Analysis</b>	<b>Hours / Week : 2</b>
<b>Sub-Code :</b>		<b>Credit : 2</b>

(At the end of the semester I & II)

**Objectives:**

- (i) To make the students analyze a simple salt containing one cation (basic radical) and one anion (acid radical) by macro method.*
- (ii) Analysis of a simple salt (By macro method)*

**ANCILLARY PRACTICAL-I**

**Cations:** Lead, copper, iron, aluminium, zinc, manganese, nickel, calcium, barium, strontium, magnesium and ammonium.

**Anions:** Carbonate, chloride, fluoride, nitrate, oxalate, borate, phosphate, and sulphate.

**Course Outcome:**

- i) Students describe the types of interfere and non-interfere anions (acid radicals). How to eliminate the interfere anions.
- ii) Students analyse a simple salt containing cations and group separation
- iii) Students analyse a salt, which have cations and anions.
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**Pedagogy:** Chalk & Talk and Group discussion

**Name of the Course Designer**

1. Mrs. K. Manimekalai, Asst. Prof
2. Dr. P. Muthuraman, Asst. Prof