

KADI SARVA VISHWAVIDYALAYA GANDHINAGAR



B.Sc. CHEMISTRY SYLLABUS

Kadi Sarva Vishwavidyalaya, Gandhinagar

B. Sc. Chemistry

Course Description: This course is designed to enable students to acquire understanding of fundamentals of Chemistry. The course provides practical training on microbiology techniques and processes to extract useful knowledge in the areas of Organic, Inorganic, Physical and analytical Chemistry for upcoming industries and institutes. It also provides opportunities for developing new chemical products and techniques for the benefit of society.

COURSE STRUCTURE:

Year	Semester	Paper	Paper Name	Marks	Practical	Total Marks
B.Sc I	I	CCH-101	Fundamental Chemistry I	100	50	150
	II	CCH-201	Fundamental Chemistry II	100	50	150
B.Sc II	III	CCH-301	Organic and Physical Chemistry	100	50	150
		CCH-302	Inorganic and Biochemistry	100	50	150
	IV	CCH-401	Physical and Organic Chemistry	100	50	150
		CCH-402	Inorganic and Analytical Chemistry	100	50	150
B.Sc III	V	CCH-501		100	50	150
		CCH-502		100	50	150
		CCH-503		100	50	150
		CCH-504		100	50	150
	VI	CCH-601		100	50	150
		CCH-602		100	50	150
		CCH-603		100	50	150
		CCH-604		100	50	150

Second Year B.Sc. (Chemistry)

Semester IV

	Subject code	Study components	Instructions Hrs / week	Examination			Credit
				Internal	University Exam	Total	
Sem IV B.Sc Chemistry	CCH-401	Physical and Organic Chemistry	3	30	70	100	3
	CCH-402	Inorganic and analytical Chemistry	3	30	70	100	3
	CPH-401	Basic Physics-III	3	30	70	100	3
	CPH-402	Basic Physics-IV	3	30	70	100	3
	PCH-401	Chemistry Practical-IV	6		100	100	3
	PPH-401	Physics Practical-IV	6		100	100	3
	FCG-401	Basic English - IV	2	15	35	50	2
	EGC-401	Principles of Management II	2		50	50	2
	ECH-401 A or ECH-401 B	Name Reactions Or Green Chemistry	2		50	50	2
			30	135	615	750	24

CCH-401- Physical and Organic Chemistry

RATIONALE: This course is designed to enable students to acquire basic understanding of the Organic and physical Chemistry. Basic properties of physical chemistry are taught to make the students aware about it.

LEARNING OUTCOMES:

- Understand the concept of origin of Organic and physical chemistry.
- Develop an understanding of the reaction mechanism occurring in any chemical reaction.

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 30 marks and End Term Examination conducted by University examination for 70 marks.

Subject Code	Subject Title	Credits	Theory			Total Marks
			Hrs.	Max Marks		
				Mid Term	End Term	
CCH-401	Physical and Organic Chemistry	3	45	30	70	100

COURSE CONTENT

Unit 1 Ionic Equilibrium	Number of lectures: 15	Weightage:33.3%
<ul style="list-style-type: none"> ● Introduction. (3 hrs) ● Electrolysis, Ionic Equilibrium, Resistance, Conductance, Specific conductance, Equivalent Conductance, Molar Conductance, Equivalent Conductance at Infinite Dilution ● Types of Conductometric Titration Acid-Base Titrations (6 hrs) <ul style="list-style-type: none"> ● Strong Acid Vs Strong Base. ● Strong Acid Vs Weak Base ● Weak Acid Vs Strong Base ● Weak Acid Vs Weak Base ● Strong Acid + Weak Acid Vs Strong Base ● Hydrolysis of salts (6 hrs) <ul style="list-style-type: none"> ● Strong Acid & Weak Base. ● Weak Acid & Strong Base. ● Weak Acid & Weak Base. 		
Unit 2 Physical properties	Number of lectures: 15	Weightage:33.3%
<ul style="list-style-type: none"> ● Vapor-Pressure (1 hrs) ● Surface tension (3 hrs) <ul style="list-style-type: none"> ● Measurement of surface tension by stalagmometer ● Parachor and its applications ● Viscosity (2 hrs) <ul style="list-style-type: none"> ● Measurement of viscosity by Ostwald-viscometer ● Refractive index (3 hrs) <ul style="list-style-type: none"> ● Specific refraction ● Molar refraction ● Measurement of Refractive index by Abbe's Refractometer ● Optical activity (2 hrs) <ul style="list-style-type: none"> ● Measurement of Optical activity by Polarimeter ● Dipole moment and its measurements & its application (2 hrs) ● Numerical (2 hrs) 		
Unit 3 Heterocyclic Compound	Number of lectures: 15	Weightage:33.3%
<ul style="list-style-type: none"> ● Introduction. (2 hrs) ● Nomenclature. ● Molecular orbital picture and aromatic characteristics of Pyrrole, Furan, Thiophene and Pyridine. (1 hr) ● Methods of synthesis for Pyrrole, Furan, Thiophene and Pyridine. (4 hrs) 		

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| <ul style="list-style-type: none"> • Chemical reactions for Pyrrole, Furan and Thiophene. (4 hrs) • Electrophilic substitution reactions of for Pyrrole, Furan and Thiophene with mechanism. (4 hrs) • Electrophilic and Nucleophilic substitution reactions of pyridine with mechanism. • Basicity of Pyridine, Piperidine and pyrrole |
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REFERENCES

Organic Chemistry

1. Organic Chemistry by Morrison and Boyd.4th ed. Pearson Education 2003
2. Organic Chemistry by pine, Hendrickson, Cram and Hammond 4th ed By P.S.Kalsi.
3. Advance Organic Chemistry by Jerry March.
4. Advance Organic Chemistry by Arun Bahal and B.S.Bahal.
5. Organic Chemistry Vol. I & II by S.M.Mukherji, S.P.Sing R.P.Kapoor.
6. Reaction mechanism and Reagents in Organic Chemistry by Gurdeep R.Chatwal 4th ed. Himalaya public House.
7. Text book of Organic Chemistry by Arun Bahal, B.S.Bhal, S.Chand.
8. Organic Spectroscopy by P.S.Kalsi.
9. Organic Chemistry by I.L.Finar.

Physical Chemistry

1. Advance Physical Chemistry by Gurdeep Raj
2. Physical Chemistry (Question and Answers) by R.N.Madan G.D.Tully, S.Chand.
3. Principal of Physical Chemistry by Puri, Sharma, Pathania.
4. Chemical Thermodynamics by R.P.Rastogy and R.R.Misra.
5. Essentials of Physical Chemistry by B.S.Bahal, Arun Bahal G.D.Tully.
6. Physical Chemistry by P.W.Atkins, 5th ed. , Oxford, 1994, 7th ed. ,2002
7. Physical Chemistry by R.A.Alberty and R.J.Silbey, John Wiley, 1995.
8. Physical Chemistry by G.H.Barrow, 5th ed. , Mac Graw Hill, 1998, 6th ed.
9. Physical Chemistry by W.J.Moore, 4th ed. , Orient Longmans, 1969.

INSTRUCTION STRATEGIES

1. Interactions with the students to understand the level of students
2. Explaining & Discussing the major terminologies related to Chemistry
3. Teaching the topics included in the syllabus with the help of teaching aids like OHP, LCD (Power point presentation), Notes, Question Banks, References and Reprints / Copy of Articles, Models, Diagrams
4. Assistance in solving of questions from our question bank.

TEACHING AND EXAMINATION

UNIT	Examination Scheme %Weightage	Teaching Scheme No. of Lecture
Unit 1	33.3	15
Unit 2	33.3	15
Unit 3	33.3	15
Total	100	45

CCH-402-Inorganic and Analytical Chemistry

RATIONALE: This course is designed to enable students to acquire basic understanding and the importance of Inorganic and Analytical Chemistry.

LEARNING OUTCOMES:

- Understand the concept of analytical chemistry.
- Applications of inorganic compounds

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 30 marks and End Term Examination conducted by University examination for 70 marks.

Subject Code	Subject Title	Credits	Theory			Total Marks
			Hrs.	Max Marks		
				Mid Term	End Term	
CCH-402	Inorganic and Analytical Chemistry	3	45	30	70	100

COURSE CONTENT

Unit 1	Number of lectures: 15	Weightage:33.3%
(A) Application of Crystal Field Theory (CFT)		(8 hrs)
1) For determination of color of complex. 2) Use of C.F.S.E. value.		
• Limitation of C.F.T. • Isomerism in complexes.		
(B) Magnetic properties of Co-ordination Compound		(7 hrs)
• Type of magnetic behavior • Method of determining magnetic susceptibility • Spin only formula • Magnetic properties for 3rd metal complexes		
Unit 2 Electrochemistry	Number of lectures: 15	Weightage:33.3%
• Introduction of terms: Oxidation, Reduction, Redox, Anode, Cathode, Electrode, Half Cell, Oxidation & Reduction Potential.		(2 hr)
• Electrochemical cell (Galvanic Cell) & Representation cell.		(4 hrs)
• Electrochemical Series and its Significance • Nernst Equation of Cell EMF and single electrode potential.		
• Description of the following electrode:		(9 hrs)

1) Metal-Metal ion Electrode. 2) Standard Hydrogen Electrode. 3) Calomel Electrode. 4) Weston standard Electrode. 5) Glass Electrode. 6) Quinhydrone Electrode		
Unit 3 Ultra violet Spectroscopy	Number of lectures: 15	Weightage:33.3%
<ul style="list-style-type: none"> • Type of electronic transitions (2 hrs) • Effect of conjugation (4 hrs) • Concept of Chromophore and Auxochrome • Bathochromic, Hypsochromic, Hyperchromic, and Hypochromic shifts. • Woodward –Fieser rules (9 hrs) • Problems of conjugated enes, enones and aromatic ketones 		

REFERENCES

Inorganic Chemistry

1. Concise Inorganic Chemistry J.D.Lee, 4th edition
2. Principles of inorganic chemistry, Puri, Sharma & Kalia
3. Inorganic chemistry by James Huheey, Keiter & Keiter
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Physical Chemistry

1. Advance Physical Chemistry by Gurdeep Raj
2. Physical Chemistry (Question and Answers) by R.N.Madan G.D.Tully, S.Chand.
3. Principal of Physical Chemistry by Puri, Sharma, Pathania.
4. Chemical Thermodynamics by R.P.Rastogy and R.R.Misra.
5. Essentials of Physical Chemistry by B.S.Bahal, Arun Bahal G.D.Tully.
6. Physical Chemistry by P.W.Atkins, 5th ed. , Oxferd, 1994, 7th ed. ,2002
7. Physical Chemistry by R.A.Alberty and R.J.Silbey, John Wiley, 1995.
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TEACHING AND EXAMINATION

UNIT	Examination Scheme %Weightage	Teaching Scheme No. of Lecture
Unit 1	33.3	15
Unit 2	33.3	15
Unit 3	33.3	15
Total	100	45

Subjective Elective

ECH-401A Name Reactions

RATIONALE: This course is designed to enable students to acquire basic understanding of the Name reactions and their application.

LEARNING OUTCOMES:

- Understand the concept of name reactions and its applications in current chemical experiments..
- Develop an understanding of the chemical reactions.

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of End Term Examination conducted by University examination for 50 marks.

Subject Code	Subject Title	Credits	Theory			Total Marks
			Hrs.	Max Marks		
				Mid Term	End Term	
ECH-401A	Name Reactions	2	24	00	50	50

Course Content

Unit 1: • Hofmann Rearrangement. • Aldol Condensation. • Diels - Alder Reaction. • Arndt Eistert reaction. • Dieckmann Condensation. • Mannich Reaction • Clemmensen Reduction.	Number of lectures: 12	Weightage:50%
Unit 2 • Reagents – Oxidizing • Reagents – Reducing	Number of lectures: 12	Weightage:50%

REFERENCES

1. Name Reaction by Prof.G.S.Kapadia, Uni.Granth Nirman Board.
2. Name Reaction by Jie Jack Li, Springer International Edition.
3. Reaction Mechanism and Reagents in Organic Chemistry by

G.R.Chatwal.

ECH-401B Green Chemistry

RATIONALE: This course is designed to enable students to acquire basic understanding of the Green Chemistry and its application for the betterment of society.

LEARNING OUTCOMES:

- Understand the concept of Green chemistry.
- Develop an understanding of the applications of green chemistry

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of End Term Examination conducted by University examination for 50 marks.

Subject Code	Subject Title	Credits	Theory			Total Marks
			Hrs.	Max Marks		
				Mid Term	End Term	
ECH-401B	Green Chemistry	2	24	00	50	50

Course Content

Unit 1: Introduction to Green Chemistry Twelve principles of green chemistry Inception of green chemistry--awards for green chemistry International organizations promoting green chemistry.	Number of lectures: 12	Weightage:50%
Unit 2 • Choice of starting materials, choice of reagents, choice of catalysts • Bio catalysts, polymer supported catalysts, choice of solvents • Synthesis involving basic principles of green chemistry • Examples –adipic acid, catechol, methyl methacrylate, urethane, aromatic amines (4-aminodiphenylamine), benzyl bromide, acetaldehyde, citral, ibuprofen, paracetamol,	Number of lectures: 12	Weightage:50%

REFERENCES

1. V.K. Ahluwalia & M.R. Kidwai: New Trends in Green Chemistry, Anamalaya Publishers (2005).
2. V. Kumar, An Introduction to Green Chemistry, Vishal Publishing CO. Jalandhar, 2007.

3. Sanghi A Shrivastav Green Chemistry