Syllabus for Bachelor of Science

Chemistry

Subject Code: 02CY0251

Subject Name: Chemistry-IV

B.Sc. Sem - IV

Objectives:

- To study physical and chemical properties of Lanthanides and Actinides series.
- To study active methylene compounds.
- To understand the study of colloids.
- To study the properties of wave mechanics

Credits Earned: 6 Credits

Course Outcomes: After completion of this course, student will be able to

- Understand the properties of lanthanides and actinides series. Their effect and their application in nuclear studies.
- Be aware of the basics of active methylene compounds.
- Obtain the information regarding colloids and their applications.
- Understand the basic of wave mechanics and their construction.

Pre-requisite of course: Before starting to study this course, student should have superficial knowledge of Inorganic chemistry and there conceptual principals.

Teaching and Examination Scheme

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE (E)	IA	CSE	Viva (V)	Term Work (TW)	
5	-	2	6	50	30	20	25	25	150

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Contents

Unit	Topics	Contact Hours
1	**Lanthanides and Actinides** IntroductionThe Lanthanoid series, properties of Lanthanoids, electronic configuration, oxidation state, ionic radii(lanthanoid contraction, color, magnetic property, basic character, solubility of compounds, double salt, The Actinied series, properties of actinoids, oxidation state, ionic radii, color of ions, formation of complex, comparison with lanthanoids, Thorium extraction and properties.	**16**
2	**Active methylene compounds** Ethyl acetoacetate, synthetic uses of ethyl acetoacetate, Tautomerism, Keto-Enoltautomerism of ethyl acetoacetate, Diethyl malonate, Synthetic uses of diethyl malonate.	**12**
3	**Colloids** Introduction, Lyophilic and Lyophobic Sols or Colloids, Characteristics of Lyophilic and Lyophobic Sols, Preparation of Sols, Dispersion Methods, Aggregation Methods, Purification methods: Optical Properties: Tyndall Effect,,, Kinetic Properties: Brownian Movement, Electrical Properties: Electrophoresis, precipitation of lyophobic sols, Gold Number, Stability of Sols, Associated Colloids, Cleansing Action of Soaps and Detergents, Emulsions, Gels, Applications of Colloids.	**16**
4	**Wave mechanics** Introduction, Basic postulates of wave mechanics, Derivation of Schrodinger equation for a particle wave, Physical significance of ψ, ψ^2 and $\psi^*\psi$, Boundary conditions, Normalization condition of wave functions, Eigen value and Eigen function, Normalization constant and normalized wave function.	**16**
Total Hours		**60**

References:

1. A Textbook of Physical Chemistry;K. L. Kapoor
2. An Introduction to Chemical Thermodynamics; R. P. Rastogi, R. R. Misra, 6thEdition, Vikas Pub. Pvt. Ltd.
3. Physical Chemistry; G. W. Castellan, 3rdEdition,Narosa Publishing House, NewDelhi.
4. Physical Chemistry; ArunBahl& J. D. Tuli, S. Chand Publishing.
5. Organic Reactions and their Mechanisms; P. S. Kalsi, New Age International Publishers.
6. Organic Chemistry; R. T. Morrison and R. N. Boyd, 6thEdition, PrenticeHall of India.
8. Concise Inorganic Chemistry; J. D. Lee, 5thEdition, Blackwell Science, London.
9. Basic Inorganic Chemistry; F. A. Cotton, G. Wilkinson
10. Principles of Inorganic Chemistry; B. R. Puri, L. R. Sharma, K. C. Kalia,Vallabh Publications, Delhi
11. Organic Chemistry; Morrison and Boyd

12. Organic Chemistry (Volume I, II & III); S. M. Mukherji, S. P. Singh, R. P. Kapoor.
13. Principles of physical chemistry; B.R. Puri, L.R. Sharma, M.S. Pathania.

Suggested Theory distribution:

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
20%	30%	25%	15%	10%	-

Qualitative Analysis:

1. Qualitative analysis of given unknown organic compound.[Bi functional, compound 1]
2. Qualitative analysis of given unknown organic compound.[Bifunctional, compound 2]
3. Qualitative analysis of given unknown organic compound.[Bifunctional, compound 3]
4. Qualitative analysis of given unknown organic compound.[Bifunctional, compound 4]

Organic Volumetric Analysis:

5. To determine the amount of Ester in the given solution.
6. To determine the amount of Glucose in the given solution.
7. To determine the amount of $-CONH_2$ in the given Acetamide solution.
8. To determine the amount of –COOH in the given carboxylic acid.

Reference Books

1. An Advanced Course in Practical Chemistry, A. K. Nad, B. Mahapatra and A. Ghoshal, New Central Book Agency (P) Ltd.
2. Practicals in Physical Chemistry, P S Sindhu, Macmillan.
3. Experimental Physical Chemistry: A Laboratory Textbook, Arthur Halpern, George McBane, W. H. Freeman.

Instructional Method:

1. The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.
2. The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.
3. Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory.
4. Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory
5. Use of hazardous/toxic chemicals should be avoided as far as possible in laboratory.
6. All students in the laboratory must wear safety goggles and lab coats during lab session.

Supplementary Resources:

1. http://nptel.ac.in/course.php?disciplineId=104
2. http://ocw.mit.edu/courses/chemistry/
3. http://vlab.amrita.edu/index.php?sub=2
4. http://www.vlab.co.in/ba_labs_all.php?id=9
5. https://www.youtube.com/user/TMPChem
6. https://www.youtube.com/playlist?list=PL166048DD75B05C0D
7. https://www.youtube.com/channel/UCqk-dmk3AOFtikaFDpsZorg
8. https://www.youtube.com/user/PradeepKshetrapal