Syllabus for Bachelor of Science

Chemistry

Subject Code: 02CY0351

Subject Name:Advanced Inorganic and Industrial Chemistry

B.Sc. Sem - VI

Objectives:

- To study the famous concept symmetry and its introduction.
- To understand organometallic chemistry.
- To study the introduction, classification, properties, and preparation of polymer.
- To study the fertilizers and its introduction.
- To study the petrochemicals.

Credits Earned: 6 Credits

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

- Understand the concepts of term symmetry.
- Be aware of the knowledge of organometallic chemistry
- Obtain the information regarding polymers and their applications.
- Understand the basic of Fertilizers.
- Will get an idea regarding petrochemicals and their imp in current scenario.

Pre-requisite of course: Required knowledge of general chemistry.

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

Marwadi UNIVERSITY

Syllabus for Bachelor of Science

Chemistry

Contents

Unit	Topics	Contact Hours
1	**Symmetry:** Introduction, symmetry element, symmetry operation,Equivalent symmetry elements and equivalent atoms, General relations amongst symmetry elements and symmetry operation, symmetry classification of molecules, classes of symmetry operations,	**15**
2	**Organometallic chemistry:** Introduction, nomenclature of organometallic compounds, ionic organometallic compounds, organometallic compounds of various group, 18 electron rule, counting of effective numbers of electrons, metal carbonyl, metal nitrosyl, nomenclature of organometallic compounds	**15**
3	**Polymers** Introduction, classification of polymer, types of polymerisation reaction, addition polymerisation, Ziegler-natta catalysed polymerisation, stereochemistry of polymers, types of plastic, synthesis of Bakelite, phenol formaldehyde, melamine, Teflon, and polychloroprene, Low density polyethylene, high density polyethylene.	**10**
4	**Fertilizers** Introduction, Plant nutrients and its role, Classification of fertilizers, Properties of fertilizers, Nitrogeneous fertilizers like urea, ammonium nitrate, ammonium sulphate, Calcium cyanamide, Phosphate fertilizers like super phosphate, triple super phosphate, mono ammonium phosphate, diammonium phosphate, Potassium fertilizers like potassium chloride, potassium sulphate, potassium nitrate, nomenclature in fertilizer industry.	**10**
5	**Petrochemicals** Introduction, petrochemicals from C_1, petrochemicals from C_2, petrochemicals from C_3.	**10**
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, 6th Edition, Vikas Pub. Pvt. Ltd.
3. Physical Chemistry; G. W. Castellan, 3rd Edition,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, 6th Edition, PrenticeHall of India.
8. Concise Inorganic Chemistry; J. D. Lee, 5th Edition, 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%	-

Suggested list of experiments:

1. Qualitative analysis of given unknown inorganic salt.[Six radicals, mixture 1]
2. Qualitative analysis of given unknown inorganic salt.[Six radicals, mixture 2]
3. Qualitative analysis of given unknown inorganic salt.[Six radicals, mixture 3]
4. Qualitative analysis of given unknown inorganic salt.[Six radicals, mixture 4]
5. Qualitative analysis of given unknown inorganic salt.[Six radicals, mixture 5]
6. Qualitative analysis of given unknown inorganic salt.[Six radicals, mixture 6]

Inorganic Volumetric Analysis:

7. To determine the amount of NO_2^- ion in the given $NaNO_2/KNO_2$ solution with the help of 0.1 N $KMnO_4$ solution.
8. To determine the amount of Ca^{+2} and Zn^{+2} in the given mixture of $CaCl_2.2H_2O$ and $ZnCl_2$ using 0.01 M EDTA solution.

Physicochemical Analysis:

(i) Conductometry
(ii) Colorimetric
(iii) Surface tension
(iv) Viscosity
(v) Analytical procedures related to kinetics and equilibrium

Organic Qualitative Analysis:

Compounds containing one functional group such as aldehyde, ketone, amine, and nitro group.

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