

INSTITUTE	FACULTY OF SCIENCE
PROGRAM	BACHELOR OF SCIENCE (CHEMISTRY)
SEMESTER	6
COURSE TITLE	ADVANCED PHYSICAL CHEMISTRY
COURSE CODE	02CY0353
COURSE CREDITS	6

Objective:

- 1 To study details of the nuclear chemistry.
- 2 To know more about activity and activity coefficient.
- 3 To study the introduction of the crystallography.
- 4 To study the Physical properties and chemical constitution.

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

- 1 Understand the concepts of nuclear chemistry
- 2 Will know more about the activity and activity coefficient
- 3 Obtain the information regarding crystallography and its various types. Brief idea regarding unit cell will also get
- 4 Understand the physical properties and chemical constitution

Pre-requisite of course: To understand advanced topics in physical chemistry

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
5	0	2	50	30	20	25	25

Contents : Unit	Topics	Contact Hours
1	Nuclear Chemistry Introduction, Radioactivity, Types of Radiations, Properties of Radiations, Detection and Measurement of Radioactivity, Types of Radioactive Decay, The Group Displacement Law, Rate of Radioactive Decay, Half-life, Radioactive Dating, Nuclear Reactions, Nuclear Fission Reactions, Nuclear Fusion Reactions,.	
2	Activity and activity coefficient Introduction, Concept of activity, activity coefficient, mean activity, ionic strength, methods of determining activity and activity coefficient, Equation of Debye- Huckel	

Contents : Unit	Topics	Contact Hours
3	Crystallography Introduction, Types of Solids, Isotropy and Anisotropy, The habit of a Crystal, Symmetry of Crystals, Miller Indices, How to Find Miller Indices, Crystal Structure, Parameters of the Unit Cells, Cubic Unit Cells, Three Types of Cubic Unit Cells, Calculation of Mass of the Unit Cell, What is Coordination Number of a Crystal Lattice, X-Ray Crystallography, Bragg's Equation, Measurement of Diffraction Angle, Rotating Crystal Method, Powder Method, Ionic Crystals, Sodium Chloride Crystal, Cesium Chloride Crystal	
4	Physical properties and chemical constitution Surface Tension and Chemical Constitution, Use of Parachor in Elucidating Structure, Viscosity and Chemical Constitution, Dunstan Rule, Molar Viscosity, Rheochor, Dipole Moment, Determination of Dipole Moment, Dipole Moment and Molecular Structure, Dipole Moment and Ionic Character, Molar Refraction and Chemical Constitution, Optical Activity and Chemical Constitution. (vapour pressure)	
Total Hours		

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	Experiments Experiment - 1, Experiment - 2, Experiment - 3, Experiment - 4, Experiment - 5, Experiment - 6, Experiment - 7, Experiment - 8	
Total Hours		

Textbook :

- 1 A Textbook Of Physical Chemistry, K. L. Kapoor, Mcgraw hill education private limited, 2021
- 2 A Textbook of Physical Chemistry, ARTHUR W. ADAMSON, Elsevier , 1973

References:

- 1 Physical Chemistry, Physical Chemistry, Castellan G. W., Narosa Publishing House, 2004
- 2 Essentials of physical chemistry, Essentials of physical chemistry, Bahl, Arun, S. Chand Publishing, 1961
- 3 Physical chemistry, Physical chemistry, Mortimer, R. G., Academic Press, 2000
- 4 Physical chemistry, Physical chemistry, Silbey, R. J., Alberty, R. A., Papadantonakis, G. A., & Bawendi, M. G. (, John Wiley & Sons, 2022

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as 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 / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking
10.00	20.00	25.00	25.00	10.00	10.00

Instructional Method:

- 1 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>