



बिरसा मुंडा ट्रायबल युनिवर्सिटी Birsa Munda Tribal University

राजपिपला, जि० नर्मदा Rajpipla, Dist. Narmda

Established by Tribal Development Department, Govt. of Gujarat

School of Science

B.Sc. (Chemistry) Programme

Subject Code & Name: - BS03MJCHE3 Physical Chemistry-I

Teaching and Evaluation Scheme:

Teaching Scheme				Examination Scheme			
Credits				Component Weightage (%)			
				CCE		SEE	
L	T	P	Total	TH	PWE	TH	PWE
3	-	1	4	35	15	35	15

Programme Name	B.Sc.
Semester	III
Course Code	BS03MJCHE3
Course Title	Physical Chemistry-I
Course Content Type (Th./Pr.)	Theory & Practical
Course Credit	3 + 1
Sessions+ Lab. Per Week	3 +2
Total Teaching/Lab. Hours	45 Theory Hours + 30 Practical Hours
* 2 Laboratory = 1 Session	

Learning Objectives

1. Understanding the synthesis, structure and properties of inorganic solids, including their chemical composition, crystal structure and how these relate to physical properties.
2. Learning about different crystal systems, Bravais lattices and point groups.
3. Understanding the packing efficiency of various crystal structures.
4. Understanding how chemical composition and crystal structure influence physical properties like magnetism, electrical conductivity and optical properties.
5. Understanding the properties of liquids, such as viscosity and surface tension, and how these properties relate to intermolecular forces.
6. Understanding gas properties, explaining gas behavior using the kinetic-molecular theory, and applying the gas laws.
7. Understanding that gases have mass and how to determine their density or molar mass using the ideal gas equation.

Prerequisites (if any)

Learning Outcomes





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On the Completion of this course, students will able to:

1. Gaining knowledge of different types of chemical bonding in solids, such as ionic, covalent and metallic bonding.
2. Learning about various types of defects in solid materials and their impact on properties.
3. Understanding the principles of thermodynamics and kinetics related to phase transformations and solid-state reactions.
4. Students will be able to describe the unique characteristics of liquids, differentiate them from solids and gases, and how intermolecular forces influence their properties.
5. Students will understand the processes of melting, boiling and evaporation and how these transitions are affected by temperature and pressure.
6. Students will develop practical skills in handling laboratory equipment, conducting experiments and analyzing experimental data related to liquid properties.
7. Applying the ideal gas law understanding kinetic theory and recognizing deviations from ideal gas behavior.
8. They may learn about the applications of gaseous state principles in various scientific fields.

Detailed Contents

UNIT	TOPIC/SUB-TOPIC	TEACHING HOURS
I	Solid State Difference between crystalline and amorphous solids, Symmetry in crystal systems, Point groups and space groups, Space lattice and the unit cell, Bravis lattices, Seven crystal systems, Lattice energy of an ionic crystal, Born-Lande equation and the Born –Haber cycle, law of rational indices, Miller indices , Interplanar spacing in a crystal system, X-ray diffraction, , The Bragg equation, Numericals	15
II	Liquid State Gaseous, Liquid and solid states, Vacancy theory of liquids, Free volume of a liquid, Physical properties of liquids: Vapour pressure, Surface tension, Kelvin equation for vapour pressure of a droplet, Excess pressure in a drop, Laplace equation and the young-Laplace equation, Surface active agents, Viscosity, Effect of temperature on viscosity	15





बिरसा मुंडा ट्रायबल युनिवर्सिटी Birsā Mūṇḍā Drāyabala Yūnīvārsīṭī

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III	Gaseous State The gas laws, Kinetic molecular theory of gases, Deviation of real gases from ideal behavior, Effect of temperature and explanation for the deviation, Vander waals equation of state, Discussion of vander waal's equation, Critical constants of gas, Determination of Critical pressure, Temperature and volume, Relation between vander waal's constant and critical constants, Numerical.	15
Text Book(s)		
Reference Books		
<ol style="list-style-type: none">1. Essentials of Physical Chemistry, B. S. Bahl, G. D. Tuli and Arun Bahl, S. Chand & Co.2. Physical Chemistry, 7th edition P. C. Rakshit3. Elements of Physical Chemistry, B. R. Puri, L. R. Sharma and Madan Pathania, Vishal Publishing Co. Jalandhar.4. Physical Chemistry, Gordon M. Barrow5. A Textbook of physical chemistry, O.P.Tadon, 1st edition6. Advanced Physical chemistry Vol-1, Gutru & Gutru, 3rd edition7. Advanced Physical chemistry Vol-2, Gutru & Gutru, 3rd edition8. Physical Chemistry, W.J. Moore, 6/E, 1996, Mac-Graw Hill Publication9. Essentials of Physical Chemistry, Bahl & Tuli, 22/E, S. Chand Publication, New Delhi.10. Advanced Physical Chemistry by Gurdeep Raj, 19/E, Goel Publishing House Meerut.		
Web Resources		
Required Software(s) (if any)		
Practical(s) (if any)		
<ol style="list-style-type: none">1. Conductometric titration: HCl Vs NaOH2. Conductometric Titration: CH₃COOH Vs NaOH3. Conductometric Titration: CH₃COOH Vs NH₄OH4. Conductometric titration: HCl Vs NH₄OH5. pH metric titration: A. Calibration of pH meter by different buffer solution6. pH metric titration: to measure pH of the solution of HCl and NaOH		30

L:: Lecture, T:: Tutorial, P::Practical

CCE:: Continuous and Comprehensive Evaluation





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(CCE Theory includes Mid Semester Examination, Assignment, MCQ quizzes, Seminar, Reflective notes, class participation, case analysis and presentation, slip tests (announced/surprised), attendance etc. or any combination of these)

PWE:: Practical Work Examination

(PWE includes Laboratory practical work, project work, viva simulation exercise work etc.)

SEE:: Semester End Evaluation

