

CURRICULUM PLAN

(Odd Semester, 2026-2027)

B.Sc. (H) Chemistry, I Year (Semester I), NEP-UGCF 2022 Name of the teacher:

Dr. Upasana Issar

Name of Paper: Gaseous and Liquid State (DSC-3: Physical Chemistry-I) UPC: 2172011103

Two Lectures Per Week

Contents	Allocation of Lectures	Month wise schedule to be followed	Tutorial/Assignments /Presentation etc
Unit 1: Gaseous state - Kinetic theory of gases- postulates and derivation of kinetic gas equation, - Behaviour of real gases- Compressibility factor, Z, Variation of compressibility factor with pressure at constant temperature (plot of Z vs P) for different gases (H_2, CO_2, CH_4 and NH_3), Cause of deviations from ideal gas behaviour and explanation of the observed behaviour of real gases in the light of molecular interactions - van der Waals (vdW) equation of state, Limitations of ideal gas equation of state and its modifications in the form of derivation of van der Waal equation, Physical significance of van der Waals constants, application of van der Waal equation to explain the observed behaviour of real gases.	12	28 th July 2026 – 15 th September 2024	- Syllabus Overview - Books Suggestions - Related Examples and Problem solving session
Unit 1 (Continued) Limitations of van der Waals equation, Reduced equation of state and law of corresponding states (statement only). Virial equation of state-Physical significance of second and third virial coefficients, van der Waals equation expressed in virial form, Relations between virial coefficients and van der Waals	06	16 th September 2026- 15 th October 2026	- Numerical Solving - Doubt Session - Assignment allocation
constants			

Unit 1 (Continued) Maxwell distribution of molecular velocities and its use in evaluating average, root mean square and most probable velocities and average kinetic energy. Definition, expression, applications and temperature and pressure dependence of each one of the following properties of ideal gases: Collision frequency, Collision diameter, Mean free path. Coefficient of viscosity, definition, units and origin of viscosity of gases, relation between mean free path and coefficient of viscosity, temperature and pressure dependence of viscosity of a gas, calculation of molecular diameter from viscosity Unit 2 Liquid state Physical properties of liquids-vapour pressure, its origin and definition, Vapour pressure of liquids and intermolecular forces, and boiling point Surface tension, its origin and definition, Capillary action in relation to cohesive and adhesive forces, determination of surface tension by (i) using stalagmometer (drop number and drop mass method both) and (ii) capillary rise method, Effects of addition of sodium chloride, ethanol and detergent on the surface tension of water and its interpretation in terms of molecular interactions, Role of surface tension in the cleansing action of detergents Coefficient of viscosity and its origin in liquids, Interpretation of viscosity data of pure liquids (water, ethanol, ether and glycerol) in the light of molecular interactions, Effects of addition of sodium chloride, ethanol and polymer on the viscosity of water, relative viscosity, specific viscosity and reduced viscosity of a solution, comparison of the origin of viscosity of liquids and gases, effect of temperature on the viscosity of a liquid and its comparison with that of a gas.	12	16 th October 2026- November 2026	• Numerical Solving • Doubt Session • Previous university papers discussion
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Dr. Upasana Issar

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