

Introduction to the structure of matter. Fundamentals of Atomic Theory, Electronic Structure and the Periodic Table. Chemical bonds (Classical concepts, Molecular Geometry, Valence Bond Theory, Principles of molecular orbital theory). Gases and kinetic theory. States of matter: Intermolecular Powers – Properties of liquids and their interpretation, Solid State (Crystal structure, Types of crystalline solids). Phase diagrams. Solutions (Expressions of concentration, Electrolytic and non-aqueous solutions and their properties). Thermochemistry (Thermochemical equations and energy properties, Enthalpies of formation, Enthalpy charts, Fuels). Chemical Kinetics (Reaction rate, Law of reaction rate and reaction mechanisms, Catalysis). Chemical equilibrium (Equilibrium constant, Law of mass action, Le Châtelier principle). Electrochemistry (redox actions, semimetals and dynamic reduction potentials. Voltaic and electrolytic cells, Nernst equation). Introduction to Carbon compounds – Organic Chemistry (Homologous series - Nomenclature). Hydrocarbons and their derivatives (Simple and aromatic hydrocarbons, oxygenates, nitrogen compounds, petrochemicals, organic polymers, lubricants). Biological molecules (proteins, carbohydrates, nucleic acids).