হুমায়রা সিদ্দিকা হুমাসা-Humaira Siddika Humasha
ড. আবু বকর সিদ্দিক-Dr. Abu Bakkar Siddiq

কলেজ সিলেবাস

বিষয় ঃ রসায়ন (Chemistry)

কোড ঃ ৪১৩

পূর্ণমান-১০০

1. **Gaseous State:** The gas laws, Ideal gas equation, Kinetic theory and its application to ideal gases, Deviation from ideal behaviour, Vender Waals equation, Dalton's law of partial pressure; The critical state and critical constants, liquefaction of gases.
2. **Solutions:** Solubility, Henny's law, Raoult's law, Ideal and nonideals solutions, Colligative properties of solutions, Effect of electrolytes on colligative properties, Buffer solutions.
3. **Thermochemistry and thermodynamics/Energetics in Chemistry:** Work and heat, Internal energy, Three laws of thermodynamics and their application, Enthalpy, Enthalpy changes in various chemical and physical processes, Joule-Thomson effect, Entropy, Spontaneity and reversibility of chemical reaction, Hess's law and its application, Bond enthalpy.
4. **Phase Equilibrium:** Phase, Components and degrees of freedom. Phase rule, Application in one component system like water and sulfur, Completely and partially miscible liquid paris.
5. **Chemical Equilibrium and Chemical Kinetics:** Equilibrium in chemical reactions and the equilibrium law, Kp-Kc and Kx measurements and effect of temperature; Pressure of Kx measurement, Degree of dissociation, Equilibrium constant. Ostwald dilution law, Concentratyion change on dissociation of solids, Solubility product, Common ion effect, pH and buffer solution. Rate equation, Order reaction, Molecularity, Rate constant, Zero, first and second order reaction, Effect of temperature on the rate of reaction.
6. **Electrochemistry and its scope:** Electrolytes and non electrolytes, Inonic mobility and conductance, Electrochemical cells, pH, Electrode potentials-emf of cells, Transport number and their determination, Electrolytic and galvanic cells, Hulf cells, Different types of electrodes, Standard Hydrogen electrode, Measurements of electrolytic conductance.
7. **Atomic Structure:** Nuclear model of the atom, Nuclear structure, Isotopes, Isobars, Isotons, Quantum number and atomic orbital, Electronic structure of atoms, Electron spin and the Pauli exclusion principle, Hund's rule; Aufbau principle, Electronic configuration.
8. **Periodic Table and Classification of Elements:** The modern periodic tables, Usefulness and, limitations of the periodic tables, Periodic properties, Atomic radius, Ionization energy, Electron affinity and electronegativity.
9. **Modern Concepts of Chemical Bonds and Bonds Type:** Ionic bonds-energy involved in ionic bonding, ionic radii, Covalent bonds, Lewis formulas, Co-ordinate covalent bonds, Octet rule, Multiple bonds, Polar covalent bonds-electronegativity, Delocatized bonding resonance, Bond length, Bond order, Bond energy, Valance bond theory, Molecular orbital theory, Metallic bond, Hydrogen bond, Vander Waals forces.
10. **Structure of molecules**
11. **Radioactivity, Nuclear reactions and Atomic energy**
12. **Acids and Bases:** Arnhenius concept, Booronsted-Lowry concept, Lewis concept, Acid-base strength, Molecular structure and acid strength, Self ionization of water and pH.
13. **Oxidation and Reduction**

14. **Common elements and their important compounds and their uses**: Hydrogen, Group 1 or IA (The alkali metals). Group 2 or IIA (The alkaline earth metals), Group IIA, Group IVA, Group VA, Group VIA. Group VIIA (Halogens), The noble Gases, Transition Metals.
15. **General Concepts on the Following:** Aliphatic and aromatic compounds. Heterocylic compounds, Bonding in organic compound, Covalent bonds, Atomic orbitals, Hybridization of orbital, Functional group, Bond angles. Polar and non-polar molecules, Shape of molecules. Carbanion, Carbocation, Free radicals and their stability. Structure of organic molecules. General concepts of nucleophilic, electrophilic and free radical mechanism of organic reactions.
16. **Aliphatic Hydrocarbons (Alkanes, Cycloalkanes, Alkenes and Alkynes):** Structure, Nomenclature, Preparation and Properties of Alkenes, Geometrical isomerism of alkenes, Cis-Trans and E-Z systems, Mechanism of electrophilic addition, Markownikov's rule, Polymer of alkenes, Physical and Chemical Properties of alkanes and cyclo alkanes, Configuration and conformation, Optical isomerism of alkanes, CisTrans isomerism on cycloalkanes. Wurtz reaction. Free radical mechanism of halogenation, Electrophlic addition reaction of alkynes, Preparation and reaction of Alkynes; Important organic synthesis starting from alkynes, acidity of alkynes.
17. **Aromatic hydrocarbons:** Source, structure, bonding in benzene. Concept of aromaticity. Hueckel rule, Mechanism of electrophlic Substitution in aromatic rings, Halogenation, Nitration. Sulfonation, Friedel-crafts atkylation and acylation. Benzene derivatives. nomenclature and their preparation, 'Resonance, Disubstitution in benzene ring, Orientation in bewene ring and its derivatives, Activation and deactivation in aromatic disubstitution.
18. **Alkyl and Aryl Halides:** Structure, Nomenclature, Preparation, Properties, Mechanism of substitution and elimination reaction, Grignard reagent synthesis and application.
19. **Alcohol, Phenols & Ether:** Structure, Nomenclature, classification of mono hydric alcohol and phenol and their reactions, Distinction between different types of alcohols.
20. **Adehydes, Ketones and Acids:** Nomenclature, useual methods of preparation and reactions of aldehydes and ketones, Nucleophlic addition to carbonyl compound, Cannizzaro reaction, Aldo1 condensation reaction, Penkin, Knoevenagel and witting reaction, Acidity, Resonance effect and inductive effect on acidity, Preparation and reaction of carboxilic acid.
21. **Amines: Aliphatic & Aromatic:** Nomenclature, Preparation, reaction of amines; Hoffman degradation; Nomenclature, Preparation and reaction of diazonium salts; Coupling reaction; Chemistry of nitro compounds: Separations of amines.
22. **Carbohydrates, Amino acids and proteins, Nucleic acid**
23. **Environmental Chemistry:** Acid rain, Green house effect, Ozone-layer depletion, Water pollution.
24. **Chemical principles of the manufacture of common organic and inorganic industrial products under local condition.**