Chemistry (रसायन विज्ञान)

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Chemistry

(A) Physical chemistry Gaseous-state:- Molecular velocity of gases, mean free path and collision diameter, liquification of gases joule thomson effect in ideal and nonideal gases, Joule "Thomson coefficient, inversion temperature, Deviation from ideal gas behavior vander waals equation of state, Law of corresponding state, critical constants and their relations with-vander waals constants

Liquid state:- surface Tension, effect of temperature on surface tension, viscosity, effect of temperature and pressure on viscosity.

Solid State:- symmetry in crystal systems, Miller inclices close packing, coordination number, structure of Nacl and CaF2, crystal-defects.

Thermodynamics:- first law of thermodynamics and its limitations, enthalpies of a system, heat of reaction formation, combustion and neutralization, Hess's law and its application bond energy and resonance energy, heat capacities at constant volume and constant pressure, relationship between. Ep and Eve extensive and intensive properties, statement of second law of thermodynamics Carnot cycle, concept of entropy, variation of entropy with temperature and volume/pressure, concept of free energy: Helmholtz and Gibbs free energies, Gibbs - Helmholtz equation, thermodynamic criteria of equilibrium, Elapeyron-clausius equation and its application, van;t hoff equation and Gibbs- Duhem equation.

Dilute solution:- Ideal and non ideal solutions, Raoult's Law colligative properties (thermodynamic treatment) Lowring of vapour pressure, osmotic pressure, elevation of boiling point and depression of freezing point in solution, abnormal colligative properties molecular weight determination by colligative properties.

Surfacephenomenon- physical and chemical adsorption Fraundlich adsorption isotherm Langmuir state value Gold-number, Hardy-Schulze rule stability of colloids, zeta potential

Chemical Kinetics-Molecularity and order of reaction, rate of reaction Zero first second and third order reactions and their determination effect of temperature on reaction velocity, energy of activation, catalysis, criteria of catalysis, enzymes catalysis, primary salt effect in ionic reactions.

Chemical equilibrium- Law of mass action and its application to homogeneous and heterogeneous equilibria, relationship between Kp and Kc. Le chatelier principle and its application to chemical equilibrium, degree of dissociation and abnormal; molecular Weight hydrolysis of salts, Bronsted & lewis acid and base. pH, buffer solution, solubility and solubility Product of sparingly soluble salts:-

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Electrochemistry- Electrolytic conductance-equivalent,specific and molecular conductances, variation of conductances with dilution of solutions, Kohlausch's law of independent migration of
ions, factors affecting the conductances, types of single electrode and their potentials, EMF of the cell, Nernest equation. EMF and equilibrium constant, concept of concentration cell With and without transference, liquid junction potential chemical cells without transference, fuel cells

B- Inorganic:

Atomic structure- dual nature of particle, Heisenberd's uncertainity principle, Schrodinger's wave equation atomic orbitatals, quantum numbers, shapes of s,p,d. orbitals, Aufbau principle and pauli's exclusion principle, Hunds law, electronic configuration of elements, modern periodic table, periodic properties of the elements and their variation in periodic table, chemical bond- Ionic bond, lattice energy, Born- Haber cycle, salvation energy, Covalent bond (Fajan's rule) Bond order, energy level diagram, of homonuclear and heteronuclear molecules, Hybridisation and shapes of inorganic molecules and ions, valence shell electron pair repulsion theory and its application, stability of nucleus, mass defect and nuclear binding energy, radioactivity, nuclear reactions-fusion and fission, carbon dating.

S-block elements-chemistry of lithium and berilium, abnormal behavior and diagonal relationship.

P-block elements- chemical reactivity of elements in group, inert pair effect, structure of their hydrides and halides, oxyacids of N, P, S and halogens, interhalogens

d-block elements: General characteristics- variable oxidation state, complex formation, magnetic properties, colour and catalytic properties,
coordination compounds-nomenclature, stereo chemistry of metal, complex and isomerisation, effective atomic number and valence bond theory, crystal field theory, crystal field splitting in tetrahedral and Octahedral complexes, crystal field stabilization energy substitution reaction in square planar complexes, electronic spectrum, molecular orbital energy level diagram in tetrahedral and octahedrdal complexes (bond only) energy level diagram for d-1 and d_9 states

Organometallic chemistry- Definition, nomenclature and classification of organometallic compounds

Bioinorganic chemistry- Structure and function of myoglobin Hemoglobin, chlorophyll and cyano cobalamine-

f-block elements: Electronic structure, lanthanide contraction and its consequences, magnetic and spectral properties and their differences from transition metalsion exchange and solvent extraction methods of separation of lanthanides chemistry of actinides.

A- ORGANIC CHEMISTRY:-

1- ORGANIC CHEMISTRY- Some Basic Principles Techniques:-

(a) Classification of organic compounds

(b) I UPAC Nomenclature of organic compounds

(c) Types of organic recation

(d) Mechanism of organic reaction- Homolytic & Hetrolytic fission of coralent Bond, carbocations, cambanians carbenes, free Radicals, Electrophile & Nueleophile Sn 1 & sn 2 reaction

(e) Electronic Displacements in covalent Bond- Inductive effect, electromeric effect Resonance, Hyperconjugation

(f) purification of organic Compounds:- fractional Distillation, chromatography

(g) estiation of elements in organic compounds

2- Isomerism:-

structural & stereo Isomerism, (Geometrical & optical Isomerism) Tautormerism conformation

3- Hydrocarbon:-

a- General methods of preparation, physical & chemical properties of Alkane, Alkene & Alkynes, Location of double bonds by ozonolysis of Alkene.

b- Aromatic Hydrocarbon:-

Benzene- It's structure, resonance Aromaticity preperation & physical and chemical properties of Benzene

Mechanism of electrophlic substitution- nitration, sulphonation, Halogenation, freidal craft's Alkylation & Acylation. Directive Influence of groups in mono substituted benzene. Carcinogenacity & (Toxicity chemistry of toluene)

c- Derivatives of Benzene:-

Preperation, Physical & chemical properties of Phenol, Aniline, Anisole Benzaldehyde & Benzoic Acid

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4- Haloalkanes:-

General Methods of preperation, physical and chemical properties preparation and properties of chloroform and Iodoform, Freon

5- Alcohols:- classification, General methods of preparation, Physical & chemical properties, mechanism, of dehydration of Alcohol, Denatured spirit, power alcohol, Absolute Alcohol fermentation of Alcohol Properties of Glyecerol.

6. Aldehyde & Ketones:-

General Methods of preparation, Physical & chemical properties, mechanism of Nucleophilic addition. **7- Ether:-** General methods of preparation of ether, physical & chemical Properties of Ether &uses

8- Carborxylic acid and their Derivatives:-

General Methods of preparation physical and properties, Influence of substituents group on acidic nature of carboxylic acid, General methods of preparation & properties of acid, Halide, ester, Amide,& Anhydride

9- Organic compounds containing nitrogen:-

a- Amines:- classification, general methods of preparation & properties, basic character of Amines, Distinction between primary secondry and tertiary amines

b- Nitro Compounds:-

General methods of preparation & properties of nitoro compounds

c- Cyanides & Isocyanides:-

General methods of preparation & properties of cyanides & isocyanides

10. Bio-molecules:-

a- Carbohydrates:- classification, Molisch's test of carbohydrate, Glucose & fructose: Preparation & properties, open & Ring structure of glucose mutarotation, Annomers.

b- Proteins: Alpha Amino acids, peptide bond, polypeptide, protein, structure of protein- Primary, secondry & tertiary structure, denaturation of proteins, Zwitter ion, Iso electric points;

c- Lipids & harmones;

oil & fats introducation, difference between oil & fats properties.

steroids- Natural & Artifical steroid Harmones- classification & physiological function

d- Vitamins- classification & functions deficiencey diseases of vitamins

e- Nucleic acids-

Nucleotides & nucleosides, Difference between DNA and RNA primay structure of DNA DNA finger printing

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(addition & condensation) addition polymers-polythene, Teflon, PVC buna-s, Buna-N condensation polymer-Nylon 6, Nylon 6,6, backelite, methyl melamine, Biodegradable & non biodegradable polymers

12- Chemistry in everyday life:-

a- chemicals in medicine:- Analgesic, tranquilizers, Antiseptics, Disinfectant, antimicrobials, antibiotics, antacids, antihistamins. antioxidants

b- chemicals in foods: food preservative, artificxal sweetening agent,

c- cleansing agents-difference between soaps & detergents cleansing action of Soaps.