

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.

F. Y. B.Sc. Chemistry - Paper – I Semester- I

Effective from June 2011

Total Hrs. 45

UNIT – I (Inorganic Chemistry)

TOPIC I : PERIODIC PROPERTIES

Definition of atomic and ionic radii, ionization energy, electron affinity and electron negativity, S block elements : Comparative study, diagonal relationship, salient features of hydrides, solvation and complexation and tendencies including their function in biosystems.

TOPIC II : VANADIUM

Extraction of Vanadium from carnotite and patronite ores, its properties and uses, Preparation and uses of V_2O_5 .

UNIT – II (Organic Chemistry)

Topic – 1 : Empirical formula . Molecular formula , and Structural formula: .

Determination of empirical formula and its relation with molecular formula determination of molecular weight of (a) organic acid by titration and silver salt method and (b) organic base by chloroplatinate method and its limitations . Determination of molecular formula of gaseous Hydrocarbons by Explosion method , Numerical example.

Topic – 2 : Stereochemistry

- (a) Isomerism :- Optical activity , Chiral and achiral molecules,
- (b) Optical isomerism of tartaric acid, Enantiomers, diastereomers (Threo & Erythro), Meso compounds Resolution of Enantiomers, inversion retention and racemization .
- (c) Geometrical Isomerism: Alkene derivative & oximes E & Z system of nomenclature .
- (d) Relative and absolute configuration, sequence rules. D & L and R & S system of nomenclature.

UNIT – III (Physical Chemistry)

TOPIC I : CHEMICAL KINETICS

- A. Chemical kinetics and its scope, rate of reaction, factors affecting rate of reaction: temperature, concentration, pressure, solvent, light and catalyst, Molecularity of reaction, Classification of chemical reaction, Order of reaction with illustration (first order, second order, third order, zero order, pseudo first order) reaction, : Second order ($a=b$), half life and mean life.
- B. Methods of determining the reaction rate: differential method- integration method- half life period method- isolation method- graphical method, Radioactive decay as first order phenomenon ; Conductometry method for determination of reaction rate constant(with example of saponification of ethyl acetate) , Numericals

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F. Y. B.Sc. Chemistry - Paper – II Semester- I

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UNIT – I (Inorganic Chemistry)

TOPIC I : SOLVENT EXTRACTION

Basic principle of solvent extraction, Classification of extraction, Mechanism of extraction, Techniques of extraction, Application of solvent extraction

TOPIC II : NOBLE GASES

Chemistry of noble gases, chemistry of xenon, structure and bonding in xenon compounds.

UNIT – II (Organic Chemistry)

Topic – 1 : Alkanes and Cycloalkanes :

- Alkanes : nomenclature, sources, methods of formation with special reference to Wurtz reaction, Kolbe reaction and decarboxylation of carboxylic acids. Physical properties and chemical reactions.
- Cycloalkanes : nomenclature, methods of formation chemical reactions, Baeyer's strain theory and its limitations, Theory of strainless ring.

Topic – 2 : Heterocyclic compounds :

Nomenclature aromaticity , and synthesis properties uses and canonical structures of Pyridine, Pyrrol, uran , Thiophene .

Topic – 3 : Polynuclear Hydrocarbons :

Classification aromaticity and synthesis of industrial preparation , properties uses and canonical structures of Napthalene , Anthracene and Phenanthene.

UNIT – III (Physical Chemistry)

TOPIC I : SOLID STATE

Definition of space lattice, unit cell, difference between crystalline and amorphous state, types of crystals with illustrations, law of crystallography. Steno's law and laws of symmetry, lattice planes, Miller indices, Bravais indices, type of cubic systems, diagrammatic representation of cubic systems and d_{100} , d_{110} and d_{111} planes, Bragg's equation (X-ray diffraction), Crystal structure of NaCl, KCl.

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F. Y. B.Sc. Chemistry Practical

Semester- I

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INORGANIC QUALITATIVE ANALYSIS

LIST OF INORGANIC CHEMICALS

CHLORIDES- Cu^{+2} , Fe^{+3} , Mn^{+2} , Co^{+2} , Ni^{+2} , Ca^{+2} , Ba^{+2} , Sr^{+2} , Na^{+1} , K^{+1} , NH_4^{+1} .

BROMIDES- Sr^{+2} , Na^{+1} , K^{+1} , NH_4^{+1} .

IODIDE – K^{+1}

NITRATE – Pb^{+2} , Co^{+2} , Ni^{+2} , Ba^{+2} , Sr^{+2} , Na^{+1} , K^{+1} , NH_4^{+1}

SULPHIDE – Zn^{+2} , Sb^{+3}

SULPHATE – Cu^{+2} , Al^{+3} , Fe^{+2} , Zn^{+2} , Mn^{+2} , Co^{+2} , Ni^{+2} , Mg^{+2} , Na^{+1} , K^{+1} , NH_4^{+1}

CHROMATE – Na^{+1} , K^{+1}

CARBONATE – Cu^{+2} , Zn^{+2} , Mn^{+2} , Co^{+2} , Ni^{+2} , Ca^{+2} , Ba^{+2} , Sr^{+2} , Mg^{+2} , Na^{+1} , K^{+1} , NH_4^{+1}

PHOSPHATE - Cu^{+2} , Al^{+3} , Fe^{+3} , Zn^{+2} , Mn^{+2} , Ca^{+2} , Ba^{+2} , Sr^{+2} , Mg^{+2} , Na^{+1} , K^{+1} ,
 NH_4^{+1}

OXIDE – As^{+3} , Sb^{+3} , Zn^{+2}

N. B. Candidate should perform the analysis of at least 10 compounds.

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F. Y. B.Sc. Chemistry - Paper – I Semester- II

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UNIT – I (Inorganic Chemistry)

TOPIC I : CO-ORDINATION CHEMISTRY

Shape of d-orbitals, Crystal Fields theory - Basic assumption, splitting of d-orbitals in octahedral, tetrahedral and square planar complexes, Definition of CFSE.

TOPIC III : FERTILIZERS

Definition and classification of fertilizer, Direct and indirect fertilizer, natural and synthetic fertilizers, symptoms of deficiency of some elements like N, P, and K. Industrial preparation of :

- (i) Urea from natural gas
- (ii) Single and triple super phosphate of lime .
- (iii) Ammonium sulphate

Hazardous effect of uses of fertilizers and its preventive measures, Mixed fertilizers, complex fertilizers, Fertilizer grade, Fertilizer ratio, fertilizer condition, Fertilizer filler.

UNIT – II (Organic Chemistry)

Topic - 1: Reaction mechanism :

- (a) Homolytic and Heterolytic fission free radicals carbonium ions (carbocations) and carbanions reactive intermediates carbenes , arynes and nitrenes.
- (b) Types of reagents, electrophiles nucleophiles .
- (c) Electromeric, inductive, conjugative effect.
- (d) Types of reactions : Addition, substitution, elimination, rearrangements. Addition, and substitution with respect to electrophilic and nucleophilic, SN_1 SN_2
- (e) Mechanism of (i) addition reaction to alkenes and dienes (ii) substitution in benzene ring nitration , sulfonation, alkylation , acylation , halogenation., cyanohydrin formation and acetal formation,
- (f) Mechanism of Perkin reaction, Hoffman bromamide and Cannizzaro's reaction.

Topic – 2 : IUPAC nomenclature of organic compounds :

UNIT – III (Physical Chemistry)

TOPIC I : CONDUCTANCE AND IONIC EQUILIBRIA

Electrical conductance, specific conductance, equivalent conductance and molar conductance, effect of dilution on concentration, cell constant and its determination, Ostwald's dilution law and its limitations, buffer solutions, acid and basic buffer actions, buffer capacity, relation between pH of acid and basic buffer and concentration of their component, Numericals.

TOPIC II : THERMODYNAMICS

Second law of thermodynamics (in detail), Carnot cycle and its efficiency, Entropy concept : Change of entropy for reversible, isothermic, isobaric and isochoric processes. Entropy change for ideal gases, Numericals.

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UNIT – I (Inorganic Chemistry)

TOPIC I : CHEMICAL BONDING

Molecular Orbital theory ; LCAO method, Bonding molecular orbital, anti Bonding molecular orbital and nonbonding molecular orbital, bond order, magnetic properties and molecular orbital energy level diagram of Heterodiatomic molecules : CO and NO, VSEPR theory.

TOPIC II : SILVER

Extraction of silver from Argentiferrous ore by cyanide ,pattinson and cupellation process, Purification of silver by Electrolysis, Hypo and Zirvogel's process, its properties and uses, Electroplating of silver and photography.

UNIT – II (Organic Chemistry)

Topic – 1 : Alkenes, dienes and alkynes :

- Alkenes : Nomenclature, method of preparation, properties and uses of ethylene and propylene Morkwonikoffs rule and Satytzeff rule, polymerization of ethylene styrene and vinyl chloride.
- Dienes : nomenclature, classification of dienes methods of formation of Butadiene chemical reactions 1,2 and 1,4 additions, Diel's – Aider reaction.
- Alkynes : nomenclature , methods of fonnation, chemical reactions, electrophilic and nucleophilic addition reactions if acetylene.

Topic – 2 : Oils and fats :

Natural fats, edible and industrial oils of vegetable origin, common fatty acids.Glycerides saponification determination of saponification value, acid value and iodine value of and oil.

Topic – 3 : Carbohydrates :

Definition and classification structure of D – glucose and D – fructose Conversion of glucose to fructose and fructose to glucose.

UNIT – III (Physical Chemistry)

TOPIC I : PHYSICAL PROPERTIES AND CHEMICAL CONSTITUTION

- Classification of physical properties,(additive, constitutive, colligative, additive constitutive), atomic volume, molar volume and chemical constitution Kopp's law, Surface tension, drop number method , parachor, Viscosity , determination of viscosity – Ostwald viscometer method viscosity and chemical constitution.
- Refractive index, measurement of refractive index, refractive index and chemical constitution (specific refraction and molar refraction), Optical activity, optical activity and chemical constitution ,polarimeter, specific rotation, Dipole moment and molecular structure, Numericals.

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F. Y. B.Sc. Chemistry Practical

Semester- II

Effective from June 2011

VOLUMETRIC EXERCISE

HNO_3	$NaOH$	$H_2C_2O_4, 2H_2O$
H_2SO_4	$NaHCO_3$	HNO_3
$NaOH + Na_2CO_3$	HCl	
$Na_2CO_3 + NaHCO_3$	H_2SO_4	
$KMnO_4$	$H_2C_2O_4 + H_2SO_4$	$NaOH$
$KMnO_4$	$H_2C_2O_4$	KOH
$KMnO_4$	$FeSO_4$	$K_2Cr_2O_7$
$K_2Cr_2O_7$	$Fe-NH_4-SO_4$	$KMnO_4$
$H_2C_2O_4$	$KMnO_4$	$FeSO_4$
I_2	$Na_2S_2O_3$	$K_2Cr_2O_7$

N. B. Candidate should perform at least 6 volumetric exercises.

ORGANIC SPOTTING

Primary tests, Ignition test, Detection of Elements, Nature of the substance (solubility test), Functional group tests, C. T., Molecular formula, Structural formula & M. P./ B. P. of the given substance.

ACID – Benzoic, Phthalic acid, Succinic acid.

BASE – Aniline, p – Toluidine

PHENOL – Phenol, Resorcinol,

NEUTRAL –

CARBOHYDRATE – Glucose, Fructose

KETONE – Acetone, Acetophenone

ESTER – Methyl salicylate, Methylacetate

ALCOHOL – Methanol, Ethanol

HYDROCARBON – Benzene, Toluene, p-Xylene

NITRO HYDROCARBON – Nitrobenzene, m-di-nitrobenzene

HALOGENATED HYDROCARBON – Carbon tetrachloride, Chlorobenzene,

AMIDE – Urea

ANILIDE – Acetanilide

N. B. Candidate should perform the analysis of at least 10 substances.