

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.

F. Y. B.Sc.

Chemistry

Paper - I

Phy. and Inor.

70 MARKS (EXTERNAL)

Effective from July - 2006

TOTAL : 60 HOURS

UNIT - I

TOPIC I : CHEMICAL KINETICS

(7 HRS.)

Chemical kinetics and its scope, rate of reaction, factors affecting rate of reaction: temperature, concentration, pressure, solvent, light and catalyst, Characteristics of simple chemical reaction : Second order (a=b), half life and mean life, Radio active decay as first order phenomenon Experimental method of Chemical kinetics; Conductometry, Numericals

TOPIC II : CONDUCTANCE AND IONIC EQUILIBRIA

(5 HRS.)

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.

UNIT - II

TOPIC I : PHYSICAL PROPERTIES AND CHEMICAL CONSTITUTION (6 HRS.)

Classification of physical properties, atomic volume, molar volume, surface tension, parachor, specific refraction, molar refraction, dipolemoment, specific rotation, viscosity and their application in determining chemical - constitution, Numericals.

TOPIC II : THERMODYNAMICS

(6 HRS.)

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

UNIT - III

TOPIC I : SOLID STATE

(6 HRS.)

Definition of space lattice, unit cell, difference between crystalline and amorphous state, types of crystals with illustrations, law of crystallography. Steno's law and law of constancy of symmetry, lattice planes, Miller 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)

TOPIC II CHEMICAL BONDING

(6 HRS.)

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.

UNIT - IV

TOPIC I : PERIODIC PROPERTIES

(6 HRS.)

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 : SILVER

(3 HRS.)

Extraction of silver from Argentiferous 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.

TOPIC III : NOBLE GASES

(3 HRS.)

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

UNIT V

TOPIC I : CO-ORDINATION CHEMISTRY (4 HRS.)

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

TOPIC II : VANADIUM (3 HRS.)

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

TOPIC III : FERTILIZERS (5 HRS.)

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.

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F. Y. B.Sc.

Chemistry

Paper - II

Organic

Effective from July 2006

70 Mark (External)

30 Mark (Internal)

Total 60 Hrs.

Time 3 Hrs. (Uni. Exam)

UNIT - I

Topic – 1 : Empirical formula . Molecular formula , and Structural formula: 4 Hrs.

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 : 8 Hrs.

- (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 & Land R & S system of nomenclature.

UNIT – II

Topic - 1: Reaction mechanism : 9 Hrs.

- (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, SN₁ SN₂
- (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 : 3 Hrs.

UNIT – III

Topic – 1 : Alkanes and Cycloalkanes : **5 Hrs**

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

Topic – 2 : Heterocyclic compounds : **4 Hrs**

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

Topic – 3 : Polynuclear Hydrocarbons : **3 Hrs.**

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

UNIT IV

Topic – 1 : Alkenes, dienes and alkynes : **7 Hrs.**

- (a) Alkenes : Nomenclature, method of preparation, properties and uses of ethylene and propylene Markovnikov's rule and Saytzeff rule, polymerization of ethylene styrene and vinyl chloride.
- (b) Dienes : nomenclature, classification of dienes methods of formation of Butadiene chemical reactions 1,2 and 1,4 additions, Diels – Alder reaction.
- (c) Alkynes : nomenclature , methods of formation, chemical reactions, electrophilic and nucleophilic addition reactions of acetylene.

Topic – 2 : Oils and fats : **2 Hrs.**

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 : **3 Hrs.**

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

UNIT – V

Topic – 1 : Arenes : **3 Hrs.**

Method of preparation of benzene, toluene, xylene from petroleum and chemical reaction, Activating and Deactivating substituents , orientation. Ortho/ Para ratio, method of formation chemical reactions and application of styrene.

Topic – 2 : INSECTICIDES : **2 Hrs.**

Preparation and uses of DDT, BHC, Methoxychlor 2:4 D.

Topic – 3 : **7 Hrs.**

- (A) Method of preparation , chemical reactions and application of Following :
Ethanol , Resorcinol, Diethyl ether, Acetone, Anthranilic acid, Citric acid and Acetamide
- (B) Problem based on different reactions.

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F. Y. B.Sc.

Chemistry

Paper - II

**Chemistry Practical
(Effective from 23/10/2002)**

56 Marks (External)

24 Marks (Internal)

Time 4 Hrs. (Uni. Exam)

INORGANIC QUALITATIVE ANALYSIS (20 MARKS)

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 15 compounds.

VOLUMETRIC EXERCISE 20 MARKS

HNO₃	NaOH	H₂C₂O₄, 2H₂O
H₂SO₄	NaHCO₃	HNO₃
NaOH + Na₂CO₃	HCl	
Na₂CO₃ + NaHCO₃	H₂SO₄	
KMnO₄	H₂C₂O₄ + H₂SO₄	NaOH
KMnO₄	H₂C₂O₄	KOH
KMnO₄	FeSO₄	K₂Cr₂O₇
K₂Cr₂O₇	Fe-NH₄-SO₄	KMnO₄
H₂C₂O₄	KMnO₄	FeSO₄
I₂	Na₂S₂O₃	K₂Cr₂O₇

N. B. Candidate should perform at least 7 volumetric exercises.

ORGANIC SPOTTING 16 MARKS

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 12 substances.

The following exercises should not be asked in the university examination

- 1. Preparation of standard solutions; KMnO_4 , $\text{K}_2\text{Cr}_2\text{O}_7$, $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$, $\text{Na}_2\text{S}_2\text{O}_3$, Succinic acid**
- 2. Calibration of Burette 25 ml., Pipette 10 ml.**