VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

Syllabus 2012

S.Y.B.Sc., CBCS SEMESTER III & IV

CHEMISTRY THEORY

Paper-III - - - INORGANIC CHEMISTRY

Paper-IV - - - ORGANIC CHEMISRTRY

Paper V - - - PHYSICAL CHEMISTRY

CHEMISTRY PRACTICALS

Based on Theory

Paper-III

Paper-IV

Paper- V

Veer-Narmad South Gujarat University, Surat

S.Y.B.Sc. SEMISTER-III

Chemistry

Paper-III [Inorganic Chemistry]

(syllabus - 2012)

50 Marks (External) **Total = 30 Hrs.**

20 Marks (Internal) **Time: 2 Hrs. (Uni. Exam.)**

UNIT - I

Topic - 1 Chemistry of Elements of first transition series: **[6 Hrs.]**

Characteristic properties of d-block elements, properties of the elements of the first transition series, their binary compounds and complexes illustrating relative stability of their oxidation states.

Topic - 2 Electronic Configuration of atom ; L-S coupling : **[4 Hrs.]**

Introduction, L-S coupling, J-J coupling (introduction), Term Symbol,

Determination of microstate of P^2 ,P^3 system.

Term Symbol of C, N, O, Ni, Ni^{+2}, Fe, Fe^{2+}, Fe^{3+}, Cr, Cr^{3+} and Co^{2+}, V, V^{+3}, Cl. -

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Topic - 1 Purification of Water: **[5 Hrs.]**

- Different methods of purification of water for potable and industrial purposes.
- Soft and hard water.
- Desalination of sea water by reverse osmosis and electro dialysis

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Topic - 2

Paper Chromatography: **[5 Hrs.]**

- Principle, chromatography
- Classification of chromatography according to mobile phase and stationary phase.
- Types of paper chromatography, one dimensional, two dimensional and radial paper

chromatography, Rf value, Use of paper chromatography in Inorganic analysis (I, IIA, IIIB, IV and halides)

UNIT - III

Topic - 1

Quantum Mechanics: **[10 Hrs.]**

(A) Derivation of the time independent Schrodinger equation, wave function and probability function, well behaved wave function.

Particle in one - dimensional box and its importance.

(B) Operators (definition and derivation), Linear Operators, Commutator Operators, Vector Operators, Laplacian Operators, Hamiltonian Operators, Hermition Operators.

Derivation of Hamiltonian equation, Hamiltonian Operators for H-atom H^{2+}, He^{2+} and Li.

Reference Books:

1. Introductory Quantum Chemistry by A. K. Chandra, Tata Mc. Graw Hill Delhi.
2. Atomic Structure and Chemical Bond by Manos Chandra, Tata Mc. Graw Hill Pub. Co. Ltd.
3. Theoretical Inorganic Chemistry by M. C. Day & J. Selbin Affiliated, East West Pub. Pvt. Ltd.
4. Coordination Compounds (Studies in Modern Chemistry) S. F. A. Kettle, Nelson.
5. Inorganic Chemistry by (Principles of Structure and Reactivity) James E. Huhely, Harper International (NY).
6. Inorganic Chemistry by R. B. Heslop and P. L. Robinson Elsevier Pub. Co. NY.
7. Physical Methods Inorganic Chemistry by R. S. Drago, W.B.S. Saunders Co. London, Reinhold Pub. Co. NY.
8. Basic Concepts of Analytical Chemistry by S. M. Khopkar, Wiely Estern Ltd. New Delhi.
9. Quantitative Analysis Day & Underwood Prentice Hall of India, Pvt. Ltd.
10. Instrumental Method of Analysis B. K. Sharma, Krishna Pub. House, Merrut.
11. Principles of Inorganic Chemistry (Puri, Sharma, Kalia).
12. Enviornmental Chemistry, By S. K. Banerji. Prentice Hall India Pvt. Ltd.
13. Progressive Inorganic Chemistry, Suratkar, Thatte, Pandit, Ideal Book Service, Poona.
14. Advanced Inorganic Chemistry Vol. I & II by Gurudeep Raj, Goel Pub. House, Meerut.
15. Quantum Chemistry Ir. N. Levine, Prentice Hall.
16. Advanced Inorganic Chemistry by Cotton & Wilkinson John Wihn Wiely.
17. Introduction to Chromatography Theory and Practice by V. K. Srivastava and K. K. Srivastava - S. Chand Pub.
18. Environmental Chemistry by. A. K. De.
19. Industrial Chemistry by B. K. Sharma

Veer-Narmad South Gujarat University, Surat
S.Y.B.Sc. SEMESTER-III
Chemistry
Paper-IV [Organic Chemistry]
(syllabus - 2012)

50 Marks (External) **Total = 30 Hrs.**
20 Marks (Internal) **Time : 2 Hrs.**
(Uni. Exam.)

UNIT - I

Topic - 1

The General nature, Reaction mechanism of applications of following reaction : **[7 Hrs.]**

(1) Michael reaction
(2) Wolf-Kishner reduction
(3) Wittig reaction
(4) Fridel-Craft reaction
(5) Mannich reaction
(6) Benzoin reaction (condensation)
(7) Reimer-Tiemann reaction
(8) Aldol Condensation.

Topic – 2

Elimination Reaction : **[3 Hrs.]**

Beta-elimination, E_2 mechanism, E_1 mechanism , stereo chemistry of elimination reactions, elimination Vs substitution. Alpha elimination: Generation of carbenes and ketenes.

UNIT - II

Topic - 1

Heterocyclic Compound : [5 Hrs.]

Classification and nomenclature.

(a) Benzopyrrole (Indole) : Occurence, synthesis (Fischer Indole synthesis, Reissert synthesis), Electrophilic substitution (nitration, sulfonation, halogenation) reactions. Gattermann reaction Riemer Tiemann reaction, Mannich reaction.

(b) Benzofuran (Coumarone) : Occurence, synthesis, substitution reactions (nitration, sulfonation, halogenation, acylation) reduction, reactions with ozone and sodium.

(c) Benzothiophene (thionaphthene) occurence, synthesis, substitution reactions (nitration, sulfonation, bromination acylation, chloromethylation), reactions with phenyl lithium, carbon dioxide diazodiacetate, sodium and other sulfur, Raneynickel.

(d) Quinoline : Synthesis (Skraup's synthesis) reduction and oxidation of Quinoline, electrophilic substitution reactions, nitration sulfonation, halogenation, Friedel Crafft's reaction and nucleophilic substitution reactions.

(e) Isoquinoline : Synthesis (Bichler-Naieralsky reaction) electrophilic and nucleophilic reactions, oxidation and reduction reactions of isoquinoline.

Topic-2

Polycyclic Aromatic Hydrocarbons : [5 Hrs.]

Classification and nomenclature.

(a) linear orthofused polycyclic hydrocarbons : Occurence, synthesis of tetracene, pentancene and hexacene.

(b) Nonlinear orthofused polycyclic hydrocarbons Occurrence synthesis of 1, 2 - benzanthrancene, 1, 2, 5, 6- dibenzanthracere, 1, 2- benzphenanthrence.

(c) ortho and perifused polycyclic hydrocarbons Occurrence and synthesis of pyrene, perylene and coronene.

(d) carcinogenic properties of polyclic hydrocarbons.

UNIT - III

Topic - 1

Carbohydrates : [5 Hrs.]

(a) Determination of configuration of D (+) glucose D (–) fructose - method of ascending and descending sugar series.
(b) Objections against open chain structure of D (+) glucose & D (–) fructose-ring structure of them, determination of size of the ring of glucose and fructose.
(c) Methods of methylating sugars.

Topic-2

Compound Containing Reactive Methylene Group : [5 Hrs.]

(a) Malonic ester : preparation from acetic acid and its synthetic applications(n-butiric acid, n- caproic acid, succinic acid, adipic acid cinnamic acid, barbituric acid).
(b) Acetoacetic ester (ethylacetoacetate) preparation and synthetic applications(butanone, 1,3 and 1,4 diketone, alicyclic compound).
(c) Keto-enol tautomerism : factors affecting Keto-enol tautomerism and its mechanism.

Reference Books :

(1) Organic Chemistry by R. T. Morison and R. N. Boyd, Prentice Hall India.
(2) Organic Chemistry Vol. I & II by I. L. Finar.
(3) Organic Chemistry Vol. I & II by B. K. Sharma & S. K. Sharma Goel Pub. House, Merrut.
(4) Reaction and Reagents In Organic Synthesis by O. P. Agrawal Goel Pub. House, Merrut.
(5) Organic Chemistry by S. H. Pine.
(6) Reaction Mechanism In Organic Chemistry S. M. Mukharji & S. P. Singh.
(7) Organic Chemistry by L. G. Wade Jr. Prentice Hall.

Veer Narmad South Gujarat University, Surat

Second Year B.Sc : Semester-III

Chemistry : Paper-V[PHYSICAL CHEMISTRY]

Syllabus

50 Marks (External) **Total = 30 Hrs.**
20 Marks (Internal) **Time : 2 Hrs.**
(Uni. Exam.)

Unit-I

[A] THEORIES OF REACTION RATE [4 Hour]

Derivation of Arthenius equation.

Collision theory of reaction rate,Energy of activation including determination, effect of catalysis on energy of activation.

Numerical Problems

[B] PHOTOCHEMISTRY [6 Hour]

Introduction to photochemistry, Basics of electromagnetic radiations, photons, Thermal and Photochemical Laws

(a) Grothus Draper's Law
(b) Lambert Beer's Law
(c) Einstein's Law of photochemical equivalence. Quantum yield or efficiency. Experimental determination of Quantum yields. Reasons of Low and high quantum yield.
Primary and secondary photochemical reactions. Factors affecting quantum yield.(i.e..temperature, light intensity and inert gases).

Isomeric changes, polymerization, Photosensitization, Photophysical processes [Fluorescence, Phosphorescence] Chemiluminescene. Factor affecting Fluorescence, Phosphorescence

Numerical Problems

Unit II

ELECTROLYTES OR ELECTRO CHEMISTRY [10 Hour]

Ions in solutions, formation of ion in solution metallic conductance, Electrolytic conductance, electrolysis Migration of ions, Transport number of ions and its Determination by moving boundry method.

Kohlraush law of ionic conductance. Application of Kohlraush law to

(a) Determination of degree of dissociation of weak electrolyte.
(b) Determination of equivalent conductivity of weak electrolyte at infinite diluation.
(c) Determination of solubility and solubility product of sparingly soluble salts.
(d) Determination of ionic product of water.

Numerical Problems

Unit III

MOLECULAR SPECTROSCOPY [10 Hour]

Electromagnetic radiation with wavelength and energy. Radio frequency, Microwave, IR, UV/visible region,

Pure rotational spectra, Vibrational and Vibrational-Rotational spectra, Raman spectra.

Rotational spectra, calculation of bond-length. Vibrational rotational spectra, Hook's law, vibrational energy level.

Numerical Problems.

References:

1. Physical Chemistry by Gurdeep Raj.
2. Physical Chemistry by K.L.Kapoor Vol.-I to IV. [Pub.Macmilan]
3. Advanced Physical Chemistry by D.N.Bajpai.
4. Text book of Physical Chemistry by S.C.Khetarpal & Yogeshwar Sharma. [Pub. R-Chand]
5. Physical Chemistry by Puri & Sharma [S. Nagin & Co.]
6. A Text Book of Physical Chemistry by A.S.Negi & Anand [New Age International]
7. Physical Chemistry by P.L.Soni & O.P.Dharmraj.
8. Physical Chemistry by B.K.Sharma.
9. Essential of Physical Chemistry by Bahl Tuli & Bahl.
10. Elemental Physical Chemistry by Glasston & Lewis.
11. Physical Chemistry by K.K. Sharma, L.K.Sharma [Vikas Publication House, New Delhi]

Veer Narmad South Gujarat University, Surat

S.Y.B.Sc. CHEMISTRY : Semester III & IV

Marks Distribution

Paper	External Marks	Internal Marks	Total Marks
Paper-III	50	20	70
Paper-IV	50	20	70
Paper-V	50	20	70
Practical	60	30	90
			300

Internal Marks Distribution :

Exam Type	Test	Assignment/ Journal (5%)	Presence (5%)	Total Marks
Theory	40	10	10	60
Practical	22	4	4	30

Veer Narmad South Gujarat University
B. Sc. Semester - III
New Syllabus in Chemistry
Industrial Chemistry
Generic Elective Course
(Effective from June-2012)
Total 45 Hrs

Unit-I

A. Synthetic fibers with flowsheet diagram: (15 hrs)
(1) Coprolactam, Nylone-6 (2) HMDA, Adipic acid, Nylone-66 (3) Nylone-12

(4) Tetrafluoroethylene, Teflon (5) Nylone-6, 10 (6) DMT Ethylene Glycol, Terylene

B. Synthetic Rubber with Flowsheet diagram:

(1) Butadiene, Styrene, Buna-S (2) Acrylonitrille, Buna-N (3) Chloroprene Neoprene

(4) Isoprene, Polyisoprene (5) Silicone Rubber (6) Poly Urethane Rubber

C. Plastics and Resins with flowsheet diagram:

(1) Ureaformaldehyde resin, Bakelite(2) Vinyl Chloride ,PVC (3) Vinyl alcohol, Poly vinyl alcohol

(4) Melamine and melamine resin (5) Bis Phenol A, Epoxy Resin (6) Propylene Polypropylene

Unit-II

A) Insecticides: (15 hrs)

(1) D.D.T (2) B.H.C (3) 2,4-D (4) 2,4,5-T (5) Aldrin (6) Malathion (7) MCPA

B) Detergents:

(1) Propyleneteramer (2) ABS (3) LAS
(4) Isoprene, Polyisoprene (5) Silicone Rubber (6) Poly Urethane Rubber

C) Explosive:

(1) RDX (2) Nitrocellulose (3) Glyceryl trinitrate (4) Trinitro Phenol(5) TNT(6) Ammitol

Unit-III

A) Synthetic drugs with flowsheet diagram: (15 hrs)

(1) Novacaine (2) Noavlgin (3) Paludrine (4) Paracetamol (5) Sulphathizaole
(6) Benadryl (Diphenyl Hydramine)

B) Synthetic dyes with flowsheet diagram:

(1) 3-Phenyl, 7-methoxy coumarine (2) Blankophore-B (3) Erichrome Black T
(4) Eosin (5) Alizarine(6) Indannthrene Khaki GG

C) Synthetic Perfume:

(1) Coumarin (2) Vanilline (3) Muskxylene (4) Muskketone (5) Musk Ambrette

D) Phenol:
(1) Rashing process (2) Cumene process (3) Dow-Toluene air oxidation process

E) Acetylene

(1) Wulff Process (2) Sachsse Process