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-IV

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 Lanthanide and Actinide Elements : [10 Hrs.]

(A) Lanthanide and Actinide Elements, Electronic configuration, Sources.

• Occurrence, Extraction by solvent and ion exchange, Properties (Spectral and Magnetic).

(B)• Lanthanide contraction, Use of Lanthanide compounds.

• Industrial use Uranium and Plutonium, Misch metal.

UNIT-II

Topic-I

Hydrogen Bonding : [5 Hrs.]

Theory of hydrogen bonding, classification, importance of hydrogen bonding in ice,

Effect of hydrogen bonding in various fields.

Topic-II **Theory of Bonding in Metal Complexes:**
[5 Hrs.]

• Theory of bonding in metal complexes (CFT)

• CFSE and its calculations.

• Factors affecting.

• Application of CFT (1) Magnetic Properties

(2) Spectral Properties

UNIT-III

Topic-I

Ion-exchange chromatography: [6 Hrs.]

• Synthesis and Characterization of ion exchanger, Basic requirements of ion exchange resin. Types of ion-exchange resin.

• Technique of ion exchange, Application of ion exchange for Separation.

Topic -II

Bio-Inorganic: Role of metal complexes in Biological systems : [4 Hrs.]

• Introduction, Role of metal ion in different biological processes, Essential, beneficial and toxic metals, Metallo - Porphyrins, Hemoglobin - as Carrier of O_2 and as Carrier of CO_2.

• Myglobin,Chlorophyll.

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-IV
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

Diazonium Salts : **[4 Hrs.]**

(a) Mechanism of dizotisation, reagents for checking completion of diazotisation.
(b) Nomenclature of Diazonium salts.
(c) Reactions of Diazonium salts, replacement reactions in which nitrogen is eliminated, its application in the synthesis of aromatic compounds, reaction in which nitrogen atom are retained.
(d) Laws of coupling, coupling agents, synthesis of diazomino and aminizo compounds.

Topic-2

Organic nitrogen compounds : **[6 Hrs.]**

(a) Preparation and physical properties and chemical reactions of nitriles, isonitriles, carbamates, semi carbazides and their application in synthetic organic chemistry.
(b) Structure and nomenclature of amines, preparation of aryl amines, physical properties and chemical reactions. Gabriel-pthalimide reaction, Hofmann Bromamide reaction.

UNIT – II

Topic – 1

Carboxylic acid and its derivatives: **[4 Hrs.]**

Structure and nomenclature of acid chloride, ester, amides of monocarboxylic acid; method of formation of monocarboxylic acid derivatives and chemical reactions.

Topic-2

(A) Vitamins and Hormones : **[3 Hrs.]**

Their definitions, classification, analytical and synthetic evidences to prove the structure of Ascorbic acid and Adrenaline

(B) Use of Reagents : **[3 Hrs.]**

(a) Anhydrous aluminium chloride
(b) NBS
(c) Grignard reagents
(d) Lithium aluminium hydride

UNIT – III

Topic - 1

Organic Sulfur Compound : **[4 Hrs.]**

(a) Aliphatic sulfur compounds : nomenclature, general methods of preparation and reaction of mercaptans, thioethers, sulfinic and sulfonic acid.
(b) Aromatic sulfonic acid : nomenclature, preparation, reactions and uses of sulfonic acids of toluene.

Topic - 2

Electromagnetic Spectrum **[6 Hrs.]**

UV and visible spectroscopy, ultraviolet absorption spectroscopy, absorption laws (Beer-Lambert law) terminology used in UV and visible spectra, molar absorptivity, types of electronic transitions, effect of conjugation, concept of Chromophore and Auxochrome and Hypsochromic shifts UV spectra of conjugated enes and enones, effect of solvent substitution on electronic transition. Problems based on calculation of λ max for conjugated dienes and unsaturated carbonyl compounds and substituted Benzene derivatives using relevant rule.

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. P

Veer Narmad South Gujarat University, Surat

Second Year B. Sc. : Semester-IV

Chemistry : Papeer-V[PHYSICAL CHEMISTRY]

Syllabus

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

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

(Uni. Exam.)

Unit-I

[A] PARTITION CO-EFFICIENT **[4 Hour]**

Explanation of Nernst distribution law and its conditions for the validity.

Complications arising in distribution law:

(a) Association of solute in one of the phases.
(b) Dissociation of solute in one of the phases.
(c) Dissociation of solute in both the phase.

Derivation of distribution law from Kinetic Consideration explanation of solvent extraction process.

Numerical Problems

[B] ADSORPTION **[6 Hour]**

Adsorption and Absorption , Heat of adsorption, Characteristics of adsorption, Physical adsorption and Chemical Adsorption.

Distinction between physical adsorption and chemical adsorption. Freundlich's adsorption isotherm, Langmuir's adsorption isotherm. Catalysis, General features of catalysis.

Heterogeneous catalysis, Adsorption theory of catalysis.

Unit II

THERMODYNAMICS : [10 Hour]

1. Free energy or work function [Gibbs free energy (G) and Helmholtz free energy (A)]

Derivation of $G=G^0+ RT \ln p$. Relation of ΔG and equilibrium constant KP (Vant Hoff isotherm)

Derivation of Clapeyron and Clapeyron- Clausius equation.

Application of Clapeyron – Clausius equation in the derivation of Molal elevation constant & Molal depression constant.

Numerical Problems

Unit III

[A] CONDUCTOMETRIC TITRATIONS : [5 Hour]

Principle, Types of conductometric titrations

(a) Strong acid V/s strong base
(b) Strong acid V/s weak base
(c) Weak acid V/s strong base
(d) Weak acid V/s weak base
(e) Mixture of strong acid and weak acid V/s strong base
(f) Precipitation titration s of
(i) $BaCl_2$ V/s K_2CrO_4 (ii) NaCl V/s $AgNO_3$

Advantages of conductometric titrations over indicator method.

[B] IONIC EQUILIBRIA [5 Hour]

Relation between degree of hydrolysis, Hydrolysis constant and pH of solutions of

(a) Salts of weak acid and strong base
(b) Salts of strong acid and weak base
(c) Salts of weak acid and weak base

Theories of acid-base indicators. Oswald and Quinonoid theories, choice of indicators, indicator exponent and useful range of pH of an indicator.

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 IV
New Syllabus in Chemistry
Industrial Chemistry
Generic Elective Course
(Effective from June-2012) Total-45 Hrs.

Unit-I

A. Inorganic Chemicals : (15 hrs)
(1) Red Phosphorus (2) Sodium hexametaphosphate(3) PCl_5

(4) Phosphoric acid

B. Lime, Cement and Refractories

C. Industrial Preparation and used of

(1) Potassium permanganate(2) Potassium dichromate (3)Titanium dioxide

(4) Bleaching powder by Bachmann's method (5) White lead by dutch method

Unit-II

A) Fertilizers: (15 hrs)

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

a. Urea from natural gas
b. Single and triple super phosphate of lime
c. Ammonium sulphate

Hazardous effect of used of Fertilizers and its preventive measures, mixed ertilizers,complex Fertilizers, Fertilizers grads, Fertilizers ratio, Fertilizers condition, Fertilizers filter.

B) Industrial Fuels:

Natural fuels, Synthetic fuels, Hydrogen- fuel of Tomorrow ,fuel for rocket (hydrazines)

Unit-III

A) Glasses ,Classification, Properties and uses of glasses (15 hrs)

B) Non Ferrayalloys :

Monel metal, Duralumin, Wood metal, Babit metal, Phosphorous bronze, Brass, Germansilver.

C) Fermentation industry:

Manufacturing of Industrial alcohol, Absolute alcohol, beers, wines and liquors, Butyl alcohols and acetone,vinegar and acetic acid, Citric acid, Lactic acid, mono sodium glutamate, lysine, Dihydrxy acetone.