

BOARD OF STUDIES 2016-17



Department of Chemistry
Nagarjuna Government College
Nalgonda

NAGARJUNA GOVT.COLLEGE, NALGONDA
(AUTONOMOUS)
DEPARTMENT OF CHEMISTRY

BOARD OF STUDIES MEETING

The members of Board of studies in Chemistry Department, N.G.College ,
Nalgonda met under the chairmanship of Sri P.Yedukondalu on 19-10-2016 and
passed the following resolutions 11.09.2017

AGENDA

1. To consider and approve the syllabus for B.Sc I, II, III years (I, II, III, IV, V & VI semesters) for the academic year 2016-17.
2. To consider and approve the choice based credit system (CBCS) and cumulative grade Point average (CGPA) system for the III year (V, VI semesters) students for the Academic year 2016-17
3. To consider and approve the General Elective for the IV Semester Students the Elective is Medicinal chemistry
4. To Consider and approve the continuation of Internal Assessment for the Students admitted in to I, II & III year degree course during 2016-17.
5. To consider and approve the CBCS and cumulative grade Point average (CGPA) System for the Ist Year Students as per the Mahatma Gandhi University new Syllabus .
6. To consider and approve to conduct year wise practical Examination for II & III year students and semester wise practical Examinations for the I Year student for the Year 2016-17
7. To consider and approve the list of examiners for paper setting and evaluation for B.Sc I,II,III years(I,II,III,IV,V & VI semesters) for the academic year 2016-17.
8. To consider and approve the model Question papers for B.Sc I, II and III Years for the academic year 2016-17.
9. Any other related academic matter.

Resolutions

1. Unitization of syllabus in to 4 units for each paper.
2. CBCS and CGPA system are approved.
3. Medicinal Chemistry ~~are~~ approved as general elective in semester-IV.
4. To conduct 2 Internal Assessments for 20 marks, one student seminar for 5 marks and one assignment for 5 marks (total 30 marks) for I , II & III year students .
5. As per MGU I year syllabus is approved.
6. Year wise practical examinations are approved for II and III years and semester wise Practical exams are approved for I year students.
7. List of the examiners are approved.
8. Model question papers are approved.
9. Internal examinations are conducted for 30 marks. Semester end exams are conducted for 70 marks, it is mandatory to get a minimum of 28 marks for one to get through it. On the Whole for 100 marks one must get 40 marks to get through the paper.
10. To design question pattern in the following lines for I, II and III year students.

Section –A

5 X 2=10 Marks

- To give five very short questions and ask them to answer all questions

Section-B

4 X 5=20 Marks

- To give Six Short questions and ask them to answer any four questions

Section-C

4 X 10 = 40 Marks

- To give 4 Long Questions with internal choice and ask them to answer all question

1. To Prepare and supply of question banks and model papers to the students
2. Continuous Internal Assessment methods adopted to evaluate the progression of the Student.

Department of Chemistry
N.G. COLLEGE
NALGONDA-508 001.

K. Manjula, M.Sc., B.Ed.
Lecturer in Chemistry,
Govt. Degree College for Women,
NALGONDA.

Dr. D. Ramesh M.Sc., Ph.D
Assistant Professor
Department of Chemistry
Mahatma Gandhi University
Nalgonda-508 254. (T S)

APPROVED THE PANEL OF EXAMINERS FOR PAPER SETTING AND
EVALUATION FOR THE YEAR 2016-2017.

SNO	PAPER	NAME	DISIGNATION	CELL NO
1	I	Dr.D.RAMESH	Assit.Prof., M.G.U, NLG	7702638320
2		Dr.V.RAVINDHAR REDDY	Assit.Prof., GDC, SIDDIPET	9492915339
3		Dr.CH. GOVERDHAN	Rtd. Assit.Prof.,	9848057671
4	II	Dr.Y.PRASHANTHI	Assit.Prof., M.G.U, NLG	9010203857
5		Dr.D.RAMESH	Assit.Prof., M.G.U, NLG	7702638320
6		Dr.V.RAVINDHAR REDDY	Assit.Prof., GDC, SIDDIPET	9492915339
7	III	Dr.M.VASANTHA	Assit.Prof., M.G.U, NLG	9849216947
8		Dr.Y.PRASHANTHI	Assit.Prof., M.G.U, NLG	9010203857
9		Sri.D. KRISHNA KUMAR	Assit.Prof., GDC,JADCHARLTA,MBNR	9866219767
10	IV	Dr.Y.PRASHANTHI	Assit.Prof., M.G.U, NLG	9010203857
11		Dr.V.RAVINDHAR REDDY	Assit.Prof., GDC, SIDDIPET	9492915339
12		Dr.E.YADAIHAH	Assit.Prof., GDC, KAIRATHA BAD	9849535003
13	V	Dr.R.ROOPA	Assit.Prof., M.G.U, NLG	9441780972
14		Dr.K.PRAVEEN KUMAR	Assit.Prof., GDC, KAIRATHA BAD	9885393125
15		Dr.R.ASHOK REDDY	PRINCIPAL, GDC,NARAYANKED	9912644506
16	VI	Dr.K.RAJENDHAR REDDY	Assit.Prof., TARAGDC,SANGAREDDY	9959175314
17	VI	Sri.A.LAXMANA RAO	ASSIT.PROF. KRR GDC ,KODAD	
18		Sri.K.NAGI REDDY	ASSIT.PROF. KRR GDC ,KODAD	

19	VII	1	Dr.A.BHANU PRASAD	PRINCIPAL, GDC ,RAMANNAPET	9848385850
20		2	Dr.K.RAJENDHAR REDDY	Assit.Prof., TARAGDC,SANGAREDDY	9959175314
21		3	Dr.ANATHA LAXMI Dr. S. Kalyani	Assit.Prof GDC(W),KOTI,HYD M.G.U.	9502388232
22	VIII	1	Dr.A.SRINIVASULU	ASSIT.PROF. KRR GDC ,KODAD	9440140506
23		2	Dr.A.BHANU PRASAD	PRINCIPAL, GDC ,RAMANNAPET	9848385850
24		3	Sri.JANARDHANA SWAMY	LECTURER, GDC ,RAMANNAPET	

V.A. 19/10/2016 Dr. D. Ramesh 19/10/16

K. Manjula, M.Sc., B.Ed.
Lecturer in Chemistry,
Govt. Degree College for Women,
NALGONDA.

Dr. D. Ramesh M.Sc., Ph.D
Assistant Professor
Department of Chemistry
Mahatma Gandhi University
Nalgonda-508 254. (T.S.)

Manjula
Department of Chemistry
M.G. COLLEGE
NALGONDA-508 001.

CONSTITUTED OF BOARD OF STUDIES: 2016-2017 2017-18

SNO	DESIGNATION	NAME	CELL NO
1	Chairman Board of studies	Sri.P.Yedukondalu, N.G College,Nalgonda	9849056316 <i>m of</i>
2	University Nominee	Dr.D.Ramesh, Asst.Prof., MGU, Nalgonda	7702638320 <i>Dr. Ramesh</i>
3	Subject Expert (from outside)	Dr.A.BhanuPrasad, Principal, GDC,Ramanapet, Nalgonda.	9848385850
4	Subject Expert (from outside)	Smt.K.Manjula Lecturer in Chemistry GDC(w),NLG	8143462182 <i>V.K. 19/10/2016</i>
5	Members: All The Faculty members of the Dept	1. Sri.P.Ravi Kumar	9440208972 <i>P. Ravi</i>
		2. Dr.K.Venakata Krishana	9441993436 <i>K. Venkata</i>
		3.Sri.K.Ravi	9160616309 <i>R. Ravi</i>
		4.Sri.M.Venkateshwarlu	9441709821 <i>M. Venkateshwarlu</i>
		5.Sri.K.Ravi kumar	9052999960 <i>R. Ravi</i>
		6.Smt.V.Bhavani	8019758494 <i>V. Bhavani</i>
		7.P.Ramu	9912670252 <i>P. Ramu</i>
		8.Sri.T.Saidulu	9885004113 <i>T. Saidulu</i>
		9.Kum.K.Saritha	7799674621

m of
Department of Chemistry
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V.K. 19/10/2016
K. Manjula, M.Sc., B.Ed.
Lecturer in Chemistry,
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Dr. Ramesh 19/10/16
Dr. D. Ramesh M.Sc., Ph.D.
Assistant Professor
Department of Chemistry
Mahatma Gandhi University
Nalgonda-508 254. (T.S.)

NAGARJUNA GOVERNMENT COLLEGE, NALGONDA
(AUTONOMOUS)

NO: / BOS/chem/acad/2016-17

11-9-2017
DATE : 17-10-2016

TO

Dr.D.RAMESH
Assistant professor ,
M.G.U Nalgonda-

**SUB:- NagarjunaGovt.college, Nalgonda(Autonomous)-convening the meeting of
Board of studies Chemistry on 19-10-2016 Intimation-Request-Reg.**


Sir,

I am happy to inform that you have been nominated as a ^{University nominee} Member of Board of Studies in the Department of Chemistry of this college for the year 2016-17. 2017-18

The meeting of the Board of studies Chemistry will be held on 19.10.16 in the Department of Chemistry to consider the following Agenda.

1. To approve the syllabus and model question papers for I, II, III, IV, V & VI semesters.
2. To approve the Introduction of internal assessment.
3. To approve the list of examinations for paper setting and evaluation.
4. Any other matter with permission of the chair.

You are requested to make it convenient to attend the meeting and extend your cooperation.


In-Charge /Chairman BOS
Department of Chemistry
CHEMISTRY DEPARTMENT
N.G. COLLEGE
NALGONDA-508 001.


Principal
Principal
Nagarjuna Govt. Degree College
NALGONDA.

NAGARJUNA GOVERNMENT COLLEGE, NALGONDA
(AUTONOMOUS)

NO: / BOS/chem/acad/2016-17

11-9-2017
DATE : 17-10-2016

TO

Dr.A.BHANUPRASAD

Principal,

GDC ,Ramanapeta Nalgonda-

Smt. K. Mangula
Lec in chem

SUB:- Nagarjuna Govt.college, Nalgonda(Autonomous)-convening the meeting of
Board of studies Chemistry on 19-10-2016 Intimation-Request-Reg.


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CHEMISTRY DEPARTMENT
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Principal
Nagarjuna Govt. Degree College
NALGONDA.

NAGARJUNA GOVERNMENT COLLEGE, NALGONDA
(AUTONOMOUS)

NO: / BOS/chem/acad/2016-17 2017-18

DATE : 11-9-2017
17-10-2016

TO

Smt.K.Manjula. ✓

Lecturer ,

GDC(W) , Nalgonda-

**SUB:- NagarjunaGovt.college, Nalgonda(Autonomous)-convening the meeting of
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In-Charge/Chairman BOS
N.G. COLLEGE
CHEMISTRY DEPARTMENT
NALGONDA-508 001.


Principal
Nagarjuna Govt. Degree College
NALGONDA

**NAGARJUNA GOVERNMENT COLLEGE:: NALGONDA
(AUTONOMOUS)
(Re-Accredited by NAAC with A Grade)**

Date:

To
The Principal
NG College
Nalgonda

Sir,

Sub: Grant of Autonomous status –Constitution of the Board of Studies
in Chemistry – request for approval – Reg.

- Ref: 1. No.F.22-1/2007(AC) Dt.3 Apr 2007
2. OU Lr. NoMR.69/H/2007/Acad, Dt:12-06-07.
3. GORT. No.467 HE. (CE-1) Dept. Dt.29.6.2007.
4. MGU Lr. 191/MGU/NLG/2015-16. Dt.28-08-2015

MGU Lr No. RENO 77/est/2017 Dt. 24.07.2017

With reference to the subject cited, I am submitting the list of Board of studies for
academic years 2016-17 for your approval.

SNO	CATEGORY	NAME & DESIGNATION	CONTACT NOS
1	Chairman Board of studies	Sri.P.Yedukondalu.	9849056316
2	University Nominee	Dr.D.Ramesh Asso.prof. M.G.University,Nalgonda.	7702638320
3	Subject expert from outside the college	Dr.A.BhanuPrasad,Principal.GDC, Ramanapet, Nalgonda.	9848385850
4	Subject expert from outside the college	Smt.K.Manjula Lecturer in chemistry GDC(w),NLG.	8143462182
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		3.Sri.K.Ravi	9160616309
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		7.M.Ramu	
		8.Sri.T.Saidulu B.Thirumalesha	9885004113 9505562658
		9.Kum.K.Saritha	7799674621
6	One representative from Industry/Corporate sector/Allied areas		

Submitted by

[Signature]
Department of Chemistry
In-Charge /Chairman BOS
N.G. COLLEGE
NALGONDA-508 001.

[Signature] 19/10/2016
Lecturer in Chemistry
Govt. Degree College for Women
NALGONDA.

[Signature] 19/10/16
Dr. D. Ramesh M.Sc.,Ph.D
Assistant Professor
Department of Chemistry
Mahatma Gandhi University
Nalgonda-508 254. (T.S.)

Proposals approved

[Signature]
Principal/ Chairman academic council
Principal
Nagarjuna Govt. Degree College
NALGONDA.

**NAGARJUNA GOVT.COLLEGE, NALGONDA (AUTONOMOUS)
DEPARTMENT OF CHEMISTRY**

CONSTITUTED OF BOARD OF STUDIES : 2016-2017 2017-2018

SNO	CATEGORY	NAME & DESIGNATION	CONTACT NOS
1	Chairman Board of studies	Sri.P.Yedukondalu.	9849056316
2	University Nominee	Dr.D.Ramesh Asso.prof. M.G.University,Nalgonda.	7702638320
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Submitted by

Dr. D. Ramesh 19/10/16

Dr. D. Ramesh M.Sc.,Ph.D
Assistant Professor
Department of Chemistry
Mahatma Gandhi University
Nalgonda-508 254. (T.S.)

Proposals approved

Approved

[Signature]

Principal/ Chairman academic council

Principal

**Nagarjuna Govt. Degree College
NALGONDA,**

In-Charge /Chairman BOS

[Signature]

K. Manjula 19/10/2016
K. Manjula, M.Sc., B.Ed.
Lecturer in Chemistry,
Nagarjuna Govt. Degree College for Women,

**NAGARAJUNA GOVERNMENT COLLEGE, NALGONDA
(AUTONOMOUS)**

ALLOCATION OF CREDITS AT SUBJECT LEVEL

COURSE: B.Sc (SCIENCE)

SUBJECT: CHEMISTRY

SN O	SEMESTER	MODULE(PAPER)	HOURS PER WEEK	MAX. MARKS	CREDIT S
1	I (CORE)	CHEMISTRY – I	04	100	04
2	PRACTICALS – I	QUALITATIVE ANALYSIS - I	02	50	01
3	II (CORE)	CHEMISTRY – II	04	100	04
4	PRACTICALS – II	QUALITATIVE ANALYSIS - II	02	50	01
5	III (CORE)	ORGANIC & GENERAL CHEMISTRY	04	100	03
6	IV (CORE)	PHYSICAL & IN ORGANIC CHEMISTRY	04	100	03
7	GENERAL ELECTIVE	MEDICINAL CHEMISTRY	02	50	02
8	PRACTICALS	VOLUMETRIC ANALYSIS	03	50	02
9	V-CORE	ORGANIC & INORGANIC CHEMISTRY	03	100	03
10	VI-(CORE)	PHYSICAL CHEMISTRY & INORGANIC CHEMISTRY	03	100	03
11	VII-(ADVANCE) ELACTIVE-I (OR) VII-(ADVANCE) ELACTIVE-II	SOLVENT EXTRACTION CHROMATOGRAPHY, CLASSIFICATION PAPER, TLC COLUMN, HPLC, GLC (OR) ALKALOIDS, TERPENOID	03	100	02
12	VIII-(SKILL BASED) ELACTIVE-I (OR) VI-(SKILL BASED) ELACTIVE	MACRO MALECULES, METRIAL SCIENCES, NONO METERIALS, CATALYSIS, DRUGS, FORMULATION , PESTICIDES (OR) SPECTRAL PROBLEMS BASED ON NMR, MASS, IR, UV SPECTRAL DATA	03	100	02
13	PRACTICALS	PREPARATION and FUNCTIONAL GROUP IDENTIFICATION OF ORGANIC COMPOUNDS	03	50	02
14	PRACTICALS	PHYSICAL CHEMISTRY PRACTCALS	03	50	02
15	PROJECT WORK				02

A. Manjula

V/S 19/10/2016
Dr. D. Ramesh

Dr. D. Ramesh M.Sc., Ph.D

Assistant Professor

K. Manjula, M.Sc., B.Ed
Lecturer in Chemistry, Department of Chemistry
Mahatma Gandhi University, Nalgonda

Principal

Nagarjuna Govt. Degree College
NALGONDA,

B.Sc I yr CHEMISTRY
SEMESTER WISE SYLLABUS
SEMESTER I
Paper – I
Chemistry - I

Unit-I (Inorganic Chemistry)

15h(1 hr/week)

S1-I-1. s-block elements:

General Characteristics of groups I and II elements, Diagonal relationship between Li and Mg, Be and Al

2 h

S1-I-2. p-block elements 1:

7 h

Group-13: Synthesis and structure of diborane and higher Boranes (B_4H_{10} and B_5H_9), Boron nitrogen compounds ($B_3N_3H_6$ and BN), Lewis acid nature of BX_3

Group – 14: Carbides-Classification – ionic, covalent, interstitial – synthesis. Structures and reactivity. Industrial application. Silicones – Preparation – a) direct silicon process b) use of Grignard reagent c) aromatic silylation. Classification – straight chain, cyclic and cross-linked.

Group – 15: Nitrides – Classification – ionic, covalent and interstitial. Reactivity – hydrolysis. Preparation and reactions of hydrazine, hydroxyl amine, phosphazenes.

S1-I-3. General Principles of Inorganic qualitative analysis

6 h

Anion analysis: Theory of sodium carbonate extract, classification and reactions of anions- CO_3^{2-} , Cl^- , Br^- , SO_4^{2-} , PO_4^{3-} , BO_3^{3-} , CH_3COO^- , NO_3^- .

Cation Analysis: Principles involved - Solubility product, common ion effect, general discussion for the separation and identification of group I individual cations (Hg_2^{2+} , Ag^+ , Pb^{2+}) with flow chart and chemical equations. Principle involved in separation of group II & IV cations.

General discussion for the separation and identification of group II (Hg^{2+} , Pb^{2+} , Bi^{3+} , Cd^{2+} , Sb^{2+}), III (Al^{3+} , Fe^{3+}), IV (Mn^{2+} , Zn^{2+}) individual cations with flow chart and chemical equations. Application of concept of hydrolysis in group V cation analysis. General discussion for the separation and identification of group V individual cations (Ba^{2+} , Sr^{2+} , Ca^{2+}) with flow chart and chemical equations. Theory of flame test. Identification of Group VI cations (Mg^{2+} , NH_4^+).

A. S. Sreeraj

Unit - II (Organic Chemistry)

15h (1 hr/week)

S1-O-1: Structural Theory in Organic Chemistry

6 h

Bond polarization: Factors influencing the polarization of covalent bonds, electro negativity – inductive effect. Application of inductive effect (a) Basicity of amines (b) Acidity of carboxylic acids (c) Stability of carbonium ions. Resonance - Mesomeric effect, application to (a) acidity of phenol. (b) acidity of carboxylic acids and basicity of anilines. Stability of carbo cations, carbanions and free radicals. Hyper conjugation and its application to stability of carbonium ions, Free radicals and alkenes.

Types of organic reactions: Addition reactions- electrophilic, nucleophilic and free radical. Substitution reactions – electrophilic, nucleophilic and free radical. Elimination and Rearrangement reactions– Examples.

S1-O-2: Acyclic Hydrocarbons

6 h

Alkanes – Methods of preparation: Corey-House reaction, Wurtz reaction, from Grignard reagent, Kolbe synthesis. Chemical reactivity - inert nature, free radical substitution, Halogenation example- reactivity, selectivity and orientation.

Alkenes - Preparation of alkenes (with mechanism) (a) by dehydration of alcohols (b) dehydrohalogenation of alkyl halides (c) by dehalogenation of 1,2 dihalides, Zaitsev's rule. Properties: Addition of Hydrogen – heat of hydrogenation and stability of alkenes. trans-addition of halogen and its mechanism. Addition of HX, Markonikov's rule, addition of H₂O, HOX, H₂SO₄ with mechanism and addition of HBr in the presence of peroxide (anti – Markonikov's addition). Oxidation (cis – additions) – hydroxylation by KMnO₄, OsO₄, trans addition- peracids (via epoxidation), hydroboration, ozonolysis – location of double bond. Dienes – Types of dienes, reactions of conjugated dienes – 1,2 and 1,4 addition of HBr to 1,3 – butadiene and Diels – Alder reaction.

Alkynes – Preparation by dehydrohalogenation of vicinal dihalides, dehalogenation of tetrahalides. Physical Properties: Acidity of terminal alkynes (formation of metal acetylides) preparation of higher alkynes, Chemical reactivity – electrophilic addition of X₂, HX, H₂O (tautomerism), Oxidation (formation of enediol, 1,2 diones and carboxylic acids) and reduction (Metal-ammonia reduction, catalytic hydrogenation)

S1-O-3: Alicyclic Hydrocarbons

3 h

Nomenclature, preparation by Freund's method, Dieckmann, heating dicarboxylic metal salts. Properties – reactivity of cyclo propane and cyclo butane by comparing with alkanes. Stability of cycloalkanes – Baeyer strain theory, Sachse and Mohr predictions and Pitzer strain theory. Conformational structures of cyclopentane, cyclohexane.

Unit-III (Physical Chemistry)

15 h (1 hr/week)

S1-P-1: Atomic structure and elementary quantum mechanics

6 h

Black body radiation, heat capacities of solids, Rayleigh Jeans law, Planck's radiation law, photoelectric effect, Limitations of classical mechanics, Compton effect, De Broglie's hypothesis. Heisenberg's uncertainty principle, Schrodinger's wave equation and its importance. Physical interpretation of the wave function, significance of ψ and ψ^2 , a particle in a box, energy levels, wave functions and probability densities. Schrodinger wave equation for H-atom. Separation of variables, radial and angular functions (only equation), hydrogen like wave functions, quantum numbers and their importance.

S1-P-2: Gaseous State

5 h

Deviation of real gases from ideal behavior. van der Waals equation of state. Critical phenomenon. PV isotherms of real gases, continuity of state. Andrew's isotherms of CO₂. The van der Waal's equation and critical state. Derivation of relationship between critical constants and van der Waal's constants. The law of corresponding states, reduced equation of states. Joule Thomson effect and inversion temperature of a gas. Liquefaction of gases: i) Linde's method based on Joule Thomson effect ii) Claude's method based on adiabatic expansion of a gas.

S1-P-3: Liquid State

4 h

Intermolecular forces, structure of liquids (qualitative description). Structural differences between solids, liquids and gases. Surface tension and its determination using stalagmometer. Viscosity of a liquid and determination of coefficient of viscosity using Ostwald viscometer. Effect of temperature on surface tension and coefficient of viscosity of a liquid (qualitative treatment only). Liquid crystals, the mesomorphic state: Classification of liquid crystals into Smectic and Nematic, differences between liquid crystal and solid / liquid. Application of liquid crystals as LCD devices.

Unit – IV (General Chemistry)

15 h (1 hr/week)

S1-G-1 Chemical Bonding

11 h

Ionic solids- lattice and solvation energy, solubility of ionic solids, Fajan's rule, polarity and polarizability of ions, covalent nature of ionic bond, covalent bond - Common hybridization and shapes of molecules.

Molecular orbital theory: Shapes and sign convention of atomic orbitals. Modes of overlapping. Concept of σ and π bonds. Criteria for orbital overlap. LCAO concept. Types of molecular orbitals- bonding, antibonding and non bonding. MOED of homonuclear diatomics - H₂, N₂, O₂, O₂⁻, O₂²⁻, F₂ (unhybridized diagrams only) and heteronuclear diatomics CO, CN⁻, NO, NO⁺ and HF. Bond order, stability and magnetic properties.

S1-G-2 Evaluation of analytical data

4 h

Significant figures, accuracy and precision. Errors-classification of errors- determinate and indeterminate errors, absolute and relative errors, propagation of errors in mathematical operations – addition, subtraction, division and multiplication (with respect to determinate errors).

References:

Unit- I

1. Principles of Inorganic Chemistry by Puri, Sharma and Kalia Vishal Publications 1996.
2. Concise Inorganic Chemistry by J.D. Lee 3rd edn.
3. Basic Inorganic Chemistry by F.A.Cotton, G.Wilkinson and Paul.L. Gaus 3rd edn Wiley Publishers 2001. Chem.
4. Vogel's Qualitative Inorganic Analysis by Svehla
5. Inorganic Chemistry Principles of structure and reactivity by James E.Huhey, E.A. Keiter and R.L. Keiter 4th edn.
6. Chemistry of the elements by N.N.Greenwood and A. Earnshaw Pergamon Press 1989.
7. Inorganic Chemistry by Shriver and Atkins 3rd edn Oxford Press 1999.
8. Qualitative analysis by Welcher and Hahn.
9. Textbook of Inorganic Chemistry by R Gopalan
10. College Practical chemistry by V K Ahluwalia, Sunitha Dhingra and Adarsh Gulati

Unit- II

1. Text book of organic chemistry by Morrison and Boyd.
2. Text book of organic chemistry by Graham Solomons.
3. Text book of organic chemistry by Bruice Yuranis Powla.
4. Text book of organic chemistry by Soni.
5. General Organic chemistry by Sachin Kumar Ghosh.
6. Text book of organic chemistry by C N pillai

Unit III

1. Principles of physical chemistry by Prutton and Marron.
2. Text Book of Physical Chemistry by Soni and Dharmahara..
3. Text Book of Physical Chemistry by Puri and Sharma.
4. Text Book of Physical Chemistry by K. L. Kapoor.
5. Physical Chemistry through problems by S.K. Dogra.
6. Text Book of Physical Chemistry by R.P. Verma.
7. Elements of Physical Chemistry by Lewis Glasstone.

Unit IV

1. Principles of Inorganic Chemistry by Puri, Sharma and Kalia Vishal Publications 1996.
2. Concise Inorganic Chemistry by J.D. Lee 3rd edn.
3. Basic Inorganic Chemistry by F.A.Cotton, G.Wilkinson and Paul.L. Gaus 3rd edn Wiley Publishers 2001. Chem
4. Analytical chemistry by G. L. David Krupadanam, D. Vijaya Prasad, K. Varaprasada Rao, K.L.N. Reddy and C. Sudhakar

Laboratory Course

45h (3 h / week)

Paper I Qualitative Analysis - I

I. Preparations:

1. Tetrammine copper (II) sulphate,
2. Potash alum $KAl(SO_4)_2 \cdot 12H_2O$,
3. Bis (dimethylglyoximate) nickel(II)

II. Analysis of two anions (one simple and one interfering)

✓ 19/10/2016
D. Ramesh 19/10/16

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Faculty of Science

B.Sc. I Yr. I Semester (Backlog) Examination, Mar/Apr 2016

CHEMISTRY - I (CBCS)

Time: 2 ½ Hrs.

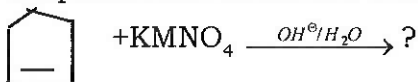
Max.Marks: 70

SECTION - A (5x 2 = 10)**Answer the following questions.**

1. Write the Corey - House reaction.
2. Write a short note on zaitsev's rule.
3. Write a short note on Pitzer's strain theory.
4. Write a short note on compton effect.
5. Explain the term enantiomers with an example.

SECTION - B (4 x 5 = 20)**Answer any FOUR of the following questions.**

6. Write the product structure for the following equation.



7. How will you convert acetylene to aldehyde.
8. Explain the aromaticity of benzenoid compounds by using the Huckel's rule.
9. Draw the molecular orbital energy diagram of HCl molecule.
10. Discuss the solubility product.
11. How do you identify the ammonium ion in Qualitative analysis.

SECTION - C (4 x 10 = 40)**Answer the following questions.**

12. (a) What is the mesomeric effect? Give an example.
(b) Write the addition of HBr in presence of peroxide in alkenes.
(OR)
(c) Explain the relative stability of 1^o, 2^o, 3^o carbo cations.
(d) Write the polymerisation reactions of acetylene.
13. (a) Explain the mechanism of nitration of Benzene.
(b) Write a short note on ring activating and ring deactivating groups.
(OR)
(c) Explain the conformational isomerism of cyclobutane.
(d) Explain why Nitro group (-NO₂) directs as meta position.
14. (a) Define the bonding and antibonding molecular orbitals.
(b) Explain the photo electric effect.
(OR)
(c) Write a short note on Heisenberg's uncertainty principle.
(d) Discuss the following with suitable examples.
i) Dipole moment ii) Induced dipole moment
15. (a) What is the meaning of Racemic mixture, Explain it.
(b) Define the following terms with an example
i) Plane of symmetry ii) Dissymmetric molecules.
(OR)
(c) How do you identify CO₃⁻² & Cl⁻ ions using inorganic qualitative analysis.
(d) Explain R.S. Configuration for a symmetric molecule.

//TELUGU VERSION//
CHEMISTRY - I (CBCS)

Time: 2 ½ Hrs.

Max.Marks: 70

SECTION - A (5 x 2 = 10)

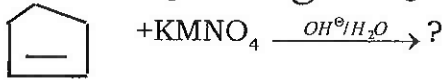
ఈ క్రింది ప్రశ్నలకు జవాబులు వ్రాయండి.

1. కొరె-హాస్ చర్యను వ్రాయండి.
2. క్లౌస్ వ నియమం గురించి తెలుపుము.
3. పిటోజెర్స్ ప్రయాస సిద్ధాంతాన్ని చర్చించండి.
4. కాంప్టన్ ఫలితం గురించి వ్రాయండి.
5. ఎనాన్నిమోమర్లు పదాన్ని నిర్వచించి తగిన ఉదాహరణలతో తెలుపండి.

SECTION - B (4 x 5 = 20)

ఈ క్రింది వానిలో ఏవేని 4 ప్రశ్నలకు జవాబులు వ్రాయండి.

6. క్రింది రసాయన చర్యలో ఏర్పడే క్రియా జన్యం గుర్తించి దానిని వ్రాయండి.



7. ఎసిటిలీన్ ను ఆల్డిహైడ్ గా ఏవిధంగా మార్చుతారో చర్యను వ్రాయుము.
8. హాకెల్ నియమాన్ని బెంజనాయిడ్ సమ్మేళనాలకు అనువర్తించండి.
9. HCl అణువు యొక్క అణు ఆర్బిటాల్ శక్తి పట చిత్రమును వ్రాయండి.
10. ద్రావణీయత లబ్ధం గురించి వ్రాయండి.
11. గుణాత్మక విశ్లేషణలో అమ్మోనియం అయాన్ ను ఏవిధంగా గుర్తిస్తారు.

SECTION - C (4 x 10 = 40)

ఈ క్రింది ప్రశ్నలకు జవాబులు వ్రాయండి.

12. (a) మిసోమర్లిక ప్రభావం అనగానేమి? ఒక ఉదాహరణ ఇవ్వము.
(b) ఆల్కీనలను HBr సంకలనం పెరాక్సైడ్ సమక్షంలో రసాయన చర్యను వ్రాయండి.
(OR)
(c) 1°, 2°, 3° కార్బో కాటయాన్లు యొక్క స్థిరత్వంను వివరించండి.
(d) ఎసిటిలీన్ పాల్లోనే పాలిమర్లికరణ చర్యలను వ్రాయండి.

13. (a) బెంజిన్ పై జలగే నైట్రేషన్ చర్య యొక్క చర్యా విధానాన్ని వ్రాయండి.
(b) వలయ ఉత్తేజిత మరియు అనుత్తేజిత సమూహాలను వివరించండి.
(OR)
(c) సైక్లో బ్యూటీన్ యొక్క అనురూపాత్మక సాధ్యశ్యమును వివరించండి.
(d) నైట్రో సమూహం మెటా స్థాన నిర్దేశకంగా పనిచేయును ఎందుకో వివరించండి.

14. (a) బంధక మరియు అపబంధక అణు ఆర్బిటాళ్లు అనగానేమి.
(b) కాంతి విద్యుత్ ఫలితంను వివరించుము.
(OR)
(c) హైసెన్ బర్గ్ అనిశ్చిత నియమంను వివరించండి.
(d) క్రింది పదాలను ఉదాహరణలతో వివరింపుము.
1) ద్విద్రవ భ్రమకం 2) పేలిత ద్విద్రవ భ్రమకం

15. (a) రెసిమిక్ మిశ్రమం అనగానేమి? వివరింపుము.
(b) ఈ క్రింది పదాలను నిర్వచించి ఉదాహరించండి.
1) సౌష్ఠవతలం 2) డైసిమెట్రిక్ అణువులు
(OR)

- (c) గుణాత్మక విశ్లేషణలో CO₃⁻² మరియు Cl⁻ అయాన్లును ఏ విధంగా గుర్తిస్తారు.
(d) అసిమెట్రిక్ అణువులో R, S - విన్యాసాన్ని వివరించండి.

✓ 19/10/2016

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A. Sreeraj

B.Sc I yr CHEMISTRY
SEMESTER WISE SYLLABUS
SEMESTER II
Paper II
Chemistry - II

Unit-I (Inorganic Chemistry)

15 h (1 hr/week)

S2-I-1 p-block Elements -II

7 h

Oxides: Types of oxides (a) Normal- acidic, basic amphoteric and neutral (b) Mixed (c) sub oxide d) peroxide e) superoxide. Structure of oxides of C, N, P, S and Cl - reactivity, thermal stability, hydrolysis.

Oxy acids: Structure and acidic nature of oxyacids of B, C, N, P, S and Cl. Redox properties of oxyacids of Nitrogen: HNO_2 (reaction with FeSO_4 , KMnO_4 , $\text{K}_2\text{Cr}_2\text{O}_7$), HNO_3 (reaction with H_2S , Cu), HNO_4 (reaction with KBr, Aniline), $\text{H}_2\text{N}_2\text{O}_2$ (reaction with KMnO_4). Redox properties of oxyacids of Potassium: H_3PO_2 (reaction with HgCl_2), H_3PO_3 (reaction with AgNO_3 , CuSO_4).

Redox properties of oxyacids of Sulphur: H_2SO_3 (reaction with KMnO_4 , $\text{K}_2\text{Cr}_2\text{O}_7$), H_2SO_4 (reaction with Zn, Fe, Cu), $\text{H}_2\text{S}_2\text{O}_3$ (reaction with Cu, Au), H_2SO_5 (reaction with KI, FeSO_4), $\text{H}_2\text{S}_2\text{O}_8$ (reaction with FeSO_4 , KI)

Interhalogens - classification- general preparation- structures of AB , AB_3 , AB_5 and AB_7 type and reactivity. Poly halides - definition and structure of ICl_2^- , ICl_4^- and I_3^- . Comparison of Pseudohalogens with halogens.

S2-I-2 Chemistry of Zero group elements

2 h

General preparation, structure, bonding and reactivity of Xenon compounds – Oxides, Halides and Oxy-halides. Clathrate compounds and Anomalous behavior of He (II)

S2-I-3 Chemistry of d-block elements

6 h

Characteristics of d-block elements with special reference to electronic configuration variable valence, ability to form complexes, magnetic properties & catalytic properties. Stability of various oxidation states and SRP Comparative treatment of second and third transition series with their 3d analogues. Study of Ti, Cr and Cu triads. Titanium triad – electronic configuration and reactivity of +3 and +4 states – oxides and halides. Chromium triad – reactivity of +3 and +6 states. Copper triad – reactivity of +1, +2 and +3 states.

Unit - II (Organic chemistry)

15 h (1 hr/week)

S2-O-1: Aromatic Hydrocarbons

7 h

Concept of aromaticity – definition, Huckel's rule – application to Benzenoids and Non – Benzenoids (cyclopropenyl cation, cyclopentadienyl anion and tropylium cation).

Preparations: From acetylene, phenols, benzene carboxylic acids and sulphonic acids

Reactions - General mechanism of electrophilic substitution, mechanism of nitration, sulphonation, and halogenation, Friedel Craft's alkylation (polyalkylation) and acylation. Orientation of aromatic substitution - Definition of ortho, para, and meta directing groups. Ring activating and deactivating groups with examples. Orientation – (i) activating groups: Amino, methoxy and alkyl groups. (ii) Deactivating groups - carboxy, nitro, nitrile, carbonyl and sulphonic acid & halo groups.

S2-O-2: Arenes and Polynuclear Aromatic Hydrocarbons**3 h**

Preparation of alkyl benzenes by Friedel Craft's alkylation, Friedel Craft's acylation followed by reduction, Wurtz-Fittig reaction. Chemical reactivity: Ring substitution reactions, side chain substitution reactions and oxidation.

Polynuclear hydrocarbons – Structure of naphthalene and anthracene (Molecular Orbital diagram and resonance energy) Reactivity towards electrophilic substitution. Nitration and sulphonation as examples.

S2-O-3: Halogen compounds**5 hrs**

Nomenclature and classification: alkyl (primary, secondary, tertiary), aryl, aralkyl, allyl, vinyl, benzyl. Chemical reactivity - reduction, formation of RMgX , Nucleophilic substitution reactions – classification into S_{N}^1 and S_{N}^2 . Mechanism and energy profile diagrams of S_{N}^1 and S_{N}^2 reactions. Stereochemistry of S_{N}^2 (Walden Inversion) 2-bromobutane, S_{N}^1 (Racemisation) 1-bromo-1-phenylpropane explanation of both by taking the example of optically active alkyl halide. Structure and reactivity – Ease hydrolysis - comparison of alkyl, vinyl, allyl, aryl, and benzyl halides.

Unit – III (Physical Chemistry)**15 h (1 hr/week)****S2-P-1: Solutions****5 h**

Liquid - liquid mixtures, ideal liquid mixtures, Raoult's and Henry's laws. Non ideal systems. Azeotropes $\text{HCl-H}_2\text{O}$ and $\text{C}_2\text{H}_5\text{OH} - \text{H}_2\text{O}$ systems. Fractional distillation, Partially miscible liquids- Phenol – Water, Trimethyl amine – Water and Nicotine – Water systems. Lower upper consolute temperatures. Effect of impurity on consolute temperature. Immiscible liquids and steam distillation. Nernst distribution law. Calculation of the partition coefficient. Applications of distribution law with solvent extraction.

S2-P-2: Dilute Solutions & Colligative Properties**5 h**

Dilute Solutions, Colligative Properties, Raoult's law, relative lowering of vapour pressure, molecular weight determination. Osmosis - laws of osmotic pressure, its measurement, determination of molecular weight from osmotic pressure. Elevation of boiling point and depression of freezing point. Derivation of relation between molecular weight and elevation in boiling point and depression in freezing point. Experimental methods for determining various colligative properties. Abnormal molar mass, Van't Hoff factor, degree of dissociation and association of solutes.

S2-P-3: Solid state Chemistry**5 h**

Laws of Crystallography – (i) Law of Constancy of interfacial angles (ii) Law of Symmetry, Symmetry elements in crystals (iii) Law of rationality of indices. Definition of space lattice, unit cell. Bravais Lattices and Seven Crystal systems (a brief review). X-ray diffraction by crystals; Derivation of Bragg's equation, Determination of structure of NaCl , KCl & CsCl (Bragg's method and Powder method).

Unit – IV (General Chemistry)

15 h (1 hr/week)

S2-G-1: Theory of Quantitative Analysis

5 hours

Volumetric Analysis: Introduction, standard solutions, indicators, end point, titration curves, Types of titrations: i)neutralization titration- principle, theory of acid base indicators, titration curves and selection of indicators- strong acid - strong base, strong acid –weak base, weak acid- strong base and weak acid –weak base.

Gravimetric analysis- Introduction, nucleation, precipitation, growth of precipitate, filtration and washing, drying and incineration of precipitate, coprecipitation and post precipitation. Determination of Ni^{2+}

S3-G-2: Theories of bonding in metals:

5 h

Valence bond theory, Explanation of metallic properties and its limitations, Free electron theory, thermal and electrical conductivity of metals, limitations, Band theory, formation of bands, explanation of conductors, semiconductors n-type and p-type, extrinsic & intrinsic semiconductors, and insulators.

S2-G-3: Material Science

5 h

Classification of materials- classification as metals, ceramics, organic polymers, composites, biological materials etc. The property of super conductivity of materials.

Super conducting materials- elements, alloys and compounds. Properties of super conductors- zero resistivity, Meisener effect and thermal properties. Composites- meaning of composites, advanced composites, classification –particle rein forced fiber reinforced and structural composites general characters of composite materials-Particle-reinforced composites – large particle and dispersion- strengthened composite. Fiber reinforced composites (continuous and discontinuous fiber composites).

References

Unit I

1. Principles of Inorganic Chemistry by Puri, Sharma and Kalia Vishal Publications 1996.
2. Concise Inorganic Chemistry by J.D. Lee 3rd edn.
3. Basic Inorganic Chemistry by F.A.Cotton, G.Wilkinson and Paul.L. Gaus 3rd edn
4. Wiley Publishers 2001. Chem
5. Chemistry of the elements by N.N.Greenwood and A. Earnshaw Pergamon Press 1989.
6. Inorganic Chemistry by Shriver and Atkins 3rd edn Oxford Press 1999.
7. Inorganic Chemistry Principles of structure and reactivity by James E.Huhey, E.A. Keiter and R.L. Keiter 4th edn.
8. Textbook of inorganic chemistry by R Gopalan

Unit II

1. Text book of organic chemistry by Morrison and Boyd.
2. Text book of organic chemistry by Graham Solomons.
3. Text book of organic chemistry by Bruce Yuranis Powla.
4. Text book of organic chemistry by Soni.
5. General Organic chemistry by Sachin kumar Ghosh.
6. Text book of organic chemistry by C N pillai

Unit III

1. Principles of physical chemistry by Prutton and Marron.
2. Text Book of Physical Chemistry by Soni and Dharmahara.
3. Text Book of Physical Chemistry by Puri and Sharma
4. Text Book of Physical Chemistry by K. L. Kapoor
5. Physical Chemistry through problems by S.K. Dogra.
6. Elements of Physical Chemistry by Lewis and Glasstone.
7. Material science by Kakani & Kakani

Unit IV

1. Vogel's Text Book of Quantitative Analysis by G.H.Jeffery, J.Bassett, J.Mendham and R.C. Denney 5th edn Addison Wesley Longman Inc. 1999.
2. Quantitative Analysis by Day and Underwood Prentice Hall (India) VI Edn.
3. Nano: The Essentials by T. Pradeep, McGraw-Hill Education.
4. Chemistry of nanomaterials: Synthesis, Properties and applications by CNR Rao et.al
5. Nanostructured Materials and Nanotechnology, edited by Hari Singh Nalwa, Academic Press
6. College Practical chemistry by V K Ahluwalia, Sunitha Dhingra and Adarsh Gulati

Laboratory Course

45hrs (3 h / week)

Paper II - Qualitative Analysis - II

I Semi micro analysis of mixtures

Analysis of two anions and two cations in the given mixture.

Anions: CO_3^{2-} , SO_3^{2-} , S^{2-} , Cl^- , Br^- , I^- , CH_3COO^- , NO_3^- , PO_4^{3-} , BO_3^{3-} , SO_4^{2-}

Cations: Ag^+ , Pb^{2+} , Hg^+ , Hg^{2+}
 Pb^{2+} , Bi^{3+} , Cd^{2+} , Cu^{2+} , $\text{As}^{3+/5+}$, $\text{Sb}^{3+/5+}$, $\text{Sn}^{2+/4+}$
 Al^{3+} , Cr^{3+} , Fe^{3+}
 Zn^{2+} , Ni^{2+} , Co^{2+} , Mn^{2+}
 Ca^{2+} , Sr^{2+} , Ba^{2+}
 Mg^{2+} , NH_4^+

✓ 19/10/2016
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A. Manjula

Faculty of Science
B.Sc. I Yr. II Semester End Examination, Mar/Apr 2016

CHEMISTRY - II (CBCS)

Time: 2 ½ Hrs.

Max.Marks: 70

SECTION - A (5x 2 = 10)

Answer the following questions.

1. What is Tyndal effect.
2. Write the structure & hybridisation of IF_5 .
3. What is Henry's law.
4. Write vanderwaal's equation and terms in equation.
5. Write any two chemical properties of hydrazene.

SECTION - B (4 x 5 = 20)

Answer any FOUR of the following questions.

6. Write any two methods of preparation of Diborane.
7. What is crystal defect? Write about Schottky defect.
8. Explain Joule - Thomson effect.
9. Write any four applications of distribution law.
10. Write about Brownian motion and Hardy - Schulze law.
11. What do you mean by intercalation compounds? Explain with graphite as example.

Answer the following questions.

SECTION - C (4 x 10 = 40)

12. (a) Write the synthesis and structure of Inorganic benzene.
(b) What are the abnormal characters of Be in II A group elements.
(OR)
(c) Write about preparation methods & applications of silicones.
(d) How is hydroxyl amine prepared? Write any two chemical reactions of hydroxyl amine.
13. (a) Classify the oxides based on oxygen content.
(b) Write a note on pseudo halogens.
(OR)
(c) What are organometallic compounds? Discuss about their classification.
(d) Write about preparation and applications of Grignard reagent.
14. (a) Write the method involved in the liquefaction of gases by Claude's method.
(b) Explain the law of corresponding states.
(OR)
(c) Discuss the crystal structure of NaCl.
(d) Derive Bragg's equation.
15. (a) Write applications of liquid crystals.
(b) What is azeotropic mixture? Explain the distillation of azeotropic mixture with an example.
(OR)
(c) Write about a) Electrophoresis b) Gold Number
(d) Explain Freundlich adsorption Isotherms.

(త్రిప్లి చూడండి)

✓ 19/10/2016

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//TELUGU VERSION//
CHEMISTRY - II (CBCS)

Time: 2 ½ Hrs.

Max.Marks: 70

SECTION - A (5 x 2 = 10)

ఈ క్రింది ప్రశ్నలకు జవాబులు వ్రాయండి.

1. టిండాల్ ప్రభావము అనగానేమి.
2. IF_5 యొక్క నిర్మాణం మరియు సంకలికరణము వ్రాయండి.
3. హెన్రీ నియమమును తెలుపుము.
4. వాండర్వాల సమీకరణం వ్రాసి ఆ సమీకరణంలోని పదాలను తెలుపుము.
5. హైడ్రజీన్ యొక్క ఏవేని రెండు రసాయన ధర్మాలు వ్రాయండి.

SECTION - B (4 x 5 = 20)

ఈ క్రింది వానిలో ఏవేని 4 ప్రశ్నలకు జవాబులు వ్రాయండి.

6. ఏవేని రెండు పద్ధతులలో డైబోరన్ తయారీ విధానాన్ని తెలుపుము.
7. స్పటిక లోపం అనగానేమి? షాట్లీ లోపం గూర్చి వ్రాయండి.
8. జెల్-థాంప్లన్ ప్రభావమును వివరించుము.
9. వితరణ నియమం యొక్క ఏవేని నాలుగు అనువర్తనాలు వ్రాయండి.
10. బ్రానియన్ చలనము మరియు హాల్డీ - ఘాట్ నియమాల గూర్చి వ్రాయండి.
11. ఇంటర్ కాలేషన్ సమ్మేళనాలు అనగానేమి? గ్రాఫైట్ ఉదాహరణగా తీసుకొని వివరించుము.

ఈ క్రింది ప్రశ్నలకు జవాబులు వ్రాయండి.

SECTION - C (4 x 10 = 40)

12. (a) అకర్బన బెంజీన్ తయారీ మరియు నిర్మాణాన్ని తెలుపండి.
(b) II A గ్రూపులోని Be యొక్క అసంగత లక్షణాలు ఏవి.
(OR)
(c) సిలోకోనల్ తయారీ మరియు అనువర్తనాలను వ్రాయండి.
(d) హైడ్రాక్సిల్ ఎమైన్ తయారీ విధానం తెలిపి దాని ఏవేని రెండు రసాయన చర్మాలు వ్రాయండి.
13. (a) ఆక్సిజన్ సంఖ్య ఆధారంగా ఆక్సైడ్ల వర్గీకరణను తెలుపండి.
(b) మిథ్యాహోలోజన్లపై ఓ వ్యాఖ్య వ్రాయండి.
(OR)
(c) కర్బనలోహ సమ్మేళనాలు అనగా ఏవి? కర్బనలోహ సమ్మేళనాల వర్గీకరణ గూర్చి చర్చించుము.
(d) గ్రీగార్డ్ కారకం తయారీ మరియు అనువర్తనాలను తెలుపుము.
14. (a) క్లాడే పద్ధతి ద్వారా వాయువుల ద్రవీకరణ విధానాన్ని వివరించుము.
(b) అనురూపస్థితుల నియమమును వివరించుము.
(OR)
(c) NaCl స్పటిక నిర్మాణం వివరించుము.
(d) బ్రాగ్ సమీకరణంను ఉత్పాదించండి.
15. (a) ద్రవ స్పటికాల అనువర్తనాలను తెలుపుము.
(b) క్షదనాంక మిశ్రమం అనగానేమి? ఒక ఉదాహరణను తీసుకొని క్షదనాంక మిశ్రమాన్ని స్వేదన ప్రక్రియ ద్వారా వేరు పరిచే విధానం తెలుపుము.
(OR)
(c) క్రింది వాటి గూర్చి వ్రాయండి ఎ) ఎలక్ట్రోఫోరోసిస్ బి) గోల్డ్ సంఖ్య
(d) ఫ్రాండ్లిష్ అభిశోషణ సమోష్ణ రేఖల గూర్చి వివరించుము.

UNIT-I

NAGARJUNA GOVT. DEGREE COLLEGE, NALGONDA
(AUTONOMOUS)
DEPARTMENT OF CHEMISTRY
B.Sc II YEAR III SEMESTER, SYLLABUS
PAPER-III

4hrs

1. Halogen compounds

Nomenclature and classification of alkyl (into primary, secondary, tertiary), aryl, aralkyl, allyl, vinyl, benzyl halides. Chemical Reactivity, formation of RMgX
Nucleophilic aliphatic substitution reaction- classification into SN1 and SN2 Energy profile diagram of SN1 and SN2 reactions. Stereochemistry of SN2 (Walden Inversion) SN1 (Racemisation). Explanation of both by taking the example of optically active alkyl halide — 2-bromobutane, Ease of hydrolysis — comparison of alkyl, benzyl, allyl, vinyl and aryl halides.

2. Hydroxy compounds

Nomenclature and classification of hydroxyl compounds.

Alcohols: Preparation with hydroboration reaction, Grignard synthesis of alcohols.

Phenols: Preparation i) from diazonium salt, ii) from aryl sulphonates, iii) from Cumene.

Physical properties — Hydrogen bonding (intermolecular and intramolecular).

Effect of hydrogen bonding on boiling point and solubility in water.

Chemical properties:

- acidic nature of phenols.
- formation of alkoxides/phenoxides and their reaction with RX.
- replacement of OH by X using PCl₅, PCl₃, PBr₃, SOCl₂ and with HX/ZnCl₂.
- esterification by acids (mechanism).
- dehydration of alcohols.
- special reaction of phenols: Bromination, Kolb-Schmidt reaction, Reimer-Tiemann reaction, Fries rearrangement, azocoupling.

3. Carboxylic acids and derivatives

Nomenclature, classification and structure of carboxylic acids.

Methods of preparation by a) hydrolysis of nitriles, amides and esters.

b) carbonation of Grignard reagents.

Special methods of preparation of aromatic acids by a) oxidation of side chain, b) hydrolysis by benzotrichlorides, c) Kolbe reaction.

Physical properties: Hydrogen bonding, dimeric association, acidity- strength of acids with examples of trimethyl acetic acid and trichloroacetic acid. Relative differences in

6 hrs

6 hrs

UNIT-II

the acidities of aromatic and aliphatic acids.

Chemical properties.: Reactions involving H, OH and COOH groups-salt formation, acid chloride formation, amide formation and esterification (mechanism).

Degradation of carboxylic acids by Huns-Diecker reaction.

decarboxylation by Schimdt reaction. Arndt-Eistert synThesis, halogenation by

I ell-Voihard- Zehnskv reaction.

Derivatives of carboxylic acids: Reaction of acid chlorides, acid anhydrides. acid amides, esters (mechanism of the hydrolysis of esters by acids and bases).

1. Carbonyl compounds

Nomenclature of aliphatic and aromatic carbonyl compounds, structure of the carbonyl group.

Synthesis of aldehydes from acid chlorides. Synthesis of aldehydes and ketones using 1,3-dithianes, synthesis of ketones from nitriles and from carboxylic acids.

Physical properties: absence of hydrogen bonding, keto-enol tautomerism. reactivity of carbonyl group in aldehydes and ketones.

Nueleophilic addition reaction with a) NaHSO. h) HCN, c) RMgX. d) NH₂OI I. e) PhNHNH₂, f) 2,4 DNPH, g) Alcohols-formation of heniiacetal and acetal.

Halogenation using PCL₅ with mechanism.

Base catalysed reactions: a) Aldol, b) Cannizzaro reaction, c) Perkin reaction, d) Benzoin condensation, e) Haloform reaction, f) Knoevenagel reaction.

Oxidation of aldehydes- Baeyer-Villiger oxidation of ketones.

Reduction: Clemmensen reduction, Woif-Kishner reduction, MPV reduction. reduction with LiAlH₄ and NaBH₄.

Analysis of aldehydes and ketones with a) 2,4-DNT test. h) Tollen's test, c) Fehling test, d) Schiff test e) Haloform test (with equation).

2. Active methylene compounds

Acetoacetic esters: preparation by Claisen condensation, keto-enol tauomerism. Acid hydrolysis and ketonic hydrolysis. Preparation of a) monocarboxylic acids.b)dicarboxylic acids.Reaction with urea Malonic ester: preparation from acetic acid.Synthetic applications: Preparation o a)monocarboxylic acids (propionic acid and n-hutyric acid)(h)Dicarboxylic acids (succinic acid and adipic acid),.-

unsaturatedcarboxylic acids (crotonic acid).Reaction with urea.

3.Exercises in interconversion**UNIT III****(GENRAL CHEMISTRY)****1. Molecular symmetry**

Concept of symmetry in chemistry-symmetry operations, symmeti:y elements.

Rotational axis of symmetry and types of rotational axes. Planes of symmetry

10 hrs**4 hrs****2 hrs****5hrs**

UNIT IV

and types of planes. Improper rotational axis of symmetry. Inversion centre. Identity element. The symmetry operations of a molecule from a group. Flow chart for the identification of molecular point group.

2. Theory of quantitative analysis

a) Principles of volumetric analysis. Theories of acid-base, redox, complexometric, iodometric and precipitation titrations, choice of indicators for these titrations.

a) Principles of gravimetric analysis: precipitation, coagulation, peptization, coprecipitation, post precipitation, digestion, filtration and washing of precipitate, drying and ignition, precipitation from homogenous solutions, requirements of gravimetric analysis.

3. Evaluation of analytical data.

Theory of errors, idea of significant figures and its importance, accuracy -- methods of expressing accuracy, error analysis and minimization of errors, precision -- methods of expressing precision, standard deviation and confidence limit.

. Introductory treatment to:

a) Pericyclic Reactions

Concerted reactions, Molecular orbitals, Symmetry properties HOMO, LUMO. Thermal and photochemical pericyclic reactions. Types of pericyclic reactions -- electrocyclic, cycloaddition and sigmatropic reactions - one example each.

b) Synthetic strategies

Terminology -- Disconnection (dix), Symbol (), synthon, synthetic equivalent (St). Functional group interconversion (FGI), Linear, Convergent and Combinatorial syntheses, Target molecule TM, Retrosynthesis of the following molecules

1) acetophenone 2) cyclohexene 3) phenylethylbromide

c) Asymmetric (Chiral) synthesis

1) Definitions- Asymmetric synthesis, enantiomeric excess, diastereomeric excess, stereospecific reaction, definition, example, dehalogenation of 1,2-dibromides by I-, stereoselective reaction, definition, example, acid catalysed dehydration of 1-phenylpropanol.

8 hrs

4 hrs

5 hrs

4 hrs

4hrs

K. Manjula
19/10/2016
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Faculty of Science

B.Sc. II Yr. III Semester (Backlog) Examination, Mar/Apr 2016

CHEMISTRY - III (CBCS)

Time: 2 ½ Hrs.

Max.Marks: 70

SECTION - A (5 x 2 = 10)**Answer the following questions.**

1. What is the HVZ reaction - Give an example .
2. What is the active methylene group - Give an example.
3. Give the equation for the preparation of primary alcohol from Grignard Reagent.
4. Define the post precipitation and coprecipitation.
5. Give two examples of Improper Rotational axis of symmetry.

SECTION - B (4 x 5 = 20)**Answer any FOUR of the following questions.**

6. Write the Reaction mechanism of pinacol - pinacolone rearrangement.
7. Give the synthesis of aldehydes and ketones by using 1,3 Butadienes.
8. What is the claisen condensation Give one example with mechanism.
9. Give the increasing order of Acidity of the following.
i) Acetic acid ii) Monochloro Acetic acid iii) Dichloroacetic acid iv) Trichloro - Acetic acid
10. Write the classification of perycyclic reactions with suitable examples.
11. Give the Retrosynthesis of phenylethyl Bromide.

Answer the following questions.**SECTION - C (4 x 10 = 40)**

12. (a) Give the reaction mechanism of perkin reaction.
(b) Explain about Keto enol tautomerism.
(OR)
(c) Explain the reaction mechanism of SN² reaction.
(d) Give th reaction mechanism of the following.
i) Hans Dicker reaction ii) Kolbe - Schmidt reaction
13. (a) Explain the reaction mechanism of SN¹ reaction.
(b) Give the preparation of phenol from (i) Diazonium salt (ii) from aryl Sulphonates.
(OR)
(c) Explain Bonzoin condensation.
(d) What is esterification? Give example with mechanism.
14. (a) Explain any two Symmetric operations with examples.
(b) Give the characteristics of HUMO & LUMO.
(OR)
(c) What is error? Explain the types of errors.
(d) What is Aldol condensation - Give one example.
15. (a) Explain stereo specificity & stereo selectivity.
(b) Explain the enantiomeric excess and Diastereomeric excess.
(OR)
(c) Define the following.
1. Functional Group Interconvention (FGI) 2. Target molecule
3. Disconnection
5. Synthons
(d) Explain the Complexo Metric Titration.

A. Manjula

Y & 19/10/2016
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//TELUGU VERSION//
CHEMISTRY - III (CBCS)

Time: 2 ½ Hrs.

Max.Marks: 70

SECTION - A (5 x 2 = 10)

ఈ క్రింది ప్రశ్నలకు జవాబులు వ్రాయండి.

1. HVZ చర్యను ఉదాహరించుము.
2. చురుకైన మిథిలన్ సమూహం అనగానేమి ఉదాహరించుము.
3. గ్రిగ్నార్డ్ కారకము ద్వారా పైమల ఆల్కహాల్ను తయారుచేయు విధానమును తెలుపుము.
4. ఉత్తరావక్షేపణము, సహ అవక్షేపణమును నిర్వచించుము.
5. అనియమిత అక్షము భ్రమణ పరావర్తన ప్రక్రియకు రెండు ఉదాహరణలు తెలుపుము.

SECTION - B (4 x 5 = 20)

ఈ క్రింది వానిలో ఏవేని 4 ప్రశ్నలకు జవాబులు వ్రాయండి.

6. పినకోల్-పినకలోన్ చర్య యొక్క చర్యా విధానము వ్రాయుము.
7. 1,3 బ్యూటాడయిన్ లను ఉపయోగించి ఆల్లిఫైడ్ మరియు కేటోన్లను తయారుచేయుము.
8. క్లెన్సన్ సంఘనము అనగానేమి? ఒక ఉదాహరణ తెలుపుము.
9. ఈ క్రింది వాటిలో ఆమ్లత్వం పెరిగే క్రమంలో వ్రాయుము.

1) ఎసిటికామ్లము	2) మోనోక్లోరో ఎసిటిక్ ఆమ్లము
3) డైక్లోరో ఎసిటికామ్లము	4) ట్రిక్లోరో - ఎసిటిక్ ఆమ్లము
10. పెరిస్టెక్టిక్ చర్యల యొక్క వర్గీకరణమును ఉదాహరించుము.
11. లిట్రో సంక్షేపణము అనగానేమి? ఒక ఉదాహరణ తెలుపుము.

ఈ క్రింది ప్రశ్నలకు జవాబులు వ్రాయండి.

SECTION - C (4 x 10 = 40)

12. (a) పెల్జీన్ చర్య యొక్క చర్యా విధానాన్ని వ్రాయుము.
(b) కీటో - ఈనాల్ టాటోమెరిజంను వివరించుము.
(OR)
(c) SN² చర్య యొక్క చర్యా విధానమును వ్రాయుము.
(d) క్రింది వాటికి చర్యా విధానమును వ్రాయుము.
1) హన్స్ డెకర్ చర్య 2) కోల్బ్ స్కిట్ క్షయయరణచర్య
13. (a) SN¹, చర్య యొక్క చర్యా విధానాన్ని వ్రాయుము.
(b) ఈ క్రింది వాటినుండి ఫినాల్ను ఎలా తయారు చేస్తారు.
i) డైయతోనియం లవణం ii) ఎరైల్ సల్ఫోనేట్లు
(OR)
(c) బెంజోయిన్ సంఘననమును వివరించుము.
(d) ఎస్టర్లకేషన్ అనగానేమి? ఒక ఉదాహరణ చర్యా విధానంను తెలుపుము.
14. (a) ఏవైన రెండు సొప్టవ ప్రక్రియలను ఉదాహరించుము.
(b) HUMO మరియు LUMO లక్షణాలను వివరించండి.
(OR)
(c) దోషం అనగానేమి? వాటిలోని రకాల గురించి వివరించుము.
(d) ఆల్కాల్ సంఘననమును ఉదాహరించుము.
15. (a) ప్రాదేశిక విశిష్టత, ప్రాదేశిక వరణీయతలను ఉదాహరించుము.
(b) ఎనన్షియోమెరిక్ ఆధిక్యత మరియు డయాస్టీరియోమెరిక్ ఆధిక్యతను వివరించుము.
(OR)
(c) ఈ క్రింది వాటిని నిర్వచించుము.
1. FGI 2. లక్ష్య అణువు 3. సింథాస్
(d) కాంప్లెక్స్మెట్రిక్ అంశమపనమును వివరించుము.

	<p>SEMESTER IV</p> <p>IN ORGANIC CHEMISTRY</p> <p>1. Chemistry of d-block elements: Characteristics of d-block elements with special reference to electronic configuration, variable valence, magnetic properties, catalytic properties and ability treatment of second and third transition series with their 3d analogues., Study of Ti, Cr and Cu traids in respect of electronic configuration and reactivity Of different oxidation states.</p> <p>2. Chemistry of f-block elements: Chemistry of lanthanides — electronic structure, oxidation states, lanthanide contraction, consequences of lanthanide contraction, magnetic properties, spectral properties and separation of lanthanides by ion exchange and solvent extraction methods. Chemistry of actinides — electronic configuration, oxidation states, actinide contraction. position of actinides in the periodic table, comparison with lanthanides in terms of magnetic properties. spectral properties and complex formation.</p>	<p>9 hrs</p>
<p>UNIT-I</p>		<p>8 hrs</p>
<p>UNIT II</p>	<p>1. Theories of bonding in metals: Valence bond theory, Explanation of metallic properties and its limitations, Free electron theory, thermal and electrical conductivity of metals, limitations, Bond theory, formation of bands, explanation of conductors, semiconductors and insulators.</p> <p>2. Metal carbonyls and related compounds — FAN rule, classification of metal carbonyls, structures and shapes of metal carbonyls of V, Cr, Mn, Fe, Co and Ni. Metal nitrosyls and metallocenes (only ferrocene).</p>	<p>7 hrs</p>
<p>UNIT III</p>	<p>(PHYSICAL CHEMISTRY)</p> <p>1. Phase rule Concept of phase, components, degree of freedom. Derivation of Gibbs phase rule. Phase equilibrium of one component — water system. Phase equilibrium of two-component system, solid-liquid equilibrium. Simple eutectic diagram of Pb-Ag system, desilverisation of lead. Solid solutions-compound with congruent melting point- (Mg-Zn) system, cnpound with incongruent melting point- NaCl- water system. Freezing mixtures.</p> <p>2. Dilute solutions</p>	<p>5 hrs</p> <p>8hrs</p>

LABORATORY COURSE –II

Practical Paper –II(Inorganic Chemistry)

90 hrs (3h/w)

I. Titrimetric analysis:

1. Calibration of weights.
2. Determination of carbonate and bicarbonate in a mixture.
3. Determination of Fe (II) Using $K_2Cr_2O_7$
4. Determination of Fe (II) using $KMnO_4$
5. Determination of Cu (II) using $Na_2S_2O_3$
6. Determination of Zn using EDTA
7. Determination of hardness of water
8. Determination of Zn by ferrocyanide

II. Gravimetric Analysis (Any three of following)

1. Determination of Barium as barium sulphate .
2. Determination of sulphate as barium sulphate .
3. Determination of lead as lead chromate.
4. Determination of nickel as Ni-DMG complex.
5. Determination of magnesium as magnesium pyrophosphate.

UNIT-IV

Colligative properties. Raoult's law, relative lowering of vapour pressure, its relation to molecular weight of non-volatile solute Elevation of boiling point and depression of freezing point. Derivation of relation between molecular weight and elevation in boiling point and depression in freezing point. Experimental methods of determination. Osmosis, osmotic pressure, experimental determination. Theory of dilute solutions. Determination of molecular weight of non-volatile solute from osmotic pressure. Abnormal colligative properties. Van't Hoff factor, degree of dissociation and association.

1). Electrochemistry

Specific conductance, equivalent conductance, measurement of equivalent conductance. Variation of equivalent conductance with dilution. Migration of ions, Kohlrausch's law. Arrhenius theory of electrolyte dissociation and its limitations Ostwald's dilution law. Debye-Huckel-Onsager's equation of conductivity (elementary treatment only). Definition of transport number, determination by Hittorf's method. Application of conductivity measurements- determination of dissociation constant (K_a) of an acid. determination of solubility product of sparingly soluble salt, conductometric titration. Types of reversible electrodes-the gas electrode, metal-metal ion, metal-insoluble salt and redox electrodes

Electrode reactions, Nernst equation, single electrode potential, standard Hydrogen electrode, reference electrodes, standard electrode potential. sign, convention, electrochemical series and its significance.

Reversible and irreversible cells, conventional representation of electrochemical cells. EMF of a cell and its measurements. Computation of cell EMF. Applications of EMF measurements, Calculation of thermodynamic quantities of cell reactions (ΔG , ΔH and K). determination of pH using quinhydrone electrode, Solubility product of $AgCl$. Potentiometric titrations..

17 hrs

A. Manjula
19/10/26

V 19/10/2016
Dr. D. Ramesh 19/10/16
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V SEMESTER

Organic Chemistry

UNIT - I

1. Nitrogen compounds

Nitro hydrocarbons: Nomenclature and classification – nitro hydrocarbons – structure.

Tautomerism of nitroalkanes leading to aci and keto form. Preparation of Nitroalkanes.

9hrs

Faculty of Science

B.Sc. II Yr. IV Semester-End Examination, Mar/Apr 2016

CHEMISTRY - IV (CBCS)

Time: 2 ½ Hrs.

Max.Marks: 70

SECTION - A (5 x 2 = 10)**Answer the following questions.**

1. Why CuSO_4 is blue while ZnSO_4 is colourless?
2. What are inner transition elements?
3. What are metallocenes?
4. What is Eutectic point?
5. What is electrochemical series?

SECTION - B (4 x 5 = 20)**Answer any FOUR of the following questions.**

6. Discuss the general properties of transition elements?
7. Write a note on Actinide contraction?
8. What are semi-conductors? Give an account of p & n-type of semi conductors.
9. What are the characteristics properties of metals?
10. Explain Zn-Mg system briefly.
11. Write a note on Rault's law?

Answer the following questions.**SECTION - C (4 x 10 = 40)**

12. (a) What are d-block elements? Explain their colour property and various oxidation states.
(b) Explain about copper triad?

(OR)

- (c) What are Lanthanides? Why are they grouped together?
- (d) Explain the separation of lanthanides by solvent extraction method?

13. (a) Write a note on conductors?
(b) Explain Free electron theory?

(OR)

- (c) What are metal carbonyls? Give their classification briefly.
- (d) Explain the structuring of $\text{Mn}_2(\text{CO})_{10}$ and $\text{Co}_2(\text{CO})_8$.

14. (a) What is phase rule? Define different terms in phase rule?
(b) Draw a labelled diagram of water system.

(OR)

- (c) What are Colligative properties? Explain briefly about osmotic pressure?
- (d) What is Van't Hoff factor? Explain the relationship between Van't Hoff factor and degree of dissociation?

15. (a) What are the main postulates of Debye-Huckel theory of strong electrolytes?
(b) Write a note on different types of conductometric.

(OR)

- (c) Derive the Nernst Equation?
- (d) What is electrochemical series? Write its significance.

Assessment

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//TELUGU VERSION//
CHEMISTRY - IV (CBCS)

Time: 2 ½ Hrs.

Max.Marks: 70

SECTION - A (5 x 2 = 10)

ఈ క్రింది ప్రశ్నలకు జవాబులు వ్రాయండి.

1. CuSO_4 నీలివర్ణం మరియు ZnSO_4 రంగును ప్రదర్శించకపోవడానికి గల కారణమేమిటి.
2. అంతర పరివర్తన మూలకాలు అనగానేమి?
3. metallocene లు అనగానేమి?
4. యుటిక్లిక్ స్థానం అనగానేమి?
5. విద్యుత్ రసాయన శ్రేణి అనగానేమి?

SECTION - B (4 x 5 = 20)

ఈ క్రింది వానిలో ఏవేని 4 ప్రశ్నలకు జవాబులు వ్రాయండి.

6. పరివర్తన మూలకాలయొక్క సాధారణ ధర్మాలను వివరించుము.
7. ఆక్సిసైడ్ సంకేచం గూర్చి వ్రాయండి.
8. p & n అర్ధవాహకాలు అనగానేమి? అర్ధవాహకాల గూర్చి తెలపండి.
9. లోహాల యొక్క సాధారణ లక్షణాలను పేర్కొనుము.
10. Zn-Mg వ్యవస్థను గూర్చి క్లుప్తంగా వివరించుము.
11. రౌల్డ్ నియమము గూర్చి వ్రాయండి.

ఈ క్రింది ప్రశ్నలకు జవాబులు వ్రాయండి.

SECTION - C (4 x 10 = 40)

12. (a) డి-బ్ల్యాక్ మూలకాలు అనగానేమి? వాటి రంగును ప్రదర్శించే ధర్మము మరియు వాటి వివిధ ఆక్సికరణ స్థితులను వ్రాయుము.

(b) కాపర్ త్రికమును గూర్చి వివరించుము.

(OR)

(c) లాంథనైడ్ లు అనగానేమి? వాటిని ఒకే గ్రూప్ లో చేర్చడానికి గల కారణమేమి?

(d) ద్రావణి నిష్కర్షణ పద్ధతి ద్వారా లాంథనైడ్లను వేరుచేయుటను వివరించుము.

13. (a) వాహకాల గూర్చి వ్రాయుము.

(b) స్వేచ్ఛా ఎలక్ట్రాన్ సిద్ధాంతంను గూర్చి వివరించండి.

(OR)

(c) లోహ కార్బనైడ్ లు అనగానేమి? వాటి పల్లికరణను క్లుప్తంగా వివరించుము.

(d) $\text{Mn}_2(\text{CO})_{10}$ మరియు $\text{Co}_2(\text{CO})_8$ ల యొక్క నిర్మాణం వివరించండి.

14. (a) ప్రొవస్థ నియమము అనగానేమి? వాటిలోని వివిధ పదాలను నిర్వచించుము.

(b) వ్యవస్థ యొక్క ప్రొవస్థ పటాన్ని గీయుము.

(OR)

(c) కణాధార ధర్మాలు అనగానేమి? ద్రవాజిసరణ పీడనం గూర్చి క్లుప్తంగా వివరించుము.

(d) వాంట్ హాఫ్ గుణకం అనగానేమి? వాంట్ హాఫ్ గుణకానికి మరియు విఘటన తీవ్రతకు మధ్య గల సంబంధాన్ని వివరించుము.

15. (a) బలమైన విద్యుత్ విశ్లేషకాలకు Debye-Huckel సిద్ధాంతములోని ప్రతిపాదనలను వ్రాయండి.

(b) వివిధ విద్యుత్ వాహక అంశమాపనాలను గూర్చి వ్రాయుము.

(OR)

(c) నెర్నెస్ట్ సమీకరణమును ఉత్పాదించుము.

(d) విద్యుత్ రసాయన శ్రేణి అనగానేమి? దాని యొక్క ప్రాముఖ్యతను గూర్చి వ్రాయుము.

Reactivity – halogenation, reaction with HONO (Nitrous acid), Nef reaction and Mannich reaction leading to Michael addition and reduction.

Amines (Aliphatic and Aromatic): Nomenclature, Classification into 1^o, 2^o, 3^o Amines and Quarternary ammonium compounds. Preparative methods -1. Ammonolysis of alkyl halides 2. Gabriel synthesis 3. Hoffman's bromamide reaction (mechanism). 4. Reduction of Amides and Schmidt reaction. Physical properties and basic character – Comparative basic strength of Ammonia, methyl amine, dimethyl amine, trimethyl amine and aniline – comparative basic strength of aniline, N-methylaniline and N,N-dimethyl aniline (in aqueous and non-aqueous medium), steric effects and substituent effects. Use of amine salts as phase transfer catalysts. Chemical properties: a) Alkylation b) Acylation c) Carbylamine reaction d) Hinsberg separation e) Reaction with Nitrous acid of 1^o, 2^o, 3^o (Aliphatic and aromatic amines). Electrophilic substitutions of Aromatic amines – Bromination and Nitration. oxidation of aryl and 3^o Amines. Diazotization Cyanides and isocyanides: Nomenclature (aliphatic and aromatic) structure. Preparation of cyanides from a) Alkyl halides b) from amides c) from aldoximes. Preparation of isocyanides from Alkyl halides and Amines. Properties of cyanides and isocyanides, a) hydrolysis b) addition of Grignard reagent iii) reduction iv) oxidation

1. Heterocyclic Compounds

Introduction and definition: Simple 5 membered ring compounds with one hetero atom
 Ex. Furan. Thiophene and pyrrole. Importance of ring system – presence in important natural products like hemoglobin and chlorophyll. Numbering the ring systems as per Greek letter and Numbers. Aromatic character – 6- electron system (four-electrons from two double bonds and a pair of non-bonded electrons from the hetero atom). Tendency to undergo substitution reactions.
 Resonance structures: Indicating electron surplus carbons and electron deficient hetero atom. Explanation of feebly acidic character of pyrrole, electrophillic substitution at 2 or

UNIT-II

5 hrs

5 position, Halogenation, Nitration and Sulphonation under mild conditions.
Reactivity of furan as 1,3-diene, Diels Alder reactions (one example). Sulphonation of thiophene purification of Benzene obtained from coal tar). Preparation of furan, Pyrrole and thiophene from 1,4,- dicarbonyl compounds only, Paul-Knorr synthesis, structure of pyridine, Basicity – Aromaticity – Comparison with pyrrole – one method of preparation and properties – Reactivity towards Nucleophilic substitution reaction – chichibabin reaction.

6 hrs

2. Carbohydrates

Monosaccharides: All discussion to be confined to (+) glucose as an example of aldo hexoses and (-) fructose as example of ketohexoses. Chemical properties and structural elucidation: Evidences for straight chain pentahydroxy aldehyde structure (Acetylation, reduction to n-hexane, cyanohydrin formation, reduction of Tollen's and Fehling's reagents and oxidation to gluconic and saccharic acid).

8 hrs

Number of optically active isomers possible for the structure, configuration of glucose based on D-glyceraldehyde as primary standard (no proof for configuration is required). Evidence for cyclic structure of glucose (some negative aldehydes tests and mutarotation). Cyclic structure of glucose. Decomposition of cyclic structure (Pyranose structure, anomeric Carbon and anomers). Proof for the ring size (methylation, hydrolysis and oxidation reactions). Different ways of writing pyranose structure (Haworth formula and chair conformational formula). Structure of fructose: Evidence of 2 – ketohexose structure (formation of penta acetate, formation of cyanohydrin its hydrolysis and reduction by HI to give 2-Carboxy-nhexane). Same osazone formation from glucose and fructose, Hydrogen bonding in osazones, cyclic structure for fructose (Furanose structure and Haworth formula). Interconversion of Monosaccharides: Aldopentose to aldo hexose – eg: Arabinose to DGlucose, D-Mannose (Kiliani - Fischer method). Epimers, Epimerisation – Lobry de bruyn van Ekenstein rearrangement. Aldohexose to Aldopentose eg: D-glucose

UNIT -III

to Darabinose
by Ruff degradation. Aldohexose (+) (glucose) to ketohexose (-) (Fructose)
and Ketohexose (fructose) to aldohexose (Glucose)

1. Aminoacids and proteins

Introduction: Definition of Amino acids, classification of Amino acids into alpha, beta, and gamma amino acids. Natural and essential amino acids – definition and examples, classification of alpha amino acids into acidic, basic and neutral amino acids with

examples. Methods of synthesis: General methods of synthesis of alpha amino acids

(specific examples – Glycine, Alanine, valine and leucine) by following methods: a)

from halogenated carboxylic acid b) Malonic ester synthesis c) strecker's synthesis.

Physical properties: Optical activity of naturally occurring amino acids: L-configuration,

irrespective of sign rotation, Zwitterion structure – salt like character - solubility, melting

points, amphoteric character, definition of isoelectric point.

Chemical properties: General reactions due to amino and carboxyl groups – lactams from

gamma and delta amino acids by heating peptide bond (amide linkage).

Structure and

nomenclature of peptides and proteins.

5hrs

2. Mass Spectrometry:

Basic principles – Molecular ion / parent ion, fragment ions / daughter ions.

Theory –

formation of parent ions. Representation of mass spectrum. Identification of parent ion,

(M+1), (M+2), base peaks (relative abundance 100%) Determination of molecular

formula – Mass spectra of ethylbenzene, acetophenone, n-butyl amine and 1-propanal.

5hrs

UNIT-IV

1.Reactivity of metal complexes:

1. Labile and inert complexes, ligand substitution reactions

– SN1 and SN2, substitution reactions of square planar complexes – Trans effect and

applications of trans effect.

2. Stability of metal complexes: Thermodynamic stability and kinetic stability, factors

affecting the stability of metal complexes, chelate effect, determination of composition of

4 hrs

4 hrs

complex by Job's method and mole ratio method.

3. **HARD OAN SOFT ACIDS ,BASES (HSAB);**
Classification, pearson's concept of hardness and softness, application of HSAB principles- stability of compounds/complexes, predicting the feasibility of reaction

4. **Bio inorganic chemistry:** Essential elements, biological significance of Na, K, Mg, Ca, Fe, Co, Ni, Cu, Zn and chloride (Cl-). Metalloporphyrins – hemoglobin, structure and Function, Chlorophyll, structure and role in photosynthesis.

4 hrs

4 hrs

A. Sampath
19/10/16

V S 19/10/2016
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V - SEMESTER – CHEMISTRY SYLLABUS

Paper – 6th Paper physical chemistry

9 hrs

Unit-I

1. Chemical kinetics

Rate of reaction, factors influencing the rate of a reaction-concentration, temperature, pressure, solvent, light, catalyst. Experimental methods to determine the rate of reaction.

Definition of order and molecularity. Derivation of rate constants for first, second, third

and zero order reactions and examples. Derivation for time half change. Methods to

determine the order of reactions. Kinetics of complex reactions (first order only):

opposing reactions, parallel reactions, consecutive reactions and chain reactions. Effect of temperature on rate of reaction, Arrhenius equation, concept of activation energy.

Theories of reaction rates- collision theory-derivation of rate constant for bimolecular

reaction. The transition state theory (elementary treatment).

5 hrs

1. Photochemistry

factors affecting crystalfield splitting energy, merits and demerits of crystal-field theory. Isomerism in coordination compounds. – structural isomerism and stereo isomerism, stereochemistry of complexes with 4 and 6 coordination numbers.

4 hrs

5. Spectral and magnetic properties of metal complexes: Electronic absorption spectrum of $[Ti(H_2O)_6]^{3+}$ ion. Types of magnetic behavior, spin-only formula, calculation of magnetic moments, experimental determination of magnetic susceptibility – Gouy method.

As per

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VI - SEMESTER – CHEMISTRY SYLLABUS

Paper – 7th Paper

Physico Chemical methods of analysis

12 hrs

1. Separation techniques

1. Solvent extraction: Principle and process, Batch extraction, continuous extraction

and counter current extraction. Application – Determination of Iron (III)

2. Chromatography: Classification of chromatography methods, principles of differential migration adsorption phenomenon, Nature of adsorbents, solvent systems, Rf values, factors effecting Rf values.

a. Paper Chromatography: Principles, Rf values, experimental procedures, choice of paper and solvent systems, developments of chromatogram – ascending, descending and radial. Two dimensional chromatography, applications.

b. Thin layer Chromatography (TLC): Advantages. Principles, factors effecting Rf values. Experimental procedures. Adsorbents and solvents. Preparation of plates. Development of the chromatogram. Detection of the spots. Applications.

c. Column Chromatography: Principles, experimental procedures, Stationary and mobile Phases, Separation technique. Applications

d. High Performance Liquid Chromatography (HPLC): Principles and Applications.

e. Gas Liquid Chromatography (GLC): Principles and Applications

4 hrs

2. Spectrophotometry

General features of absorption – spectroscopy, Beer-Lambert's law and its limitations,

transmittance, Absorbance, and molar absorptivity. Single and double beam spectrophotometers. Application of Beer-Lambert law for quantitative analysis

Unit – I

UNIT -II

UNIT -II

Difference between thermal and photochemical processes. Laws of photochemistry- Grothus-Draper's law and Stark-Einstein's law of photochemical equivalence. Quantum yield. Ferrioxalate actinometry. Photochemical hydrogen- chlorine, hydrogen-bromine reaction. Jablonski diagram depicting various processes occurring in the excited state, qualitative description of fluorescence, phosphorescence, non-radiative processes (internal conversion, intersystem crossing). Photosensitized reactions- energy transfer processes (simple example)

2. Thermodynamics -I

The first law of thermodynamics-statement, definition of internal energy and enthalpy. Heat capacities and their relationship. Joule's law-Joule-Thomson coefficient.

Calculation of w , q , dU and dH for the expansion of perfect gas under isothermal and

adiabatic conditions for reversible processes. State function.

Temperature dependence of enthalpy of formation-Kirchoff's equation.

6hrs

UNIT -III**Thermodynamics -II**

Second law of thermodynamics. Different Statements of the law. Carnot cycle and its

efficiency. Carnot theorem. Thermodynamic scale of temperature. Concept of entropy,

entropy as a state function, entropy changes in cyclic, reversible, and irreversible

processes and reversible phase change. Calculation of entropy changes with changes in V

& T and P & T . Entropy of mixing inert perfect gases. Entropy changes in spontaneous

and equilibrium processes.

The Gibbs (G) and Hlmholtz (A) energies. A & G as criteria for thermodynamic

equilibrium and spontaneity-advantage over entropy change. Gibbs equations and the

Maxwell relations. Variation of G with P , V and T .

Inorganic chemistry

1. Coordination Chemistry: IUPAC nomenclature, bonding theories - review of Werner's theory and Sidgwick's concept of coordination, Valence bond theory,

geometries of coordination numbers 4-tetrahedral and square planar and 6-octahedral and its limitations, crystal field theory, splitting of d-orbitals in octahedral, tetrahedral and

square-planar complexes - low spin and high spin complexes

10 hrs

UNIT-IV

10 hrs

UNIT-III

of

1. Chromium in $K_2Cr_2O_7$
2. Manganese in manganous sulphate
3. Iron (III) with thiocyanate.

4 hrs

2. Electronic spectroscopy:

Interaction of electromagnetic radiation with molecules and types of molecular spectra.

Potential energy curves for bonding and antibonding molecular orbitals.

Energy levels of molecules (σ, δ, n). Selection rules for electronic spectra. Types of electronic transitions

in molecules effect of conjugation. Concept of chromophore.

4 hrs

1. Infra red spectroscopy

Energy levels of simple harmonic oscillator, molecular vibration spectrum, selection

rules. Determination of force constant. Qualitative relation of force constant to bond

energies. Anharmonic motion of real molecules and energy levels. Modes of vibrations in

polyatomic molecules. Characteristic absorption bands of various functional groups.

Finger print nature of infrared spectrum.

2. Raman spectroscopy

Concept of polarizability, selection rules, pure rotational and pure vibrational Raman

spectra of diatomic molecules, selection rules.

3hrs

3. Proton magnetic resonance spectroscopy (1H -NMR)

Principles of nuclear magnetic resonance, equivalent and non-equivalent protons,

position of signals. Chemical shift, NMR splitting of signals – spin-spin coupling,

coupling constants. Applications of NMR with suitable examples – ethyl bromide,

ethanol, acetaldehyde, 1,1,2-tribromo ethane, ethyl acetate, toluene and acetophenone.

3 hrs

(v) Spectral interpretation

Interpretation of IR, UV-Visible, 1H -NMR and mass spectral data of the following

compounds 1. Phenyl acetylene 2. Acetophenone 3. Cinnamic Acid 4. para-nitro aniline.

5 hrs

UNIT-IV

1. Pesticides

1. Introduction to pesticides – types – Insecticides, Fungicides, Herbicides, Weedicides,

Rodenticides plant growth regulators, Pheromones and Hormones. Brief

discussion with examples, Structure and uses.
ii. Synthesis and present status of the following.
DDT, BHC, Malathion, Parathion, Endrin, Baygon, 2,4-D and Endo-sulphon

5hrs

2. Green Chemistry

Introduction: Definition of green Chemistry, need of green chemistry, basic principles of green chemistry

Green synthesis: Evaluation of the type of the reaction i) Rearrangements (100% atom economic), ii) Addition reaction (100% atom economic), Pericyclic reactions (no by-product).

Selection of solvent:

i) Aqueous phase reactions ii) Reactions in ionic liquids iii) Solid supported synthesis

iv) Solvent free reactions (solid phase reactions)

ii) Green catalysts: i) Phase transfer catalysts (PTC) ii) Biocatalysts

Microwave and Ultrasound assisted green synthesis:

1. Aldol condensation
2. Cannizzaro reaction
3. Diels-Alder reactions
4. Strecker synthesis
5. Willaimson synthesis
6. Dieckmann condensation

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Faculty of Science
B.Sc. III Yr. V Semester-End Examination
CHEMISTRY - VI (CBCS)

Time: 2 ½ Hrs.

Max.Marks: 70

SECTION - A (5 x 2 = 10)

Answer the following questions.

1. Define first Law of thermodynamics.
2. Write the units for the first order and second order rate constants.
3. Define Stark Einstein law of photochemical equivalence.
4. Define "State Function" and give an example.
5. Write formula of the following complexes.
 1. Hexa amine cobalt (III) chloride.
 2. Potassium hexa cyano ferrate (II)

SECTION - B (4 x 5 = 20)

Answer any FOUR of the following questions.

6. For a first order reaction prove that $t_{90\%} = 3.3 t_{1/2}$.
7. Prove $C_p - C_v = R$ for ideal gases.
8. A photo chemical system absorbs 3×10^{20} Quanta of light for a second on irradiation for 2 min. 0.002 moles of the reactant was found to have reacted. Calculate the quantum yield of the photochemical process.
9. Prove that $\mu_{ST} = 0$ for ideal gases.
10. Describe Sidgwick's EAN rule give one example for obeying this rule.
11. Explain stereo isomerism with examples.

Answer the following questions.

SECTION - C (4 x 10 = 40)

12. (a) Write the factors influencing reaction rate.
(b) For a given reaction rate is 2×10^{-4} mole $\text{lit}^{-1}\text{s}^{-1}$ at 300 K and 6×10^{-4} mole $\text{lit}^{-1}\text{s}^{-1}$ at 310 K respectively calculate the activation energy of a reaction.
(OR)
(c) Derive the equation for the second order rate constant for $A \longrightarrow \text{Products}$.
(d) Derive the equation for the first order rate constant.
13. (a) Derive the equation for W_{max} in a gaseous system under isothermal conditions.
(b) One mole of a gas expanded reversibly, isothermally from 1L to 10L at 300 K find the work done.
(OR)
(c) Prove $Pv^\gamma = \text{Constant}$.
(d) An ideal gas is expanded irreversibly from 1 L to 10 L at 2atm and 300 K find the work.
14. (a) Derive Gibb's Helmholtz equation.
(b) Explain Jablonsky diagram.
(OR)
(c) Explain the Werner's theory of coordination complexes.
(d) Discuss the absorption spectra of $[\text{Ti}(\text{H}_2\text{O})_6]^{+3}$ ion.
15. (a) Discuss the splitting of d- orbitals in octahedral complexes.
(b) Explain the salient features of VBT.
(OR)
(c) Explain the structure and magnetic properties of complexes on the basis of VBT.
 1. $[\text{Co}(\text{NH}_3)_6]^{+3}$,
 2. $(\text{CoF}_6)^{3-}$
(d) Write a note on ionisation and linkage isomerism.

VII (Advance) Elective – II Syllabus

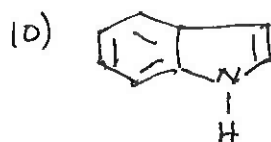
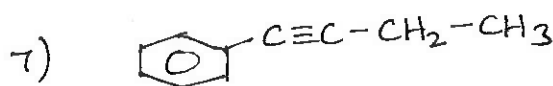
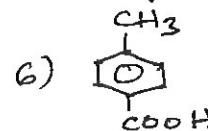
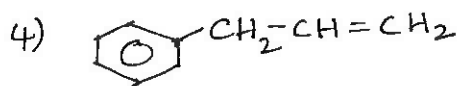
Alkaloids :- Morphine, Thebaine, Codeine, Pipavarine, Quinine, Isolation, Structural elucidation, Synthesis and Medicinal importance of the above alkaloids.

Terpenoids:- α - Terpenol, Camphor, Gerniol, α -pienene, Limonine, Isolation, Structural elucidation, Synthesis and Medicinal importance of the above Terpenoids.

VIII (Advance) Elective – II Syllabus

Spectral Problems based on NMR, Mass, IR, UV Spectral data.

- 1) Toluene 2) *p*-Nitro toluene 3) *p*-hydroxy benzaldehyde



V & 19/10/2016

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Faculty of Science
B.Sc. III Yr. V Semester-End Examination
CHEMISTRY - V (CBCS)

Time: 2 ½ Hrs.

Max.Marks: 70

SECTION - A (5 x 2 = 10)

Answer the following questions.

1. Write a note on nef reaction.
2. Explain the Diels - Alder Reaction of furan.
3. Define molecular ion with example.
4. Define anomer with example.
5. What are labile and inert complexes.

SECTION - B (4 x 5 = 20)

Answer any FOUR of the following questions.

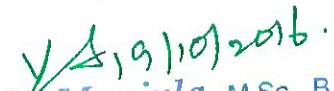
6. Write the reaction of glucose with phenyl hydrazene.
7. Write any two preparation methods for isocyanide.
8. Write the classification of amino acids based on their nature.
9. Write the Resonance structure of Pyrrole and pyridene.
10. Write the functions of Hemoglobin.
11. Write a note on jobs method for the determination of complex composition.

Answer the following questions.

SECTION - C (4 x 10 = 40)

12. (a) Discyuss the actin of Nitrous acid with primery secondary and tertiary amines.
(b) Explain the Hoffmann's bromamide reaction with mechanism.
(OR)
(c) Explain Chichibabin reaction with mechanism.
(d) Write the preparation of purrole, furan and thiophene.
13. (a) Write the strecker's synthesis for preparation of valine.
(b) Write the preparation method for Alanine from carboxylic acid.
(OR)
(c) Write the structure elucidation of open chain structure of glucose molecule.
(d) Write the Interconversion of glucose to fructose.
14. (a) Write the mass spectra of ethyl benzene.
(b) Write the mass spectra of acetophenone.
(OR)
(c) Explain the applications of trans effect.
(d) Explain the factors affecting the stability of Complexes.
15. (a) Explain SN¹ reaction mechanism in coordinator compounds with example.
(b) Explain the pearson's HSAB principle with suitable example.
(OR)
(c) Explain the structure and Function of Chlorophyll.
(d) Write a note on toxicity of As and Pb.


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