

**End Semester Examinations - Nov-Dec 2015 Exams**

**14CH1001 Applied Chemistry**

**Set A**

**Time : 3 hrs**  
**Total Marks: 100**

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1. a) What is zeolite? Explain Zeolite process of softening with a neat diagram. (12)  
b) Calculate total, permanent and temporary hardness of a sample water containing  $\text{Ca}(\text{HCO}_3)_2 = 16.2 \text{ mg/l}$ ,  $\text{CaCl}_2 = 22.2 \text{ mg/l}$ ,  $\text{MgSO}_4 = 24 \text{ mg/l}$ ,  $\text{Mg}(\text{HCO}_3)_2 = 7.3 \text{ mg/l}$  (atomic wt. of Ca and Mg are 40 and 24 respectively) (5)  
c) Write short note on calgon conditioning. (3)
- OR**
2. a) Write short notes on a) Disadvantages of scales      b) Difference between temporary and permanent hard water  
c) Breakpoint chlorination (12 marks)  
b) How does dissolved oxygen cause boiler corrosion? Suggest measures for its removal. (8)
3. a) Discuss the preparation, properties and uses of polyethylene. (8)  
b) List down the drawbacks of raw rubber. (8)  
c) Write a short note on condensation polymerisation. (4)
- OR**
4. a) How is bakelite prepared? Write down its uses. (7)  
b) Explain the role of moulding constituents of plastics. (7)  
c) Define the following with examples. i) Addition polymerisation      ii) Functionality (6)
5. a) Discuss the method of proximate analysis of coal. Give its significance. (10)  
b) Calculate Gross and Net calorific value of a coal sample containing Carbon-85%, Hydrogen-8%, Sulphur-1%, Nitrogen-2% and ash – 4% . (5)  
c) Write short note on rocket propellants. (5)
- OR**
6. a) Explain orsat method of flue gas analysis with a neat sketch. Point out the significance. (15)  
b) How is nitrogen estimated in Ultimate analysis of coal? (5)
7. a) Define electrode potential. Derive Nernst equation for electrode potential. (10)  
b) Calculate the emf of Daniel cell at  $25^\circ\text{C}$  when the concentration of zinc sulphate and copper sulphate are 0.01M and 0.1M respectively. The standard potential of cell is 1.2 volts. (5)  
c) Write a note on sacrificial anodic protection method of corrosion control. (5)
- OR**
8. a) Discuss the construction and working of a lead acid battery.. (12)  
b) What is oxidation corrosion? Explain the influence of stable, unstable, volatile, porous oxide layers in corrosion rate. (8)

9. a) Explain the steps involved in the manufacturing process of refractories. (10)
- b) Write note on a) Graphite as lubricant b) Gaseous electrical insulators. (10)

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**End Semester Examinations - Nov-Dec 2015 Exams**

**14CH1003 Environmental studies**

**Set A**

**Time : 3 hrs**  
**Total Marks: 100**

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1. a) Discuss the merits and demerits of Dams. (10)  
b) Explain in detail the role of an individual in conservation of natural resources? (10)
  - OR**
  2. a) What do you meant by soil erosion? Discuss the effects and control methods. (10)  
b) State hydrological cycle? Explain the effects of over utilization of ground water. (10)
  3. a) What is meant by ecological succession? Describe the stages of ecological succession. (10)  
b) What do you understand by conservation of biodiversity? Explain *In situ* conservation along with merits and limitations.(10)
  - OR**
  4. a) Elucidate the values of biodiversity with suitable examples. (10)  
b) Elaborately discuss the biogeographical classification of India. (10)
  5. a) What do you meant by green chemistry? Mention the principles involved in it. (10)  
b) Discuss the effects of water pollution on human health, plants and animals. (10)
  - OR**
  6. a) Write a note on different types of solid wastes. Suggest few measures to control urban wastes. (10)  
b) Define noise pollution. Discuss its effects and control methods. (10)
  7. a) Explain the importance of water conservation and the methods adopted for rain water harvesting. (8)  
b) List out the important tools to create the environment awareness. (5)  
c) Explain various measures and problems of sustainable development. (7)
  - OR**
  8. a) What do you mean by acid rain? Explain its causes and adverse effects. (10)  
b) Discuss the salient features of Wildlife Protection Act. (5)  
c) Suggest steps to conserve water in modern agriculture. (5)
  9. a) Distinguish between hypocenter and epicenter. Explain the effects of earthquake and its management steps. (10)  
b) What is the role of Information Technology in Human Health (5)  
c) Population explosion affects the environment seriously – Discuss (5)
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**End Semester Examinations - Nov-Dec 2015 Exams**

**14CH2001 Basic Inorganic Chemistry**

Set A	Time : 3 hrs Total Marks: 100	
1.	a) Explain the Bohr's atomic model with a neat diagram? (8) b) Write short notes on: i) Hund's rule    ii) aufbau principle    iii) Pauli exclusion principle    iv) Octant rule. (4X3)	
<b>OR</b>		
2.	a) Explain the discovery of Nucleus using Rutherford model? (10) b) Write short notes on: i) atomic number    ii) mass number (5+5)	
3.	a) Highlight the salient feature of a ionic bond? Illustrate with the specific example? (10) b) Explain the types of covalent bonds with suitable example? (10)	
<b>OR</b>		
4.	a) List out the physical properties of metallic bonds? (12) b) Write the Lewis structure of the following ionic compounds, NaCl, CaF <sub>2</sub> , Al <sub>2</sub> O <sub>3</sub> , MgO? (4X2)	
5.	a) Derive the Born-Landé equation? (10) b) What are crystal defects? Explain the types of Defects? (10)	
<b>OR</b>		
6.	a) Briefly discuss on 'Super conductivity' with an example? (10) b) What is bond order? Explain with a suitable example? (6) c) Findout the structure and types of overlapping using VBT for IF <sub>7</sub> ? (4)	
7.	a) Describe the salient features of Molecular Orbital Theory with Suitable examples? (12) b) Write the valence bond theory treatment of $\pi$ -bonding in ClNO and NO <sub>3</sub> <sup>2-</sup> ? (8)	
<b>OR</b>		
8.	a) Discuss the VSEPR theory with suitable example? (10) b) Give any three difference between bonding molecular orbital and antibonding molecular orbitals? (6) c) Write the molecular orbital diagram of O <sub>2</sub> molecule? (4)	
9.	a) Briefly discuss the Bronsted- Lowry concept of 'Acids and Bases'? (10) b) Explain the dual behavior of water? Give any two example? (10)	

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**End Semester Examinations - Nov-Dec 2015 Exams**

**14CH2006 Basic Organic Chemistry**

<b>Set B</b>		<b>Time : 3 hrs</b>
		<b>Total Marks: 100</b>
1.	Discuss the classification and nomenclature of heterocyclic compounds?	(10 +10)
<b>OR</b>		
2.	a) What are free radicals? Give two methods of their generation?	(12)
	b) Write a short note on 'arynes' ?	(8)
3.	a) What is mesomeric effect? explain using suitable examples?	(10)
	b) Differentiate between carbocation and carbanion?	(10)
<b>OR</b>		
4.	a) Explain addition reactions? Give an example for cyclo addition reaction?	(10)
	b) Differentiate between SN <sub>1</sub> and SN <sub>2</sub> reactions?	(10)
5.	a) Define the terms enantiomer and diastereoisomer? Give example?	(10)
	b) In mono substituted cyclohexanes, why the substituent prefer to occupy the equatorial position?	(10)
<b>OR</b>		
6.	Draw the chair conformations for 1,2 - Dimethylcyclohexane and explain?	(20)
7.	a) Draw the Newmann projection for different conformations of butane?	(12)
	b) Write briefly on tautomerism?	(8)
<b>OR</b>		
8.	Taking suitable examples explain the E, Z system for designating geometrical isomers?	(20)
9.	Explain the following rearrangements and their mechanism: i) Fries rearrangement, ii) Hofman rearrangement ?	(10 +10)

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**End Semester Examinations - Nov-Dec 2015 Exams**

**14CH2008 Basic Reaction Mechanism**

**Set A**

**Time : 3 hrs**  
**Total Marks: 100**

1. a. Selecting a suitable example, highlight the mechanism of an NGP reaction? **(12)**

- a. What are the evidences for the operation of an NGP reaction?  
**(8)**

**OR**

2. a. Write the Hammett equation?  
**(2)**

1. What does the sign and magnitude of the  $\rho$  value imply?  
**(10)**

- a. Outline the significance of the  $\sigma$  value in the Hammett equation?  
**(8)**

3. Explain the various mechanistic pathways followed in aromatic nucleophilic substitution reaction giving suitable examples? **(20)**

**OR**

4. a. Discuss the mechanism of the  $SN_1$  and  $SN_2$  reactions  
**(5+5)**

- a. Highlight the factors that affect the rate of both  $SN_1$  and  $SN_2$ ?  
**(5+5)**

5. a. State the Markonikoff's rule?  
**(3)**

- a. Briefly describe the various stages in the mechanism of a free radical addition? **(8)**

- a. Taking a suitable example, highlight the mechanism involved in a nucleophilic addition reaction?  
**(9)**

**OR**

6. a. Illustrate anti addition reaction with a suitable example?  
**(5)**

- a. Discuss the mechanism of HBr addition to 1,3-butadiene?  
**(10)**

- a. Write a note on cycloaddition reactions?  
**(5)**

7. a. Differentiate between a nucleophile and an electrophile?  
**(4)**

- a. What is an  $SE_2$  reaction?

(4)

- a. Discuss the mechanism of a

(6+6)

- (i) Hydrogenation reaction and (ii) a Hydration reaction

**OR**

8. a. Differentiate between a Wheland intermediate and a Meisenheimer intermediate? (6)

- a. Discuss the mechanism of operating in

I. Dehydrohalogenation reaction

(7)

II. Hydroxylation reaction

(7)

9. **Compulsory**

(8+4+8 = 20)

- (a) Discuss the important features of the mechanism of a E2 reaction?  
(b) Explain the factors favoring a E2 mechanistic pathway?  
(c) Formulate two suitable examples of reactions following the E2 pathway?

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**End Semester Examinations - Nov-Dec 2015 Exams**

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**14CH2023 Applied Nanochemistry and Next Generation Materials**

**Set B**

**Time : 3 hrs**  
**Total Marks: 100**

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1. a) How can you prepare 1D nano structure by using Bottom-Up method? (8+6+6 Marks)  
b) Write the preparation of nanoparticles by CVD method.  
c) How will you synthesis CdSe Nanocrystalites ?  
**OR**
2. a) How will you prepare Gold Nanoparticles in the Lab? (4+8+8 Marks)  
b) Explain how Sol Gel method used to fabricate nanoparticles?  
c) Write the spontaneous growth techniques used to form 1D nanostructure?
3. a) Explain Template based synthesis of Nanorods? (6+8+6 Marks)  
b) Write the three types nucleation modes with diagram?  
c) What is spinal? How will prepare in the laboratory?  
**OR**
4. a) Write the various method of preparation of CNT? (8+6+6 Marks)  
b) Discuss the three methods for the formation of monodispersed semi-conductor NPs?  
c) Narrate the various physical properties of the nanomaterials?
5. a) Discuss the methods of synthesis of Bucky Ball? (8+6+6 Marks)  
b) Write the three types nucleation modes with diagram?  
c) Discuss the advantages and disadvantages of STM.  
**OR**
6. a) Discuss the types of SPM? (4+10+6 Marks)  
b) Define MBE? Discuss the instrumentation, working principles of MBE?  
c) Difference between Evaporation and Sputtering for the fabrication of Thin Films?
7. a) Write brief notes on Scanning Tunneling Microscopy. (10+10 Marks)  
b) Write the instrumentation, working concepts and applications of AFM.  
**OR**
8. a) Write the concept of softlithography. (10+10 Marks)  
b) Discuss the instrumentation, working principles and applications of TEM?
9. a) Write the concept of photolithography. (10+10 Marks)  
b) Write the Short Term, Currently and Long Term Applications of Nanomaterials.
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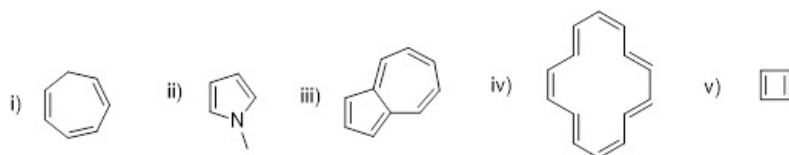
**End Semester Examinations - Nov-Dec 2015 Exams**

**15CH3003 Organic Reaction Mechanism and Stereochemistry**

**Set A**

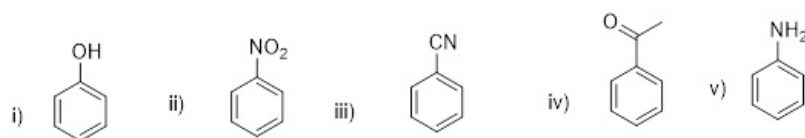
**Time : 3 hrs**  
**Total Marks: 100**

1. a. Derive Hammett Equation. Why is it called as LFER? 10
- b. What is Huckel's rule? Predict the aromaticity of the following compounds based on Huckel's rule. 10

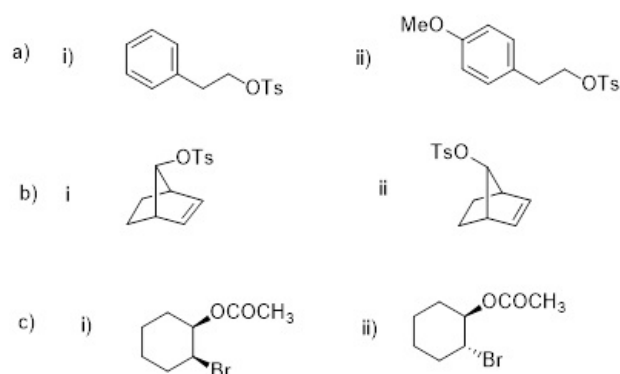


**OR**

2. a. What is the importance of  $\sigma$  and  $\rho$  in Hammett equation? 7
- b. What is primary kinetic isotopic effect? 3
- c. Explain the resonance effect in the following compounds with resonance structure. 10



3. a. Discuss on the addition - elimination and elimination - addition mechanism in detail. 10
- b. Which one of the following pair will undergo solvolysis faster? Explain your prediction based on the intermediates. 10



**OR**

4. a. How will you synthesize diazonium salt?. What are the synthetic applications of diazonium salt? 10
- b. What is Markovnikov rule. Explain Markovnikov's observation based on mechanism 4
- c. How will you achieve the synthesis of the following compounds from cyclohexene via Prevost and Woodward method? 6

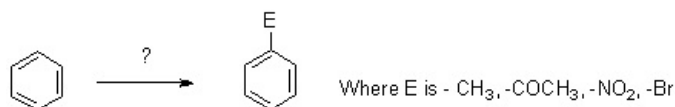


5. a. Differentiate between E1 and E2 elimination with mechanism. 8

b. Explain the following rules with suitable examples 4

i) Saytzev rule ii) Brett's rule

c. Suggest reagents for the following aromatic electrophilic substitution reactions. Give mechanism 8



**OR**

6. a. What is Friedel Crafts Reaction? Explain with mechanism. 8

b. Predict the O/P and meta directing nature of the following groups. Explain your prediction based on the resonance effect 8

i) NO<sub>2</sub> ii) OH iii) NH<sub>2</sub> iv) CN

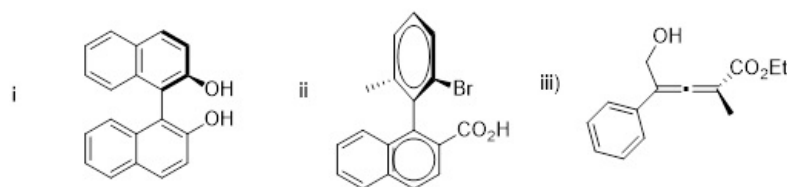
c. Even though -NH<sub>2</sub> group is o/p directing, aniline gives only meta nitro aniline upon nitration. Explain 4

7. a. Define the following terms with suitable examples. 10

i) Enantiomers ii) Diastereomers iii) Atropisomerism iv) chirality v) Plane of Symmetry

b. Differentiate between enantiomers and diastereomers 4

c. Assign R and S Configuration for the following compounds 6



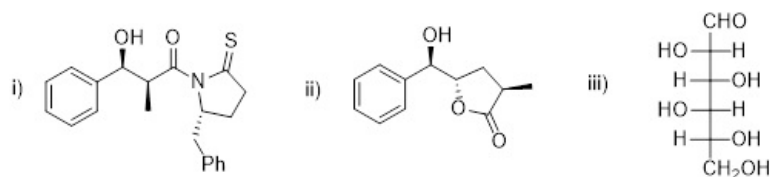
**OR**

8. a. Explain the following terms with suitable example 8

a. Helical chirality b) Planar chirality

b. Suitably substituted biphenyls are optically active in spite of the absence of chiral carbon. Discuss 2

c. Assign R and S configuration for all the chiral centers of the following compounds following Cahn-Ingold-Prelog method. 10

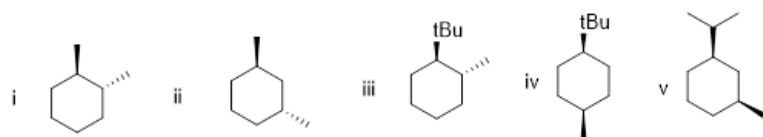


9. a. Define the following terms with suitable example 10

i) Enantioselectivity ii) stereospecificity iii) conformation iv) flag pole interaction v) 1,3-diaxial interaction

b. Discuss on the conformers of decalins 5

c) Predict the most stable conformers of the following compounds. Give reason 5



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**End Semester Examinations - Nov-Dec 2015 Exams**

**15CH3001 Chemical Kinetics and Photochemistry**

**Set B**

**Time : 3 hrs**  
**Total Marks: 100**

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1. 1.a. What is molecularity of a reaction? Explain its with examples. (3 marks)
- 1.b. Derive the rate constant expression for a third order reaction when the concentration of all the three reactants are similar? (10 marks)
- 1.c. What is a parallel reaction. Derive its kinetics. (7 marks)
- OR**
2. 2.a. Describe Lindemann – Hinshelwood hypothesis.(10 marks)
- 2 b. The rate constant of a reaction at 27<sup>o</sup> C and 37<sup>o</sup> C are  $1.3 \times 10^{-3} \text{ S}^{-1}$  and  $2.6 \times 10^{-3} \text{ S}^{-1}$  respectively. Determine its activation energy and the frequency factor at 27<sup>o</sup> C. (10 marks)
3. 3.a.What is a branching chain reaction? Explain its characteristics.(10 marks)
- 3.b.Describe the theory of absolute reaction rates. (10 marks)
- OR**
4. 4.a. Explain the principle of operation of flash photolysis with a diagram.(10 marks)
- 4.b. What is a stopped flow method? Explain with a schematic diagram. (10 marks)
5. 5.a. Derive Hammett relationship equation. Explain its importance. (10 marks)
- 5.b. Derive the kinetics of bimolecular surface reactions. (10 marks)
- OR**
6. 6.a. Derive the kinetics of enzyme – catalysed reactions. (10 marks)
- 6.b. What is a fast reaction? Derive the kinetic equation of a reaction.(10 marks)
7. 7. a.What is adsorption? Explain its characteristics.(10 marks)
- 7.b.Derive BET isotherm equation.(10 marks)
- OR**
8. 8.a. What is the significance of Beer – Lambert’s law? Derive its basic equation. (5 marks)
- 8.b. What is photosensitization? Explain any three photosensitized reactions.(10 marks)
- 8.c. Explain the significance of resonance fluorescence. (5 marks)
9. 9.a. What is an electronic spectra? Derive the equation for the frequency of an electronic transition.(10 marks)
- 9.b. Explain the mechanism of the following with examples. (10 marks)
- (i) Chemiluminescence; (ii) Phosphorescence
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**End Semester Examinations - Nov-Dec 2015 Exams**

**15CH3002 Chemical Bonding and Nuclear Chemistry**

**Set A**

**Time : 3 hrs**  
**Total Marks: 100**

1. (a)  $\text{HNO}_3$ ,  $\text{H}_2\text{SO}_4$ ,  $\text{HClO}_4$ ,  $\text{HCl}$  are all equally acidic in water. How? (4 Marks)
- (b) Mention the important factors in determining the relative acid strengths. (4 Marks)
- (c) Explain  $K_w$  with suitable mathematic expression. (4 Marks)
- (d) Explain the various Acid-Base concepts. (8 Marks)

**OR**

2. (a) Brief the conjugate acid and conjugate base with an example. (2 Marks)
- (b) Relate the  $\text{pK}_a$  value with acid strength. (2 Marks)
- (c) Explain Lewis concept of acid and base with example. (4 Marks)
- (d) What is the conjugate acid and conjugate base of the following (4 Marks)
- (i)  $\text{HCl}$ ; (ii)  $\text{CH}_3\text{NH}_2$ ; (iii)  $\text{OH}^-$ ; (e)  $\text{NH}_4^+$
- (e) Define: HSAB Principle. How to categorize hard acid and hard base, soft acid and soft Base? (8 Marks)
3. (a) Classify the solvents based on polar and non-polarity character. (2 Marks)
- (b) List of the type of reactions in non aqueous solvents. (2 Marks)
- (c) Explain the auto-ionisation reaction of any four Non-aqueous solvents. (4 Marks)
- (d) Concise the limitations of Non-aqueous solvents. (4 Marks)
- (e) Discuss about the Redox, Acid-base and Precipitation reactions in liquid Ammonia with suitable chemical equation. (8 Marks)

**OR**

4. (a) Brief "Amphiprotic solvents". (2 Marks)
- (b) Complete the following reactions (2 Marks)
- $\text{Mg} + \text{H}_2\text{SO}_4 \rightarrow$
- $\text{Zn} + \text{H}_2\text{SO}_4 \rightarrow$
- (c) How  $\text{NO}_2^+$  ion is produced? Explain. (4 Marks)
- (d) Mention the applications of Non-aqueous solvents. (4 Marks)
- (e) Discuss about the Redox and solvolytic reactions in sulphur dioxide with suitable chemical equation. (8 Marks)
5. (a) What is an ionic bond? (2 Marks)

(b) Which one of the following quantities is not involved in the Born-Haber cycle? (2 Marks)

- (i) Ionization energy
- (ii) Lattice enthalpy
- (iii) Electronegativity
- (iv) Enthalpy of formation

(c) Discuss the important characteristics of covalent compounds. (8 Marks)

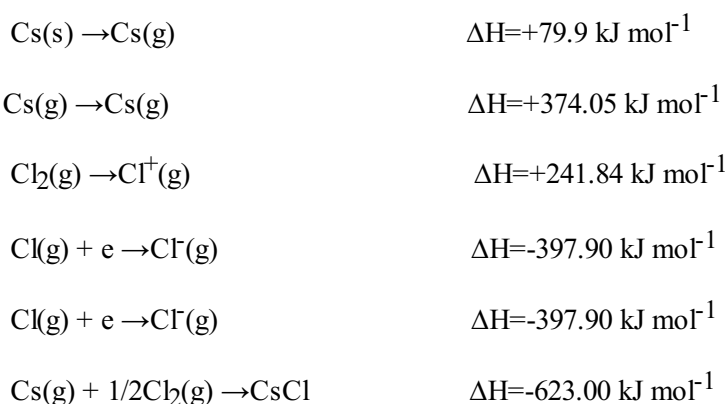
(d) Why are ionic compounds usually high melting points? Whilst most simple covalent compounds have low melting point? (8 Marks)

**OR**

6. (a) Describe the important properties of Ionic compounds. (5 Marks)

(b) What is the difference between covalent and ionic bond? (5 Marks)

(c) Calculate the lattice energy of caesium chloride using the following data (10 Marks)



7. (a) Define: Octet rule. (2 Marks)

(b) Define: Non-polar Covalent Bond. (2 Marks)

(c) Mention the limitations of VBT. (4 Marks)

(d) Evaluate and arrange the relative stability of this molecule to  $\text{F}_2^+$ ,  $\text{F}_2$  and  $\text{F}_2^-$ . (4 Marks)

(e) Explain the Hybridization and its types. (8 Marks)

**OR**

8. (a) Calculate the bond order for  $\text{Li}_2$ . (2 Marks)

(b) The general formula  $\text{AX}_3\text{E}_2$  is consistent with which molecular geometry? (2 Marks)

(c) Draw the Lewis Dot Structure for  $\text{CCl}_4$ ,  $\text{BF}_3$ ,  $\text{CH}_4$  and  $\text{H}_2\text{O}$ . (4 Marks)

(d) Discuss the Bond lengths and bond strengths of  $\text{O}_2^{2-}$ ,  $\text{O}_2^-$  and  $\text{O}_2$ . (4 Marks)

(e) Compare MO theory, VSEPR theory and VB theory. (8 Marks)

9. (a) Define: critical mass of a fissionable material? What does it indicate? (2 Marks)

(b) What is meant by Neutron activation analysis? (2 Marks)

(c) How does the n/p ratio affects the nuclear stability? Explain. (4 Marks)

(d) Compare the nuclear fusion and nuclear fission reactions.

(4 Marks)

(e) Write a detailed account on Geiger Muller Counter.

(8 Marks)

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**End Semester Examinations - Nov-Dec 2015 Exams**

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**15CH3016 Instrumental Methods of Analysis**

**Set B**

**Time : 3 hrs**  
**Total Marks: 100**

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- |    |  |          |
|----|--|----------|
| 1. | a. Write notes on Selectivity and Sensitivity?                   | (5+10+5) |
|    | b. Explain the principle of Redox titrations with an example?    |          |
|    | c. Briefly discuss Exclusion Chromatography?                     |          |
|    | <b>OR</b>  |          |
| 2. | A. Discuss Partition and Adsorption Chromatography?              | (10)     |
|    | B. Discuss in detail the Acid Base titrations with pH curves?    | (10)     |
| 3. | A. Explain the Principle and techniques of Paper Chromatography? | (10+6+4) |
|    | B. Write down the classification of Chromatography?              |          |
|    | C. What do you mean by retention time?                           |          |
|    | <b>OR</b>  |          |
| 4. | A. Explain the Principle and techniques of Gas Chromatography?   | (10)     |
|    | B. Discuss in detail about the HPLC?                             | (10)     |
| 5. | Discuss the principle, instrumentation and applications of SEM?  | (20)     |
|    | <b>OR</b>  |          |
| 6. | Explain the principle, instrumentation and application of XRD?   | (20)     |
| 7. | Write a detailed account on TGA?                                 | (20)     |
|    | <b>OR</b>  |          |
| 8. | Write notes on   | (10+10)  |
|    | a. Atomic absorption Spectroscopy      b. DTA                    |          |
| 9. | a. Discuss in detail about Water Analysis?    (15+5)             |          |
|    | b. Write short notes on Chemical Sensors?                        |          |
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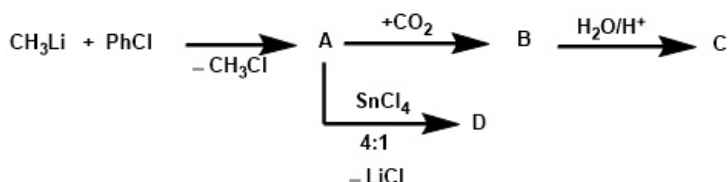
**End Semester Examinations - Nov-Dec 2015 Exams**

**15CH3017 Main Group Chemistry**

**Set A**

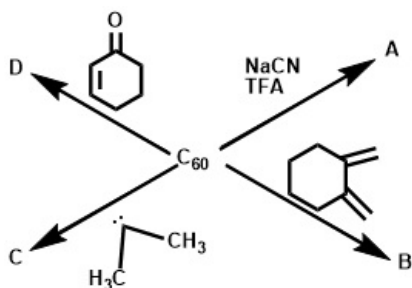
**Time : 3 hrs**  
**Total Marks: 100**

1. a. Discuss the synthesis and behavior of light switching crown ethers. 5 Marks
- b. Describe the electrical conductivity/non-conductivity behavior of the following compounds. 8 Marks
- (i) Graphite      (ii) Carbon nanotube      (iii) Fullerene      (iv) Diamond
- c. (i). Write the synthesis and structure of beryllium dihydride. 3+4 Marks
- (ii). Find out A, B, C and D from the following reactions.



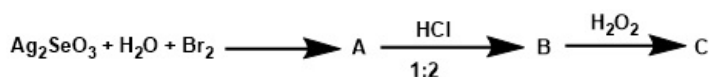
**OR**

2. a. Write the synthesis of the following compounds 6 Marks
- (i) Dibenzo-18-crown-6      (ii) Dibenzo-14-crown-4      (iii) Dibenzo-12-crown-4
- b. Differentiate between allotropes and polymorphs. 4 Marks
- c. Draw the structure of the following compounds. 4 Marks
- (i) Mellitic acid      (ii) Dimethyl beryllium      (iii) <sup>t</sup>BuLi in THF      (iv) Beryllium chloride
- d. (i). Explain the double C-H activation of acetylene. 2+4 Marks
- (ii). Predict A, B, C and D in the following reactions.



3. a. (i). What is carbothermic reaction? Explain with an example. 3+2 Marks
- (ii). Why  $\text{Te}(\text{OH})_6$  is a weaker acid than sulfuric acid and selenic acid?
- b. Give an account on ortho and pyrosilicates with examples. 4 Marks
- c. Explain the synthesis and structures of  $\text{ICl}_2^-$  and  $\text{ICl}_2^+$ . 5 Marks
- Why the structure of  $\text{ICl}_2^-$  is different from that of  $\text{ICl}_2^+$ ?
- d. (i). Discuss the synthesis and diprotic acidic behavior of selenous acid. 3+3 Marks

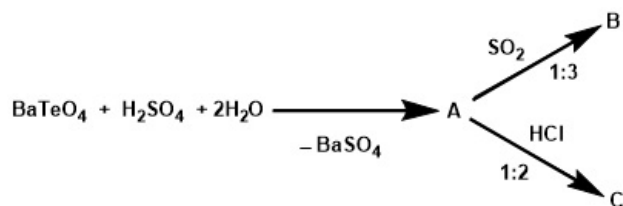
(ii). Find out A, B and C in the following reactions.



OR

4. a. Explain the different forms of sulphur with their corresponding temperatures. 5 Marks

b. Predict A, B and C in the following reactions. 3 Marks



c. Draw the structure of the following compounds. 6 Marks

(i) Titanocene Pentasulfide (ii) Cyclo-S<sub>6</sub> (iii) Si<sub>2</sub>O<sub>7</sub><sup>6-</sup> (iv) Se<sub>2</sub>O<sub>5</sub> (v) IF<sub>3</sub> (vi) Cyclo-S<sub>12</sub>

d. (i). Discuss about cyclic silicates with specific examples. 3+3 Marks

(ii). Write a short note on gaseous allotropes of Sulphur.

5. a. Describe the synthesis and structures of XeF<sub>6</sub>, [XeF<sub>7</sub>]<sup>-</sup> and [XeF<sub>8</sub>]<sup>2-</sup> 6 Marks

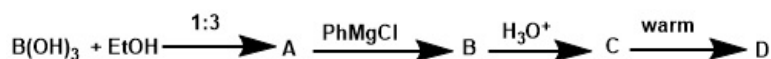
b. (i). Why the structure of borazine is “lumpy”? 2+2 Marks

(ii). Why aminoborane is oligomerized?

c. Write the synthesis of the following compounds from borazine. 6 Marks

(i) B-trichloro borazine (ii) Cycloborazine (iii) B-trimethoxy borazine

d. Predict A, B, C and D from the following reaction sequence. 4 marks



OR

6. a. Draw the structures of N(SiH<sub>3</sub>)<sub>3</sub> and trimethylamine. 4 Marks

Why the structure of N(SiH<sub>3</sub>)<sub>3</sub> is different from trimethylamine?

b. Explain the synthesis and structure of XeOF<sub>4</sub> and XeO<sub>2</sub>F<sub>2</sub>. 4 Marks

c. (i). Draw the structure of the following compounds. 4+2 Marks

(i) B<sub>5</sub>O<sub>6</sub>(OH)<sub>4</sub><sup>-</sup> (ii) Croconate (iii) [XeO<sub>6</sub>]<sup>4-</sup> (iv) [S<sub>4</sub>]<sup>2+</sup>

(ii). Why borazine is called as “inorganic benzene”?

d. Describe the structures of boron oxide, metaboric acid and boric acid. 6 Marks

7. a. Write the balanced equations for the preparation of [NP(OPh)<sub>2</sub>]<sub>4</sub> from 2 Marks

PCl<sub>5</sub>, NH<sub>4</sub>Cl and sodium phenoxide.

b. (i). Give an account on high thermal silicones and silicone rubber. 4+4 Marks

(ii). Describe the synthesis and structure of (SN)<sub>x</sub>.

c. How are the following synthesized? 10 Marks

(i) Phospham from ammonia

(ii)  $S_3N_3Cl_3$  from ammonium chloride

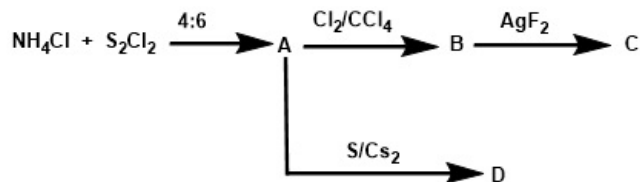
(iii) Diphosphazenes from ammonia

(iv) Disulphur dinitrogen from sulphur

(v)  $S_4N_2$  from Sulphur

OR

8. a. Find out A, B, C and D in the following reactions. 4 Marks



- b. Write the synthesis of the following compounds from  $[\text{NPCl}_2]_3$ . 8 Marks

(i)  $(\text{NPPH}_2)_3$     (ii)  $(\text{NPF}_2)_3$     (iii)  $(\text{NPCl}_2)_3 \cdot \text{HClO}_4$     (iv)  $(\text{N}_3\text{P}_3\text{Cl}_5\text{O})^- (\text{AsPh}_4)^+$

- c. Write a short note on “Coordination polymers”. 4 Marks

- d. Explain  $d\pi$ - $p\pi$  bonding in cyclotriphosphazene. 4 Marks

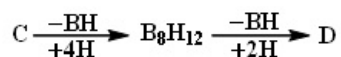
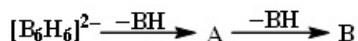
9. a. Describe the STYX number for  $\text{B}_5\text{H}_9$  with structures. 6 Marks

- b. (i). Write the synthesis of 1,2- $\text{C}_2\text{B}_{10}\text{H}_{12}$ , 1,7- $\text{C}_2\text{B}_{10}\text{H}_{12}$  and 1,12- $\text{C}_2\text{B}_{10}\text{H}_{12}$ . 3+3 Marks

- (ii). Explain whether the following compounds are isoelectronic using Wade’s rules.

(i)  $\text{B}_6\text{H}_6^{2-}$     (ii)  $\text{C}_2\text{B}_4\text{H}_6$

- c. Predict A, B, C and D from the following equations. 4 Marks



- d. Give an account on di and tetranuclear metal clusters with suitable examples. 4 Marks

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Wishing you All the Best

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