



Credit Based First Semester B.Sc. Degree Examination, Nov./Dec. 2018
(Common to all Batches)
CHEMISTRY (Paper – I)

Time : 3 Hours

Max. Marks : 80

- Instructions :**
- 1) A single booklet containing 40 pages will be issued. No additional sheets will be issued. Write question number and subdivision **clearly**.
 - 2) Write equations and diagrams **wherever** necessary.
 - 3) Answer Part A in **first two** pages of answer book.
 - 4) Scientific calculator is **allowed**.

PART – A1. Answer any ten of the following : (2×10=20)

- a) What is R_f value ?
- b) How many significant figures are in (i) 0.0405 (ii) 8.02 ?
- c) Alkali metals are poor oxidizing agents. Give reason.
- d) Write Borne-Lande equation and explain the terms.
- e) Even though nitrogen atom is SP^3 hybridized, the bond angle in NH_3 is less than $109^\circ 28'$. Why ?
- f) Thermal stability of $BeCO_3$ is least among alkaline earth metal carbonates. Give reason.
- g) Define the law of rationality of indices.
- h) What is zero order reaction ? Give an example.
 - i) What is heterogeneous catalysis ? Give an example.
 - j) Acetic acid is stronger than propionic acid. Give reason.
- k) What are carbocations ? Give an example.
 - l) State Huckel rule.



PART – B

Answer **any four** of the following questions choosing **one** question from each Unit. (15×4=60)

Unit – I

2. a) What is ionisation energy ? Describe its determination by discharge tube method. 4
- b) What is solvent extraction ? Explain the basic principle. 4
- c) i) What are determinate errors ? Explain how they are minimised. 4
- ii) Explain the general principle of chromatography. 3
3. a) Write any three differences between co-precipitation and post precipitation. 3
- b) Define electron affinity. How it is evaluated by Born-Haber cycle ? 5
- c) i) Calculate the effective nuclear charge felt by the last d electron of manganese. (atomic number of manganese = 25). 3
- ii) Write any four applications of gas chromatography. 4

Unit – II

4. a) Compare the shapes of H_2O and F_2O based on valence shell electron pair repulsion theory. 4
- b) Explain the good conductor, semiconductor and insulator properties of material using band theory. 4
- c) i) Write any four postulates of valence bond theory. 4
- ii) Write any three differences between bonding molecular orbitals and antibonding molecular orbitals. 3
5. a) Explain hybridisation and shape of BF_3 molecule. 3
- b) Draw the molecular orbital energy level diagram for nitrogen molecule. Write the molecular orbital configuration. Calculate the bond order and give its magnetic property. 5
- c) i) Give three differences between valence bond theory and molecular orbital theory. 3
- ii) Describe Fajan's rules with suitable examples. 4



Unit – III

6. a) Derive Bragg's equation $n\lambda = 2d \sin\theta$ for a crystalline solid.
b) Explain collision theory of reaction rates.
c) i) Derive an expression for rate constant of a second order reaction when the initial concentration of the reactants are same.
ii) Explain enzyme catalysis with two examples.
7. a) Write any three general characteristics of a catalytic reaction.
b) Explain the determination of crystal structure of sodium chloride by Bragg's method.
c) i) Determine the Miller indices for a plane when the intercepts along the axes are $2a$, $3b$ and $2c$.
ii) How is the order of a reaction determined by differential method and half life method ?

Unit – IV

8. a) What is benzyne ? Explain the benzyne mechanism for the conversion of bromobenzene to aniline.
b) What is Claisen condensation ? Give its mechanism.
c) i) What is Hofmann rearrangement ? Give its mechanism.
ii) What is meant by resonance ? Write the resonance structure of carboxylate ion.
9. a) Write the mechanism of Reimer-Tiemann reaction.
b) What is hydrogen bonding ? Explain the types of hydrogen bonding with suitable example.
c) i) What is cross conjugation ? Give an example.
ii) How is stereochemical evidence helpful in determining reaction mechanism ?

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**Credit Based First Semester B.Sc. Degree
Examination, October/November 2017
(Common to all Batches Scheme)
CHEMISTRY (Paper – I)**

Time : 3 Hours

Max. Marks : 80

- Instructions :**
- 1) Write the question number and sub divisions **clearly**.
 - 2) Write equations and diagrams **wherever necessary**.
 - 3) Answer Part – A in first **two** pages of the answer book.
 - 4) Scientific calculators are **allowed**.

PART – A

1. Answer **any ten** of the following : (2×10=20)
- a) What is chromatography ?
 - b) How many significant figures are there in
 - i) 2.341
 - ii) 0.0310
 - c) How does oxidising property vary across a period and down a group in a periodic table ?
 - d) Even though nitrogen atom is sp^3 hybridised, the bond angle in NH_3 is less than $109^\circ 28'$. Why ?
 - e) Diatomic helium molecule does not exist. Give reason.
 - f) Thermal stability of $BeCO_3$ is least among alkaline earth metal carbonates. Give reason.
 - g) What is a zero order reaction ? Give an example.
 - h) State law of interfacial angle.
 - i) What is catalytic promoter ? Give an example.
 - j) Chloroacetic acid is stronger than acetic acid. Why ?
 - k) What are carbanions ? Give their relative stabilities.
 - l) State Huckel rule.



PART – B

Answer any four of the following questions choosing one question from each Unit. (15)

Unit – I

2. a) What is ionisation energy ? Describe its determination by discharge tube method.
b) What are determinate errors ? Explain how they are minimised.
c) i) Explain the volumetric method of quantitative analysis.
ii) What is R_f value ? Explain its significance.
3. a) Calculate the effective nuclear charge felt by last d electron of copper. (Atomic number of copper = 29).
b) Define electron affinity. How is it evaluated by Born-Haber cycle ?
c) i) Write the three differences between co-precipitation and post precipitation.
ii) Explain the principle of gas chromatography and its applications in organic chemistry.

Unit – II

4. a) Compare the shapes of H_2O and F_2O based on valence shell electron pair repulsion theory.
b) Give any four differences between valence bond theory and molecular orbital theory.
c) i) Describe Fajan's rule with suitable example.
ii) Explain the conditions for the formation of molecular orbitals by linear combinations of atomic orbitals method.
5. a) Explain hybridisation and shape of BeF_2 molecule.
b) Draw the molecular orbital energy level diagram for nitrogen molecule. Write the molecular orbital configuration, calculate the bond order and give its magnetic property.
c) i) Describe the solubility of ionic solid in polar solvent.
ii) Explain the good conductor, semi conductor and insulator properties of material using band theory.



Unit – III

6. a) Derive an expression for rate constant of a second order reaction when the initial concentration of the reactants are equal.
- b) Define axis of symmetry. Draw and explain the different types axes of symmetry in a cubic crystal.
- c) i) Derive Bragg's equation $n\lambda = 2d \sin\theta$ for a crystalline solid.
ii) Write Michaelis-Menten equation and explain the terms.
7. a) A second order reaction with equal concentration of the reactants is 75% complete in 45 minutes. Calculate the rate constant of the reaction.
- b) Explain transition state theory and derive the relationship between rate constant and equilibrium constant.
- c) i) Explain any three general characteristics of a catalytic reaction.
ii) Describe the determination of crystal structure of rock salt by Bragg's method.

Unit – IV

8. a) What is benzyne ? Explain the benzyne mechanism for the conversion of bromobenzene to aniline.
- b) Explain conjugation and cross conjugation with suitable example.
- c) i) What is Claisen condensation ? Give its mechanism.
ii) What is charge transfer complex ? Give an example.
9. a) Write the mechanism of Dienone-Phenol rearrangement.
- b) What is hydrogen bonding ? Explain the types of hydrogen bonding with suitable example.
- c) i) What is Curtius rearrangement ? Give an example.
ii) Give the mechanism of Reimer-Tiemann reaction.

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