

Mid-West University
Examinations Management Office
 Final Examinations-2079

Bachelor level/ B.Sc/ 2nd Semester

Time: 3 hours

Full Marks : 60

Pass Marks: 30

Subject: Fundamentals of Chemistry-II (CHEM425/325)

Candidates are required to give their answer in their own words as far as practicable. The figures in the margin indicate full marks.

Inorganic Chemistry

Long answer questions (attempt any two) [2x5=10]

- 1) Draw a simple Born-Haber cycle. Write Fajan's rule for polarizability.
- 2) Describe about valence shell electron pair repulsion theory for bonding of molecule. Draw ammonia molecule, iodine tetra chloride ion and xenon hexa fluoride molecule to support VSEPR theory.
- 3) Explain the LCAO concept for the formation of molecular orbitals. Draw oxygen and HCl molecular orbitals according to molecular orbital theory showing energy level diagrams.

Very short answer Questions (attempt any five) [5x2=10]

- 4) Write the characteristics of ionic compounds.
- 5) Differentiate between sigma bond and pi bond.
- 6) Define hydrogen bond. Write its types with example.
- 7) Write the difference between bond length and bond order.
- 8) What is hybridization? Draw a structure of sp³d hybridized molecule.
- 9) Give Ralph Pearson's HSAB principle. Write any two applications of his principle.
- 10) What is lattice energy? Write its effect in solubility.

Organic Chemistry

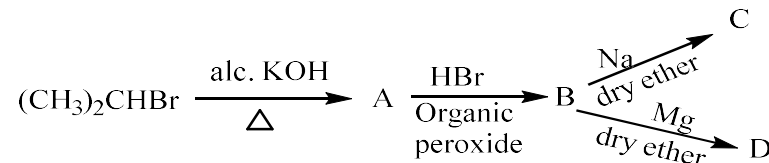
Long answer questions (attempt any two) [2x5=10]

- 1) Discuss enantiomers and diastereomers. (should include definition, examples, illustrations, differences)
- 2) What do you mean by configuration of a compound? Discuss with examples how the sequence rules (CIP rules) help in assigning R and S configurations.

- 3) What are nucleophilic substitution reactions? List the factors that govern the type SN¹ or SN² substitution reaction. Draw the energy profile for SN¹ and SN² reactions. Why is CH₃CH₂⁺ more stable than CH₃⁺?

Very short answer Questions (attempt any five) [5x2=10]

- 4) Define specific rotation. Draw a labeled schematic diagram of polarimeter.
- 5) What is chiral centre? Draw and specify R and S configuration of Lactic acid.
- 6) What are stereoisomers? Do meso compounds rotate plane polarized light? Yes or no, give reason.
- 7) What are carbocations? Write about its structure in brief.
- 8) In the given sequence of reactions, identify A, B, C & D. Write the reactions too.



- 9) Write and classify the possible isomers of C₄H₉I. Also identify the optical isomers, in any.
- 10) Define racemic modification. Discuss any one method.

Physical Chemistry

Long questions (attempt any two) [2x5=10]

- 1) State Raoult's law. Derive an expression for the determination of molecular weight of solute from Raoult's law. The vapour pressure of water at 20°C is 17mmHg. Calculate the vapour pressure of 3% ($\frac{w}{w}$) solution of urea. Molecular weight of urea = 60amu [1+2+2]
- 2) What is Van't Hoff factor? Derive an expression for Van't Hoff factor for the degree of association and dissociation of molecules. If 0.1M solution of unknown solution has observed osmotic pressure of 0.19RT, calculate Van't Hoff factor. [1+3]
- 3) Derive the relationship between K_p and K_c. Calculate the ratio of K_p to K_c at 27°C for the given reaction.
 $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \leftrightarrow 2\text{NH}_3(\text{g})$ [3+2]

Very short answer Questions (attempt any five)

[5x2=10]

- 4) Define ebullioscopic and cryoscopic constant.
- 5) The solubility product of BaSO_4 is 1.1×10^{-10} at 25°C . What amount of BaSO_4 will be precipitated, if 1 milli mol of H_2SO_4 is added to one litre of a saturated solution of BaSO_4 ?
- 6) Why is Ostwald's law valid for weak electrolytes only?
- 7) Write reaction mechanism for Benzonoid to Quinonoid conversion in acidic medium.
- 8) Differentiate between lyophilic and lyophobic colloids.
- 9) An aqueous solution contains 100grams of glucose per litre. Assuming the glucose solution to be ideal, calculate the Osmotic pressure at 398K. (Molecular weight of glucose = 180 and $R = 0.0821 \text{ L atm K}^{-1} \text{ Mol}^{-1}$)
- 10) Which one has higher boiling point, pure water or saline water? Explain on the basis of colligative property.

THE END