

Mid-West University  
**Examinations Management Office**  
Final Examinations-2082

Bachelor level/ B.Sc./ I Semester  
Time: 3 hrs.  
Subject: Fundamentals of Chemistry-I (CHE315/415)

Full Marks: 60  
Pass Marks: 30

*Candidates must give answers in their own words as far as practicable. The figures in the margin indicate full marks. Use separate answer sheet for Inorganic, Organic, Physical parts.*

**Inorganic Chemistry**

**Group-A**

**Short Answer Questions (Attempt any FIVE)**

[5x2=10]

1. How does Bohr Theory explain the nature of atom?
2. Write the quantum numbers of
  - a.  $3d^1$
  - b. 19<sup>th</sup> electron of Calcium atom
3. Define ionization energy. How does it varies in group and period?
4. Give some examples of beneficiation of metal by thermal decomposition method.
5. Show your acquaintance with solubility product.
6. Define radioactivity and how it is related to mass ratio.

**Group-B**

**Long Answer Questions (Attempt any TWO)**

[2x5=10]

7. Derive Schrodinger's wave equation. What is physical significance of wave equation?
8. Describe Ellingham diagram with appropriate explanation.
9. Write short notes on
  - a) Electron affinity
  - b) Nuclear Fusion

**Organic Chemistry**

**Group-A**

**Short Answer Questions (Attempt any FIVE)**

[5x2=10]

1. Boiling point increase with increase in molecular weight. What is the reason behind it?
2. Calculate the % of expected isomers during monobromination of butane. The relative rates of substitutions per 3°, 2°, 1° hydrogen is 1600:82:1.
3. Specify Z and E configuration of  $\text{CH}_3\text{-CH=C-CH}_3$  (Br)
4. Among alkane and alkene, which is more acidic? Justify it.
5. Write short notes on Ozone layer depletion.
6. What is bromine test for unsaturated compound?

**Group-B**

**Long Answer Questions (Attempt any TWO)**

[2x5=10]

7. What is elimination reaction? Explain kinetics, mechanism and orientation of E2 reaction.

8. Discuss the mechanism of halogenation of alkane.
9. State Markovnikov's rule. Show the reaction of propene with HBr in the presence and absence of peroxide. Also, show the mechanism of halogen in ethene.

### Physical Chemistry

#### Group-A

#### Short Answer Questions (Attempt any FIVE)

[5x2=10]

1. Differentiate between accuracy and precision.
2. What is root mean square velocity? Calculate the root mean square velocity of Nitrogen gas at NTP.
3. Write the Maxwell-Boltzmann's equation along with its significance.
4. Why Claude's method is superior to Linde's method for the liquefaction of gas?
5. The angle of contact for water-glass is  $8^\circ$ , but it is  $140^\circ$  in mercury-glass, why?
6. Write seven crystal systems with their axial distance, axial angles, and examples.

#### Group-B

#### Long Answer Questions (Attempt any TWO)

[2x5=10]

7. Deduce Kinetic gas equation. Calculate the Kinetic energy of 4gm of Oxygen gas at  $127^\circ\text{C}$ . ( $R=8.314 \text{ J K}^{-1} \text{ Mole}^{-1}$ ) [2+3]
8. Derive Van der Waal's equation of critical state. The van der Waal's constant for HCl gas are:  $a = 3.67 \text{ atm lit}^2 \text{ mol}^{-2}$  and  $b = 40.8 \text{ ml mole}^{-1}$ , find critical temperature of the gas. [3+2]
9. Derive an expression for the determination of the viscosity of an unknown solvent by Ostwald's Viscometer method. Water and ethanol took 105 and 200 seconds respectively to flow through fixed marks of Ostwald's Viscometer at  $25^\circ\text{C}$ . Calculate the viscosity of ethanol if at  $25^\circ\text{C}$  the density of ethanol and water are  $0.80 \text{ gm cm}^{-3}$  and  $1 \text{ gm cm}^{-3}$  respectively, and the viscosity of water is 0.01 poise. [3+2]

**The End**