

Mid-West University
Examinations Management Office
End Semester Examinations 2081

Bachelor level/ B. Sc./ 6th Semester

Time: 3 hours

Subject: Advanced Chemistry IV (CHE463)

Full Marks: 60

Pass Marks: 30

Candidates are required to give their answer in their own words as far as Practicable. The figures in the margin indicate full marks. Use separate answer sheet for Inorganic, Organic and Physical parts.

Inorganic chemistry

Long answer questions (attempt any two).

[2x5=10]

1. Write the postulates of crystal field theory. Also, explain crystal field stabilization energy.
2. What are the main assumptions of valence bond theory? Predict the structure and geometry of $\text{Ni}(\text{CO})_4$ based on VBT.
3. What is the biological role of alkali metal? Write the structure of hemoglobin.

Short answer questions (attempt any five).

[5x2=10]

4. Define co-ordination compounds. How does it differ from double salt?
5. What are chelate complexes? Give examples.
6. What is EAN rule?
7. Write the IUPAC name of following compound
 - a. $\text{Cr}(\text{NH}_3)_4(\text{NO}_2)\text{Cl}] \text{NO}_3$
 - b. $\text{cis}[\text{Co}(\text{en})_2\text{Cl}_2]\text{Cl}$
8. Write the role of trace element in biological system.
9. Show your acquaintance to the stability of complex.

Organic Chemistry

Long answer questions (attempt any two).

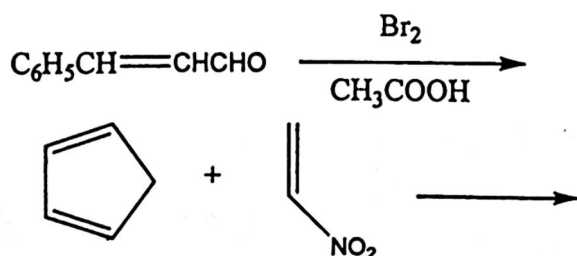
[2x5=10]

1. What are Enolate ions? Illustrate the formation of Enolate ions. Differentiate between kinetic enolates and thermodynamic enolates.
2. Give your acquaintance with
 - a) Friedel Craft acylation
 - b) Wittig reaction
3. Discuss Aldol Condensation with its mechanism. [5]

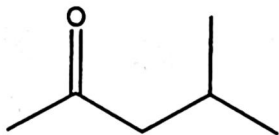
Short answer questions (attempt any five).

[5x2=10]

4. What do you understand by active methylene compounds? Give two examples.
5. Write in brief about carbon-carbon bond forming reactions. Give an example of a C-C bond forming reaction.
6. Predict the major products in the given reactions:



7. How would you synthesize the following molecule by acetoacetic ester synthesis?



8. Show your acquaintance with Darzen's condensation.
9. Draw the structure of Caryophyllene. Indicate the stereocenters in that structure.

Physical Chemistry

Long answer questions (attempt *any two*).

[2x5=10]

1. Establish a thermodynamic relation for the entropy of mixing for two different ideal gases. Calculate the entropy of mixing of 1 mole of Oxygen gas and 2 moles of Hydrogen gas, assuming that no chemical reaction occurs and the gas mixture behaves ideally.
2. Derive Clausius-Clapeyron's equation.
3. What is Gibb's Helmholtz equation? Derive the relation; $\Delta G = \Delta H - T\Delta S$. Write the physical significance of free energy.

Short answer questions (attempt *any five*).

[5x2=10]

4. State Third law of thermodynamics. Write the significance of this law.
5. Define reaction Isotherm. Write Isotherm equation.
6. How can you obtain entropy change in ideal gas? Mention equation.
7. For acetic acid the melting point at 1atm pressure is 16.61°C, molar heat of fusion is 2800 Cal/mol and molar volume change is 9.614 cc/mole. What will be the melting point at 11 atm. pressure?
8. Write the working principle of Refrigerator.
9. What is fugacity? Write the relation between K_p and K_c in terms of fugacity rule.

The End