

Final Year M.Sc. Degree Examination
August 2009
(Freshers)

APPLIED CHEMISTRY
APP.CHEM-2.01 - Advanced Inorganic Chemistry

Time : 3 Hours

Max. Marks : 85

- Note :**
1. Answer any ELEVEN question from Part-A, THREE questions from Part-B and any THREE full questions from Part-C.
 2. Numbers to the right indicate marks.

PART-A

Answer any ELEVEN of the following.

11x2=22

1. a) What is 18-electron rule? Explain its significance.
 b) Point out the differences in LMCT and MLCT spectra.
 c) The electronic absorption bands of $[\text{Ni}(\text{en})_3]^{2+}$ occur at higher frequencies corresponding to the bands for $[\text{Ni}(\text{H}_2\text{O})_6]^{2+}$; Justify
 d) Explain outer sphere electron transfer reactions.
 e) Define crystal field stabilization energy.
 f) What is nephelauxetic effect?
 g) Write the molecular orbital energy level diagram for $[\text{Co}^{\text{III}}(\text{NH}_3)_6]^{3+}$.
 h) What are chelates? Give examples.
 i) What is oxidative addition reaction? Give example.
 j) Explain the role of Mg^{2+} in biological system.
 k) Explain the role of copper salt in Wacker's process.
 l) Draw the mechanism of water gas shift reaction in cyclic form.
 m) Write the structure of any two metal complexes uses as anticancer agent.
 n) Write reaction for intake of oxygen by hemoglobin and myoglobin.
 o) What are electron carriers? Explain.

PART-B

Answer any THREE of the following.

3x8=24

2. a) Give the shortcomings of CFT.
 b) Discuss the structure and bonding for weak field and strong field complexes of Co(II) on the basis of CFT.

4+4

3. a) With neat diagram, explain the splitting pattern of d-orbital in octahedral and Sq. planar fields.
 b) What is spectrochemical series? Why is it so called? **4+4**
4. a) Discuss the factors affecting the magnitude of Δ .
 b) Discuss the preparation, properties and bonding features of ferrocene. **4+4**
5. a) Draw the catalytic reactions for hydroformylation using dicobaltate octacarbonyl catalyst with mechanism.
 b) What is nitrogen fixation? Explain the role of metal ions in this fixation. **4+4**
6. a) Discuss the importance, advantages and disadvantages of Wilkinson's catalyst.
 b) Explain the mechanism of hydrogenation of olefins using Willkinson's catalyst. **4+4**

PART-C

Answer any THREE of the following.

3x13=39

7. a) Using CFT, show the orbital occupancies for both weak and strong octahedral fields for Co^{2+} , Fe^{3+} and Zn^{2+} . Predict the nature of the complex.
 b) What are the structural differences between cytochromes and ferredoxins? Explain their biological role. **7+6**
8. a) Discuss the mechanism of the reaction

$$[\text{Co}(\text{NH}_3)_5 \text{Cl}]^{2+} + [\text{Cr}(\text{H}_2\text{O})_6]^{2+} \xrightarrow{\text{H}^+}$$

 b) Explain oxidative addition and reductive elimination reaction with example. **7+6**
9. a) Construct an Orgel diagram for d^3 ion. Explain the importance of Orgel diagram in the study of complexes.
 b) Discuss the mechanism of sodium-potassium pump in biological systems. **7+6**
10. a) Why the crystals field splitting for the complex $[\text{Rh}(\text{H}_2\text{O})_6]^{3+}$ larger than that for $[\text{Co}(\text{H}_2\text{O})_6]^{3+}$?
 b) Write the factors affecting the metal-metal bonding. **7+6**
11. a) What are Cytochromes? Discuss the structure and oxygenation of cytochrome P-450.
 b) Discuss the structure and function of Hemoglobin.
 c) Discuss the oxidation of Olefins (Wacker process) with mechanism. **5+4+4**

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Final Year M.Sc. Degree Examination
August/September 2009
Directorate of Correspondence Course
(Freshers)

APPLIED CHEMISTRY

DEC.APP.CHEM.2.02 : Bio-Organic and Medicinal Chemistry

Time : 3 Hours

Max. Marks : 85

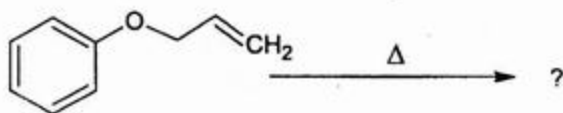
- Note :**
1. Answer any ELEVEN subdivisions from Part-A, THREE full questions from Part-B and any THREE full questions from Part-C.
 2. Figures to the right indicate marks.

PART-A

1. Answer any ELEVEN questions.

11x2=22

- What is Hoffmann rearrangement?
- Give an example of a [2+2] cycloaddition reaction.
- Give an example for Birch reduction.
- What is Chichibabin reaction? Explain with mechanism.
- What are analgesics? Give an example.
- Give the product of the following reaction



- Mention the impurities present in the samples of aspirin.
- What are sedatives and hypnotics? Give an example.
- Give two synthetic applications of Reimer-Tiemann reaction.
- Write the Woodward and Hoffmann rules for electrocyclic reactions.
- What are anticoagulants? Give one example.
- Suggest any two methods of synthesis of 1,2-diols from olefins.
- Give one method of synthesis of sulfapyridine.
- Write any two reactions of selenium dioxide.
- What is Fries rearrangement? Explain with an example.

PART-B**Answer any THREE of the following questions.****3x8=24**

2. a) Write a note on Sigmatropic Rearrangements.
 b) Explain the mechanism of Clemmenson reduction. **5+3**
3. a) Discuss the mechanism of action of barbiturates as sedative drugs.
 b) Outline the synthesis of Chlorpromazine. **5+3**
4. a) Discuss the synthetic applications of Lithiumdiisopropylamide (LDA).
 b) Explain the mechanism the Pinacol-pinacolone rearrangement. **5+3**
5. a) What is Peterson's synthesis? Give the mechanism of base catalyzed Peterson reaction.
 b) Write a note on antibacterial agents. **4+4**
6. Give the mechanisms and synthetic applications of the following:
 a) Reformatsky reaction
 b) Wilkinson's catalysis **4+4**

PART-C**Answer any THREE of the following questions.****3x13=39**

7. a) Explain any one theory of drug action and describe the factors affecting drug action.
 b) Discuss Mannich reaction with mechanism.
 c) Explain the therapeutic uses and adverse effects of methadone and diclofenac. **5+4+4**
8. a) Discuss the synthetic applications of Gilman reagent.
 b) Outline the mechanism and synthetic applications of Michael addition reaction.
 c) Explain the therapeutic uses and adverse effects of adrenergic drugs. **5+4+4**
9. a) Electrocyclic reactions are completely stereoselective. Justify with suitable examples.
 b) Discuss the mechanism of benzyl-benzilic acid rearrangement.
 c) Write the mechanism of Stork enamine reaction. **5+4+4**
10. a) Write a note on common methods of assay.
 b) Explain the mechanism of action of dicumarol as anticoagulants.
 c) Discuss the synthetic applications of 1,3-dithiane. **5+4+4**
11. a) Discuss the mechanism of Wagner-Meerwein rearrangement.
 b) Describe the therapeutic uses of ibuprofen and diazepam.
 c) Outline the synthesis of indomethacin. **5+4+4**

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M.Sc. (Final) Degree Examination
August 2009
(Freshers)

APPLIED CHEMISTRY

APP.CHEM. 2.03 : Polymer Chemistry and Technology

Time : 3 Hours

Max. Marks : 85

- Note :**
1. Answer any **ELEVEN** question from Part-A, **THREE** questions from Part-B and any **THREE** full questions from Part-C.
 2. Marks are indicated at the right side.

PART-A

Answer any **ELEVEN** questions.

11x2=22

1. a) What are polymer and oligomers?
 b) What are the differences between thermoplastic and thermoset with suitable examples?
 c) What are T_m and T_g ?
 d) Define molecular weight in polymers.
 e) Explain ASTM.
 f) Why does anionic polymerization results to a living polymer?
 g) What is polymer degradation?
 h) What are fibers and mention its uses?
 i) What is degree of polymerization?
 j) What is the role of additives in polymer processing?
 k) What are inhibitors? Give suitable example.
 l) What is the role of initiators?
 m) Name the different average molecular weights associated with polymers.
 n) Explain the number average molecular weight of polymers?
 o) Explain the condensation polymerization with suitable example.
 p) Explain Tear resistance.

PART-B

Answer any **THREE** questions.

3x8=24

2. a) Discuss phenolic resins with examples. 4+4=8
 b) Discuss the classifications of polymers. 4+4=8
3. a) Discuss cationic polymerization. 4+4=8
 b) Describe briefly about mechanical properties of polymer. 4+4=8

4. a) State the Mark Houwink equation. Discuss about the significance of the parameters of this equation to determine the molecular weight of the polymer by viscosity method.
- b) What are flame retardants? Explain with some suitable examples. 4+4=8
5. a) Discuss about Injection moulding.
- b) Write a note on film casting. 4+4=8
6. a) Explain cationic free radical polymerization.
- b) Write a note on polyamides. 4+4=8

PART-C**Answer THREE questions.****3x13=39**

7. a) Discuss briefly about polymer dissolution.
- b) Write a note on polymerization techniques. 7+6=13
8. a) What is Zeigler-Natta catalyst and how it is useful in polymerization process.
- b) Discuss about biomedical polymers. 7+6=13
9. a) Draw a schematic diagram of GPC. Discuss in detail the principle and working of GPC.
- b) Discuss briefly about mechanical properties of polymer. 7+6=13
10. a) Discuss end group analysis of molecular weight of polymers.
- b) Discuss the solution properties of polymers. 7+6=13
11. a) Write a note on polyesters.
- b) Discuss various factors which affect the glass transition temperature of polymers. Describe any one method to experimentally determine T_g of a polymer. 7+6=13

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Final Year M.Sc. Degree Examination
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APPLIED CHEMISTRY
APP.CHEM-2.04 - Selected Topics in Industrial Chemistry

Time : 3 Hours

Max. Marks : 85

- Note :**
1. Answer any ELEVEN question from Part-A, THREE questions from Part-B and any THREE full questions from Part-C.
 2. Numbers to the right indicate marks.

PART-A

Answer any ELEVEN of the following.

11x2=22

1. a) What are unit operations?
b) What is the SI unit of power?
c) Define the term mole fraction.
d) Define Reynold number.
e) What is diffusion?
f) Define latent heat?
g) Define humidity.
h) Define the term quality.
i) What is meant by tolerance?
j) Define ISO.
k) Convert 1/cm.sec to 1b/f min.
l) Define the term stoichiometric coefficient.
m) What are heat exchangers?
n) Define the term Nucleation.
o) Define the term steam efficiency.

PART-B

Answer any THREE of the following.

3x8=24

2. a) Write a note on quality control process in any industry.
b) Explain the mechanism of drying. 4+4
3. a) Explain the Stefan-Boltzmann law.
b) What is quality assurance? Explain. 4+4

4. An evaporator is used to concentrate cane sugar solution. A feed of 10000 kg per day containing 38% sugar is evaporated producing 74% solution. Calculate the weight of solution produced and amount of water removed. 8
5. a) Explain the advantages and disadvantages of setting ISO 9000 certification. 4+4
 b) Explain the term quality function. 8
6. Write a note on ISO-14000 series. 8

PART-C

Answer any THREE of the following.

3x13=39

7. a) Explain the mechanism of drying. 7+6
 b) Write a note on the techniques of material balance. 7+6
8. a) Explain the Fick's law of diffusion. 7+6
 b) What are the factors affecting the quality of design? 7+6
9. a) Explain the term quality of design. 7+6
 b) Write a note on ISO-9000 series. 7+6
10. a) A gas mixture contains 0.13 mol N_2 , 1.27 mol NH_3 and 0.1 mol H_2O is contained at a total pressure of 830 mm of Hg and 321 K. Calculate a) Mole fraction and mass fraction of each component. b) Its density 7+6
 b) Explain the principle of material balance with chemical reaction. 7+6
11. a) Explain Fourier's law of heat conduction. 8+5
 b) Write a note on heat exchangers. 8+5

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