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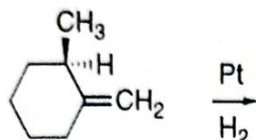
**St Aloysius College (Autonomous)**  
**Mangaluru**  
**Semester IV- P.G Examination - M.Sc. Analytical Chemistry**  
**August / September 2021**  
**ORGANIC SYNTHETIC METHODS**

Time: 3 Hours

Max. Marks: 70

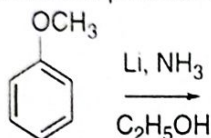
**PART - A**1. Answer any **FIVE** sub-divisions of the following: (2x5=10)

a) Predict the major product in the following. Justify your answer.



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b) Write the product in the following. Give the reaction mechanism.



- List out the merits and demerits of Jones reagent in oxidation reactions.
- Give an example for the ozone mediated oxidation reaction. Write the reaction mechanism.
- What are 1,3-dipolar addition reactions? Give an example.
- Give any two reactions yielding products with new C-C double bonds (-C=C-).
- Suggest a suitable protecting reagent for carbonyl groups. Write the protection and deprotection reactions.
- What are synthons and synthetic equivalents? Give suitable examples.

**PART - B**

Answer any **FIVE** of the following choosing at least one full question from each unit: (5x12=60)

**UNIT- I**

- Explain the dissolving metal reduction reactions of carbonyl compounds involving addition of hydrogen. (4)
  - With a suitable example, explain the stereoselectivity of hydride transfer reductions. (4)
  - Explain the following
    - Wolf-Kishner reduction and
    - Clemmensen reduction
 (4)
- Explain the hydroboration reaction of alkenes. Comment on the regioselectivity of the reaction. (4)
  - Write a note on reduction reactions using arene sulphonyl derivatives of hydrazine. (4)
  - Explain the bimolecular reduction of esters. (4)

**UNIT- II**

- Write a note on different chromium based oxidizing reagents and their application in oxidation of alcohols. (4)
  - Explain benzylic and allylic halogenation reaction with suitable examples. (4)

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c) Write the mechanism of oxidation reaction using osmium tetroxide.  
Mention any two synthetic applications of the reagent. (4)

5. a) Illustrate the synthetic applications following oxidizing reagents.  
i) Periodic acid and ii) Lead tetra acetate (4)

b) Write a note on halogenation of carbonyl compounds. (4)

c) Discuss the dehydrogenation reactions using S and Se. (4)

#### UNIT- III

6. a) Write a note on carbene insertion reaction and its applications in organic synthesis. (4)

b) Explain the following reactions with suitable examples.  
i) Dieckmann cyclization and ii) Arndt -Eistert homologation (4)

c) Explain the synthesis of 7-methoxy -1- tetralones. (4)

7. a) Discuss the synthetic applications of Ene reaction. (4)

b) Explain the chemical synthesis of Biotin. (4)

c) Explain the following reactions  
i) Thorpe condensation and ii) Robinson annulation. (4)

#### UNIT- IV

8. a) With a suitable example, explain the importance of functional group interconversion in retrosynthetic analysis. (4)

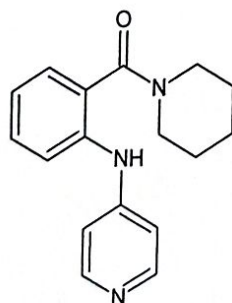
b) Suggest any two protecting reagents for the amino group. Write the corresponding protection and deprotection reactions. (4)

c) Perform retrosynthetic analysis of 2-methyl-6-methoxy indole 3-acetic acid and suggest a feasible synthetic route. (4)

9. a) Perform retrosynthetic analysis of benzocaine and p-acetamol. (4)

b) Give one group and two group C-C disconnections with suitable examples. (4)

c) Propose a feasible synthetic route for the following molecule through retrosynthetic analysis.



(4)

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St Aloysius College (Autonomous)  
Mangaluru

Semester IV - P.G. Examination - - M.Sc. Analytical Chemistry

August / September 2021

**SPECTROSCOPIC METHODS OF ANALYSIS**

Time: 3 Hours

Max.Marks:70

**PART - A**

1) Answer any FIVE sub divisions of the following

(5×2=10)

- Among the following, which elements do not produce Auger spectrum & why?  
i)N ii) H<sub>2</sub> iii) C iv) He
- How does electric gradient arise in NQR spectroscopy?
- How does viscosity of solvent effect flame photometer?
- Justify that Atomic Emission spectroscopy is dependent on flame temperature, but Atomic absorption spectroscopy is not.
- Justify that fluorescent radiation is of higher wavelength than that of excited radiation.
- How does the pH of the solution affect fluorescence? Give an example.
- What is the relation between  $\lambda_{min}$  of an X-ray continuum and applied voltage &  $\lambda$  of maximum intensity?
- How are turbidimetry and colorimetry similar and different?

**PART - B**

Answer any FIVE of the following choosing at least one full question from each unit. (5×12=60)

**UNIT - I**

- What is hyperfine splitting in ESR? Illustrate with examples of hydrogen atom and methyl radical. (5)
  - Draw the energy level diagram and calculate NQR transition frequencies for a nucleus with  $I=5/2$ , assuming  $\eta = 0$ . (4)
  - Discuss the principle of Auger spectroscopy. (3)
- Predict the Mossbauer spectra of  $[Fe(CN)_6]^{-4}$  &  $[Fe(H_2O)_6]^{2+}$  and explain the pattern. (5)
  - Explain the following terms (4)
    - Nuclear quadrupole coupling constant.
    - Asymmetry parameters
  - What is zero field splitting? Explain with suitable energy level diagrams. (3)

**UNIT - II**

- Differentiate between total consumption burner & premix burner. Sketch a neat diagram for the same & explain their mode of working. (5)
  - Explain the application of Flame photometry. (4)
  - Explain the ionization interferences in flame photometry. How that can be overcome? (3)

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5. a) Explain the working of Induced coupled plasma. (5)  
b) Explain the role of following in flame photometer. (4)  
i) Mirrors ii) slits.  
c) Explain the application of Atomic absorption spectroscopy. (3)

**UNIT - III**

6. a) With the help of energy level diagram explain intersystem crossing of excited molecule. Justify that phosphorescence always occurs at longer ' $\lambda$ ' than that of fluorescence spectrum. (5)  
b) What is fluorescence quenching? Discuss the possible types of quenching. (4)  
c) What is Chemiluminescence? Explain the principle of it. (3)
7. a) Sketch a neat block diagram of spectrofluorimeter and explain its mode of working. (5)  
b) Discuss the following applications of fluorimetry. (4)  
i) Determination of Vitamin B<sub>1</sub>  
ii) Determination of Aneurine hydrochloride in pharmaceutical preparations.  
c) What is internal conversion? Justify that it leads to predissociation. (3)

**UNIT - IV**

8. a) Give an account of interaction of x-ray with matter. (5)  
b) What is Octant rule? Illustrate it taking 3-methyl cyclohexanone as an example. (4)  
c) Explain Laue transmission method of x-ray diffraction. (3)
9. a) Discuss the following in brief. (5)  
i) Circular Dichroism  
ii) Cotton effect  
b) Explain the effects of concentration and particle size of suspension on nephelometry and turbidimetry. (4)  
c) What is plane polarized light? How is it obtained? Explain. (3)

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**St Aloysius College (Autonomous)**

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**Semester IV – P.G. Examination – M.Sc. Analytical Chemistry**  
**August / September 2021**

**CHEMISTRY OF POLYMERS AND NATURAL PRODUCTS**

Time: 3 Hours

Max. Marks: 70

**PART - A**

1. Answer any **FIVE** sub divisions of the following: (5x2=10)
- a) Define the following terms:
    - (i) degree of polymerization
    - (ii) glass transition temperature
  - b) Between polyethylene and polystyrene, which polymer exhibits higher T<sub>g</sub> value? Explain why.
  - c) Write the structure of the repeating unit for each of the following polymer.
    - (i) Teflon
    - (ii) Poly(ethylene terephthalate)
  - d) Sketch the characteristic DSC curve of a semicrystalline polymer sample and mention the various features.
  - e) How cinchonine can be obtained from cinchotoxine?
  - f) Give evidence for the presence of reactive methylene group in camphor.
  - g) State isoprene and special isoprene rules.
  - h) Outline the biogenesis of Adrenaline.

**PART - B**

Answer any **FIVE** of the following choosing at least one full question from each unit: (5x12=60)

**UNIT - I**

- 2.a) Explain the use of gel permeation chromatography in isolation and purification of polymers. (5)
- b) With a suitable example, explain the mechanism of chain growth polymerization. (4)
- c) Write a note on viscosity of polymer solutions. (3)
- 3.a) Describe fractional precipitation of polymers. (5)
- b) Write a brief account of weight average and viscosity average molecular weight concepts. (4)
- c) Discuss the effect of crystallinity on the properties of polymers. (3)

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**UNIT - II**

- 4.a) Explain osmometry method of determination of molecular weight. (5)  
b) What is glass transition temperature? Explain Tg-transitions and associated properties. (4)  
c) Discuss the application of ebulliometry method in molecular weight determination. (3)
- 5.a) Outline the principle of Thermo gravimetric analysis in polymer characterization. (5)  
b) Write a note on mechanical properties of polymers. (4)  
c) Explain the procedure for determining Tg using DSC technique. (3)

**UNIT - III**

- 6.a) How do you Synthesis Papaverine? (5)  
b) How do you ascertain the position of carboxyl and hydroxyl groups in Reserpine? (4)  
c) Account for the presence of phenanthrene nucleus and ether linkage in Morphine. (3)
- 7.a) Outline the synthesis of piperine. (5)  
b) Describe Hoffmann's and Embde's degradation. (4)  
c) Discuss the use of the following reagents in structure determination of compounds: i) O<sub>3</sub> (ii) CrO<sub>3</sub> (3)

**UNIT - IV**

- 8.a) Describe the Wagner's work for establishing the structure of  $\alpha$ -pinene. (4)  
b) Outline the steps involved in the commercial synthesis of camphor. (4)  
c) Sketch the synthesis of Farnesol. (4)
- 9.a) Discuss how the structure of santonin was established by degradation studies. (5)  
b) Write a note on structural features of squalene. (4)  
c) Explain the chemical synthesis of geraniol. (3)

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**St Aloysius College (Autonomous)**

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**August / September 2021**

**APPLIED ANALYSIS AND AUTOMATION**

**Time: 3 Hours**

**Max. Marks: 70**

**PART - A**

1. Answer any **SEVEN** sub divisions of the following:

**(7x2=14)**

- What is catalysis and inhibition?
- Explain briefly factor affecting enzyme catalyzed reaction.
- Explain the basis of reaction rate method of Analysis.
- Mention the merits and demerits of automation.
- What are poisons and mention few types.
- How do you determine the moisture in food analysis?
- Outline the importance of QA and QC in pharma industries.
- Mention the types and significance of ISO.
- What are the laws related to drugs and cosmetics in India?

**PART - B**

Answer any **FOUR** of the following choosing at least one full question from each unit: **(4x14=56)**

**UNIT - I**

- Describe the reaction scheme analysis of lactic acid dehydrogenase (LDH) and Glutamic oxaloacetic transaminase (GOT) **(5)**
  - Derive the rate law for an enzyme catalyzed reaction and show how the rate can be related to enzyme concentration. **(5)**
  - Give an account of differential and integral kinetics method of analysis. **(4)**
- Write a note on conductometric determination of reaction rate. **(3)**
  - Explain the application of enzyme catalysis with example. **(4)**
  - Explain any two types of determination of reaction rate. **(4)**
  - Describe the micro determination of inorganic species. **(3)**

**UNIT - II**

- Explain the principle and working of automatic elemental analyzer. **(4)**
  - Explain the working principle of BUN analyzer. **(3)**
  - Explain the mode of action of cyanide. **(3)**
  - Discuss the alcohol test and dye reduction test for milk. **(4)**
- Explain the methods of determining the ammonia in the given water sample using water analysis. **(4)**

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- b) Explain the principle involved in flow injection analysis and highlight the analytical application of FIA. (4)
- c) Discuss the effect of action of organophosphate in humans. (3)
- d) Explain the analysis of fat and minerals in milk. (3)

**UNIT - III**

- 6.a) Briefly discuss the laws related to quality control. (4)
- b) Explain briefly (i) ISO9000 and ISO14000 Series (3)  
(ii) Quality Assurance (3)
- c) Explain the current trends in quality control. (4)
- 7.a) Discuss the importance and application of quality control in pharmaceutical industry. (3)
- b) Comment on the importance of sampling techniques in pharmaceutical industry. (4)
- c) Write a note on ISO17025 series. (4)
- d) Explain the quality control in raw materials and finished goods. (3)

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