

Reg. No. :

Name :

Third Semester M.Sc. Degree Examination, February 2021

Chemistry/Polymer Chemistry

CH/CL/CA/CM/PC 232 – ORGANIC CHEMISTRY – III

Common for Chemistry (2016 Admission Onwards) and

Polymer Chemistry (2018 Admission Onwards)

Time : 3 Hours

Max. Marks : 75

SECTION – A

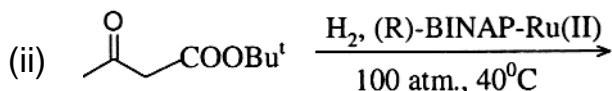
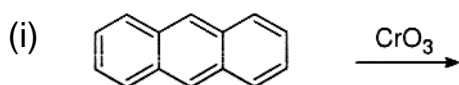
Answer any **two** among (a), (b) and (c) from each questions. Each sub question carries **2** marks.

1. (a) Determine the structure of the compound. Molecular formula C_3H_6O , $\lambda_{max} = 292 \text{ nm}$ and $\epsilon_{max} = 21$; IR (1) 2720 cm^{-1} (w) and (2) 1738 cm^{-1} (s).
- (b) A nitrogen containing aromatic compound shows bands at 1550 and 1350 cm^{-1} . Identify the functional group present in it.
- (c) Indicate which absorption bands in the IR spectrum can be used to distinguish between the following pairs of compounds :
 - (i) $(CH_2)_3N$ and $(CH_3)_2CHNH_2$,
 - (ii) CH_3CH_2OH and CH_3CO_2H

P.T.O.



2. (a) Explain the advantages of TOF mass analysers?
 (b) What do you mean by DEPT?
 (c) Give the splitting pattern in the ^1H NMR spectrum of $\text{CH}_2=\text{CHBr}$.
3. (a) What are the different factors affecting the rate of Chichibabin reaction.
 (b) Predict the products of the following reactions :



- (c) What are the advantages of osmium tetroxide compared to KMnO_4 in hydroxylation of alkenes? What are the disadvantages?
4. (a) What is chiral pool synthesis?
 (b) Describe Kolbe oxidation
 (c) What are synthons? How is it related with synthetic equivalents?
5. (a) What is the principle of column chromatography?
 (b) Describe the application of paper chromatography in identifying different α -amino acids.
 (c) What is capillary electrophoresis?



SECTION – B

Answer (a) or (b) of each question and each question carries **5** marks.

6. (a) Discuss briefly about Nuclear Overhauser Effect (NOE)?
(b) Explain nitrogen rule. Explain how it is useful in determining the molecular formula.
7. (a) What is olefin metathesis? Discuss the synthetic applications.
(b) Discuss the mechanism and applications of Mitsunobu reaction.
8. (a) Explain with examples :
(i) Shapiro reaction and
(ii) Ritter reaction.
(b) Discuss Wolf-Kishner reduction and Oppenauer oxidation.
9. (a) Explain the principle of gas chromatography. What type of substrates are analysed using GC?
(b) Discuss the principle and applications of solvent extraction.
10. (a) Discuss about Electrospray and MALDI ion sources in mass spectrometry.
(b) Identify the structure of the compound using following spectral details :
- MF : $C_8H_{10}O_2$
IR Bands : 3000, 2951, 2936, 1509, 1464, 1233, 1060, 827 cm^{-1}
 1H NMR : δ 3.75s, 6H, δ 6.83, s, 4 H
 ^{13}C NMR : (off resonance splitting in paranthesis) 56(q), 114(d) and 153 (s) ppm
EIM MS : 138 (Base peak) 123, 95, 41



SECTION – C

Answer any **three** questions and each question carries **10** marks.

11. Discuss the characteristic group frequencies in IR spectroscopy. How will you distinguish intermolecular and interamolecular hydrogen bonding using IR spectroscopy?
 12. Discuss the anisotropic effects in NMR spectroscopy. Discuss the spin-spin interactions in NMR spectroscopy.
 13. Write notes on the metal mediated C-C coupling reactions with special reference to
 - (a) Stille reaction
 - (b) Suzuki coupling
 - (c) Sonagashira coupling.
 14. Discuss the basic principles of retro synthetic analysis. Explain one group and two group C - C disconnections.
 15. With a schematic diagram explain the principle, instrumentation and applications of HPLC.
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Reg. No. :

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Third Semester M.Sc. Degree Examination, February 2021

Chemistry/Polymer Chemistry

CH/CL/CA/CM/PC 233 : PHYSICAL CHEMISTRY III

Common for Chemistry (2016 Admission onwards) and
Polymer Chemistry (2018 Admission onwards)

Time : 3 Hours

Max. Marks : 75

SECTION – A

Answer **any two** among **A, B** and **C** of each questions. Each sub question carries **2** marks.

- (A) State perturbation theorem.

(B) Draw the MO diagram of LiH.

(C) Write the term symbol of outermost electron in sodium.
- (A) Explain the terms in cc-p VTDZ.

(B) Differentiate between MM and SE methods.

(C) Write any two drawbacks of ab-initio method.
- (A) What is the principle of ESR spectroscopy?

(B) How many peaks are observed in the Mossbauer spectrum of $[\text{Fe}(\text{H}_2\text{O})_6]^{2+}$?

(C) What are ENDOR and ELDOR?

P.T.O.



4. (A) Explain Debye theory of heat capacity of solids.
(B) Explain law of mass action.
(C) Define Kopp's law.
5. (A) Explain Ag-AgCl electrode.
(B) What is the principle behind voltametry?
(C) What are the applications of amperometry?

(10 × 2 = 20 Marks)

SECTION – B

Answer **either A or B** of each question. Each question carries **5** marks.

6. (A) Explain the MO theory of H_2^+ .
(B) Apply HMO method to allyl system and explain the bonding.
7. (A) Write the differences between STOs and GTOs.
(B) Explain Huckel and extended Huckel model.
8. (A) Explain fine and hyperfine structures in ESR with an example.
(B) Explain Doppler effect and chemical shift.
9. (A) Derive the expression for the total partition function.
(B) Explain quantum theory of heat capacity of solids.
10. (A) How can you determine the concentration of a given alkali by potentiometric titrations?
(B) Explain the instrumentation of AAS.

(5 × 5 = 25 Marks)



SECTION – C

Answer **any three** question. Each question carries **10** marks.

11. Explain quantum mechanical treatment of sp^2 hybridization for alkenes.
12. What are ab-initio and DFT methods?
13. How can you explain (a) spin crossover process and (b) iron complexes by Mossbauer spectroscopy.
14. Explain Einstein theory of heat capacity of solids.
15. Differentiate between cyclic and stripping voltametry.

(3 × 10 = 30 Marks)



(Pages : 3)

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Reg. No. :

Name :

First Semester M.Sc. Degree Examination, August 2021

Chemistry / Polymer Chemistry

CH / CL / CM / CA / PC 213 - PHYSICAL CHEMISTRY - I

**(Common for Chemistry (2016-2019 Admission) and
Polymer Chemistry (2018-2019 Admission))**

Time : 3 Hours

Max. Marks : 75

SECTION – A

Answer **any two** from (a), (b) and (c) of each question. Each sub question carries **2** marks.

1. (a) Give any four consequences of classical mechanics.
(b) What is Laplacian operator?
(c) Prove that position and momentum will not commute each other.
2. (a) Explain different types of surfaces.
(b) Give the use of Langmuir adsorption isotherm.
(c) What is physisorption?
3. (a) Explain Euler's relation.
(b) What is fugacity? Give an expression for fugacity.
(c) Discuss activity and activity coefficient.

P.T.O.



4. (a) Explain parallel reactions with example.
(b) Discuss relaxation spectroscopy.
(c) What is quantum yield?
5. (a) Derive an expression for mean free path.
(b) Explain dipole-dipole interaction.
(c) Give the principle of drop weight method.

(10 × 2 = 20 Marks)

SECTION – B

Answer either (a) or (b) of each question. Each sub question carries **5** marks.

6. (a) Explain Hermitian operator and their properties.
(b) Derive an expression for partition function in 1D box.
7. (a) Discuss the principle and application of ESCA.
(b) Explain the significance of BET and Harkins - Jura isotherms.
8. (a) Derive Maxwell relations. Explain it.
(b) Discuss the dependence of activity on temperature and pressure.
9. (a) Explain the kinetics of $\text{H}_2\text{-Cl}_2$ reaction.
(b) Write a note on Flash photolysis.
10. (a) Derive equation of state of a real gas.
(b) Differentiate barometric method and dynamic method of measurement of vapour pressure of a liquid.

(5 × 5 = 25 Marks)



SECTION – C

Answer any **three** questions. Each question carries **10** marks.

11. Give any five postulates of quantum mechanics and explain.
12. Explain the mechanism and theory of heterogeneous catalysis.
13. Discuss Gibb's Helmholtz equation and its application.
14. Explain theories of unimolecular reactions.
15. Write a note on quenching of fluorescence. Derive Stern-Volmer equation.

(3 × 10 = 30 Marks)



Reg. No. :

Name :

First Semester M.Sc. Degree Examination, August 2021

Chemistry/Analytical Chemistry/Polymer Chemistry

CH/CL/PC 211: INORGANIC CHEMISTRY I

(2020 Admission)

Time : 3 Hours

Max. Marks : 75

SECTION – A

Answer **any two** among (a), (b) and (c) from each question.

Each sub question carries **2** marks.

1. (a) Define the terms constant error and proportionate errors?
(b) What is a complexometric indicator? Give an example
(c) What is meant by ageing of precipitate? Explain.
2. (a) Explain SOFC's?
(b) What are Anti-stokes phosphors? Give two examples.
(c) What are Fullerides? Mention its uses.
3. (a) What is nephelauxetic effect? How can it explain metal ligand covalency in metalcomplexes?
(b) How do d-orbitals split in square planar crystal fields?
(c) Explain thermodynamic and kinetic stability of complexes.

P.T.O.



4. (a) Write one method for preparation of isopolyacid of Vanadium
(b) Explain the application of zeolites as molecular sieves.
(c) Give one method for preparation of polysiloxanes.
5. (a) Suggest a method to control acidity in soil.
(b) Explain the catalytic role of Freons on ozone layer.
(c) What is meant by ion speciation?

(10 × 2 = 20 Marks)

SECTION – B

Answer either (a) or (b) of each question. Each question carries **5** marks:

6. (a) Define CFSE. Calculate CFSE for $[Mn(H_2O)_6]^{2+}$ and $[Cu(NH_3)_6]^{2+}$.
(b) Explain Jahn-Teller theorem. Briefly discuss JT effect.
7. (a) Write a note on classification of errors into determinate and indeterminate.
(b) Compare the method of averages and least squares for treatment of analytical data.
8. (a) Briefly the types of solid electrolytes.
(b) Write a note on molecular magnets.
9. (a) What are the adverse effects of air pollutants on human
(b) Write a note on exchange phase composition.



10. (a) Write a note on structure of XeF_2 .
- (b) How are silicones prepared? What are the reasons for their thermal stability and chemical inertness?

(5 × 5 = 25 Marks)

SECTION – C

Answer any **three** questions. Each question carries **10** marks:

11. Explain molecular orbital theory of bonding in the complex $[Co(NH_3)_6]^{3+}$.
12. Write a note on preparation and properties of heteropoly acids of Mo and W.
13. Give a brief account of:
- (a) Photochemical smog and its role in ozone depletion.
 - (b) Hydrologic cycle
14. Differentiate between co-precipitation and post-precipitation. How do they affect quantitative analysis? How they can be avoided? Describe the use of oxine as precipitant in gravimetry.
15. Write a note on Solid state chemistry of metal nitrides, fluorides and chalcogenides.

(3 × 10 = 30 Marks)



Reg. No. :

Name :

First Semester M.Sc. Degree Examination, August 2021

Chemistry/Analytical Chemistry/Polymer Chemistry

CH/CL/PC 212 : ORGANIC CHEMISTRY — I

(2020 Admission)

Time : 3 Hours

Max. Marks : 75

PART – A

Answer **any two** sub-questions among (a), (b), or (c) from each question. Each sub-question carries **2** marks

- How do you determine Re and Si face?
 - Discuss the isomerism occurs in substituted spiranes.
 - What is the application of Cram's rule?
- Discuss the preparation and stability of triphenyl methyl free radical.
 - Discuss the reactivity of singlet and triplet carbenes.
 - Discuss two methods for the generation of nitrenes.
- What is Walden inversion?
 - What are non-classical carbocations?
 - Compare S_N1 and S_N2 reactions.
- What is Iodo-lactonization?
 - What is Robinson annulation? What is its application?
 - What are the uses of sulfur ylides?

P.T.O.



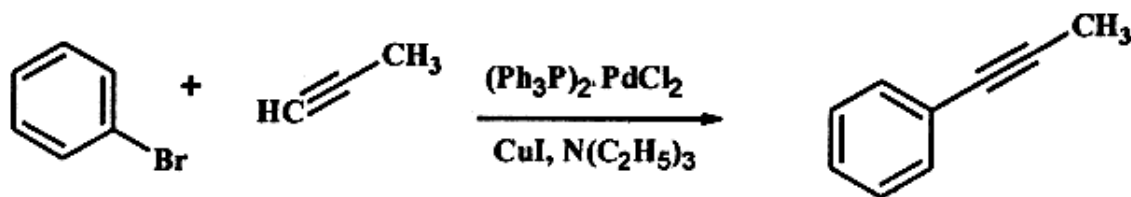
5. (a) What is E1cB mechanism?
 (b) What is Hofmann elimination rule?
 (c) What are the factors that determine elimination proceed via E1 or E2 mechanism?

(10 × 2 = 20 Marks)

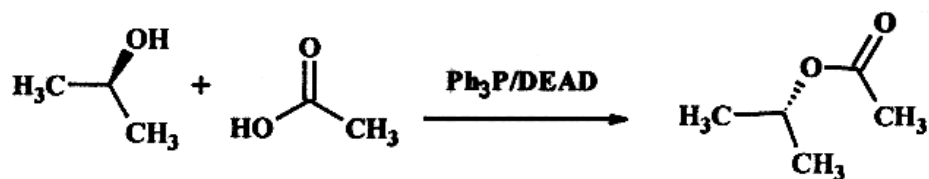
PART – B

Answer either (a) or (b) of each question. Each question carries 5 marks.

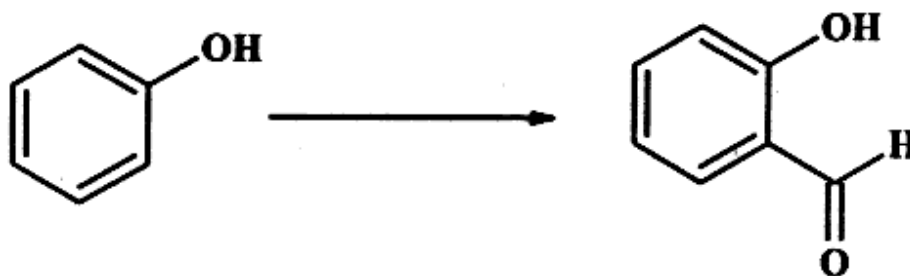
6. (a) Briefly describe the Felkin-Ahn model.
 (b) Explain the conformational analysis of decalin.
7. (a) Discuss the mechanism of Pschorr cyclization.
 (b) Describe the mechanism of the following conversion:



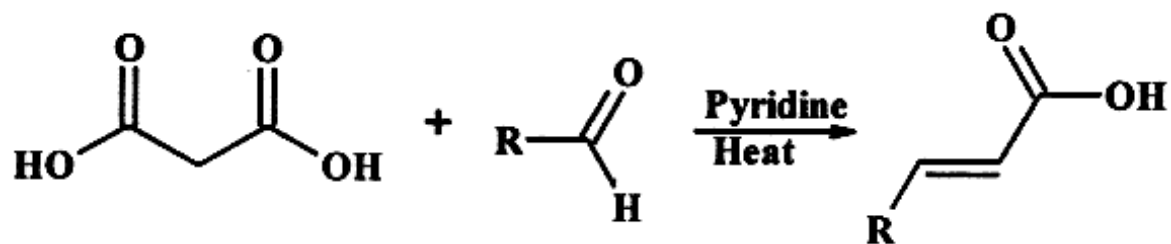
8. (a) Discuss the mechanism of the following reaction:



- (b) Effect the following conversion and explain the mechanism:



9. (a) Describe the mechanism of the following reaction:



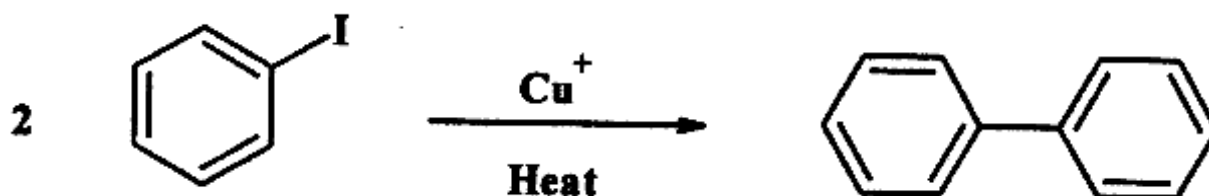
- (b) What is Benzoin condensation? Give its mechanism.
10. (a) What is Chugaev reaction? Discuss its mechanism.
- (b) What is Wittig reaction? Give its mechanism. Discuss the scope of Wittig reaction.

(5 × 5 = 25 Marks)

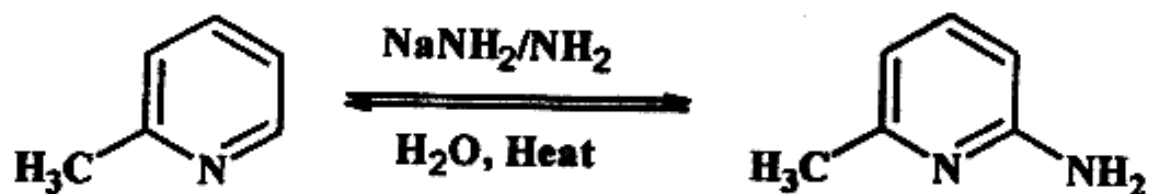
PART – C

Answer **any three** questions. Each question carries **10** marks.

11. (a) Distinguish between Stereospecific and stereoselective synthesis.
- (b) Discuss the importance of stereochemistry in drugs.
12. (a) Explain the mechanism of the following reaction:



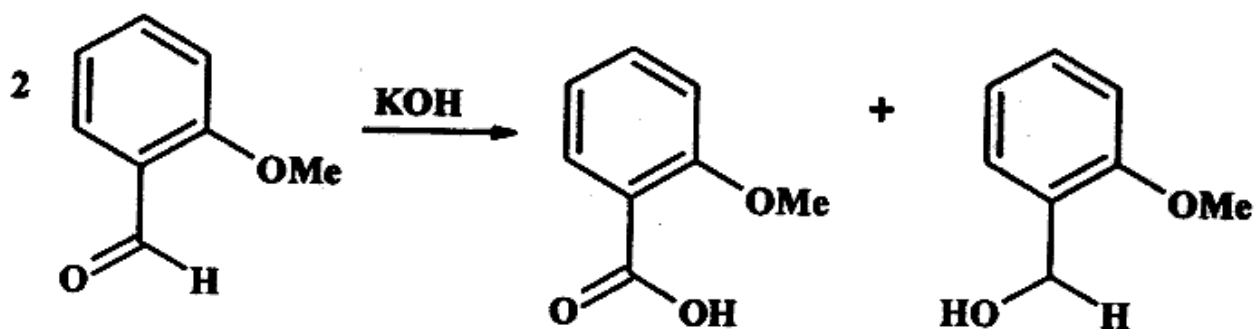
- (b) Explain the S_{RN}1 mechanism.
13. (a) Describe the mechanism of the following reaction:



- (b) Explain the mechanisms of acid and base catalyzed ester hydrolysis.

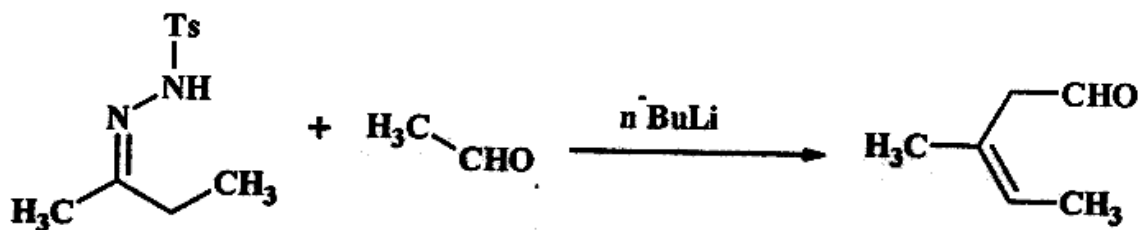


14. (a) Describe the mechanism of the following reaction:



(b) What is Perkin reaction? Explain its mechanism.

15. (a) Discuss the mechanism of the following reaction:



(b) What is Peterson reaction? Discuss its mechanism.

(3 × 10 = 30 Marks)



Reg. No. :

Name :

First Semester M.Sc. Degree Examination, August 2021

Chemistry/Analytical Chemistry/Polymer Chemistry

CH/CI/PC 213 : PHYSICAL CHEMISTRY – I

(2020 Admission)

Time : 3 Hours

Max. Marks : 75

SECTION – A

Answer **any two** among (a), (b) and (c) from **each** question. **Each** sub question carries **2** marks.

1. (a) Determine the average value of linear momentum for particle in a one dimensional box.
(b) What are well behaved wave functions? Illustrate with examples.
(c) Define orthonormal functions.
2. (a) What are block factored matrices?
(b) Explain reducible and irreducible representation.
(c) Cyclic groups are abelian. Explain.
3. (a) Differentiate between associative and dissociative chemisorption.
(b) What is the condition under which BET isotherm approximates Langmuir adsorption isotherm?
(c) Explain with one example anionic surfactants.

P.T.O.



4. (a) Discuss a method for the determination of partial molar properties.
- (b) Give a short note on temperature dependence of free energy.
- (c) Discuss a method for the determination of excess volume.
5. (a) How does primary salt effect differ from secondary salt effect?
- (b) Differentiate between vanHoff intermediate and Arrhenius intermediate.
- (c) What happens to the overall reaction rate when iodine is replaced by bromine in the halogenation of acetone in aqueous solution?

(10 × 2 = 20 Marks)

SECTION – B

Answer (a) or (b) of **each** question and **each** question carries **5** marks.

6. (a) Discuss the transformational properties of atomic orbitals.
- (b) Construct group multiplication table for the symmetry operations of NH₃ molecule.
7. (a) Discuss the Langmuir-Hinshelwood mechanism.
- (b) A monolayer of N₂ molecule (effective area 0.162 nm²) is adsorbed on the surface of 1 g of an Fe/Al₂O₃ catalyst at 77 K, the boiling point of liquid nitrogen occupies 2.85 cm⁻³ at 0°C and 1 atm pressure. What is the surface area of the catalyst?
8. (a) Show that \hat{L}^2 and \hat{L}_x commute.
- (b) Derive time dependent Schrodinger equation.
9. (a) Derive Gibbs-Helmoltz equation. Give any two applications of the equation.
- (b) Steam is condensed at 100°C and the water is cooled to 0°C and frozen to ice. What is the molar entropy change of the water? Consider that the average specific heat of liquid water is 4.2 J K⁻¹ g⁻¹. The enthalpy of vaporisation at the boiling point and the enthalpy of fusion at the freezing point are 2258.1 and 333.5 J g⁻¹, respectively.



10. (a) Calculate the specific reaction rate k at 556°C for the reaction : $2\text{HI} \rightarrow \text{H}_2 + \text{I}_2$ The activation energy for the reaction is 44000cals: collision diameter is 3.5×10^{-8} .
- (b) Briefly describe the flash photolysis method for studying fast reactions.
(5 × 5 = 25 Marks)

SECTION – C

Answer **any three** questions and **each** question carries **10** marks.

11. Deduce hybrid orbitals of BF_3 and PCl_5 molecules using group theoretical treatment.
12. (a) Explain the BET theory of adsorption.
- (b) Discuss the use of Langmuir and BET isotherms for surface area determination.
13. Obtain the allowed eigen states and energies of a particle constrained to move within the boundary of a three-dimensional box.
14. What is fugacity? Derive a relationship between fugacity and pressure. Discuss the method of determination of fugacity of a real gas.
15. Describe the Hinshelwood theory of branching chain reaction. Explain the lower and upper explosion limits with reference to the kinetic expression.
(3 × 10 = 30 Marks)
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Reg. No. :

Name :

Second Semester M.Sc. Degree Examination, November 2021

Chemistry/Polymer Chemistry/Analytical Chemistry

CH/CL/PC 222 – ORGANIC CHEMISTRY – II

(2020 Admission)

Time : 3 Hours

Max. Marks : 75

SECTION – A

Answer **two** among (a), (b) and (c) from each. Each sub question carries **2** marks.

1. (a) What is meant by plate theory of chromatography? Explain.
(b) What are the common spray reagents used in the detection of alkaloids and glycosides?
(c) Define the term 'affinity chromatography'.
2. (a) Highlight the advantages (any four) of phase transfer catalysis.
(b) What is F-strain? Explain with an example.
(c) How do you convert acetone to 2-methylpropene? Specify the reagents and intermediate formed.
3. (a) Outline the different steps involved in Claisen rearrangement.
(b) Describe the mechanism of Wolf rearrangement.
(c) How is acetyl chloride converted to propionic acid?

P.T.O.



4. (a) What are metallocenes? Mention the applications of metallocenes.
(b) How is Huisgen reaction helpful in illustrating 1,3-dipolar reaction?
(c) Describe the synthetic importance of retro-Diels-Alder reaction.
5. (a) What is singlet oxygen? How is it generated?
(b) Predict the product/s in the photolysis of butadiene in presence of benzophenone as sensitizer. Outline the mechanism.
(c) Outline the mechanism of oxa di-pi-methane rearrangement.

(10 × 2 = 20 Marks)

SECTION – B

Answer either **(a)** or **(b)** of each question. Each sub question carries **5** marks.

6. (a) Differentiate between adsorption and partition chromatography with suitable examples.
(b) Briefly describe the separation of two organic compounds using column chromatography.
7. (a) With suitable illustration distinguish between kinetic and thermodynamic control of reactions.
(b) What is meant by the principle of microscopic reversibility?.
8. (a) Discuss the mechanism of the following rearrangements with evidences.
(i) Hofmann
(ii) Dienone-phenol.
(b) (i) Outline the mechanism of Beckmann rearrangement.
(ii) Outline the mechanism of Curtius rearrangement.



9. (a) (i) Differentiate between anti-aromaticity and nonaromaticity.
(ii) Define the terms 'aromaticity' and 'homoaromaticity'.
- (b) Discuss the aromaticity of annulenes.
10. (a) Give any two reactions for remote intramolecular free radical C–H functionalization. Outline the mechanism of any one of them.
- (b) Outline the mechanisms of the following rearrangements.
- (i) Di-pi-methane
- (ii) Photo-Fries.

(5 × 5 = 25 Marks)

SECTION – C

Answer any **three** questions. Each question carries **10** marks.

11. Describe briefly the principle, instrumentation and applications of GC.
12. Discuss the different methods of determining reaction mechanism.
13. Delineate the mechanism of the following rearrangements with evidences
- (a) Wagner-Meerwein
- (b) Benzidine
- (c) Schmidt
- (d) Orton
14. Discuss the influence of aromaticity on physical and chemical properties of organic compounds.
15. Describe the applications of photochemistry

(3 × 10 = 30 Marks)



Reg. No. :

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Second Semester M.Sc. Degree Examination, November 2021

Chemistry/Polymer Chemistry/Analytical Chemistry

CH/CL/PC 222 : ORGANIC CHEMISTRY – II

(Common for Chemistry/Analytical Chemistry (2016 – 2019 Admission) and
Polymer Chemistry (2018 – 2019 Admission))

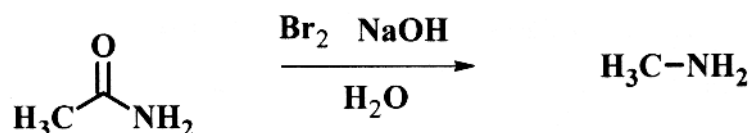
Time : 3 Hours

Max. Marks : 75

SECTION – A

Answer **any two** sub-questions among (a), (b) or (c) from each question.Each sub-question carries **2** marks.

- Illustrate Steric effect with an example.
 - What is Taft equation? What are its applications?
 - Discuss the special salt effect in SN reactions.
- Discuss the mechanism of Wagner-Meerwein rearrangement.
 - Sketch the mechanism of



- What is the catalyst used in Wittig reaction? Discuss one of its methods of preparations.

P.T.O.



3. (a) What are non-benzenoid aromaticity?
 (b) What is oxy-Cope rearrangement?
 (c) What are fluxional molecules? Give an example.
4. (a) What is chemiluminescence?
 (b) Discuss the photochemistry of Vitamin D.
 (c) Discuss the applications of photochemistry.
5. (a) What are the functions of secondary metabolites?
 (b) What are Flavonoids? Give examples.
 (c) What is the evidence for the presence of two tertiary nitrogen atoms in nicotine?

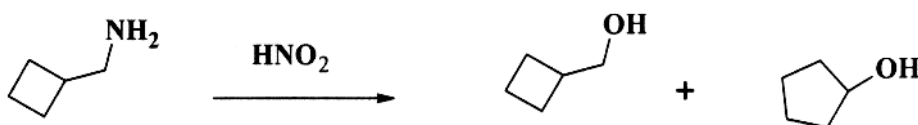
(10 × 2 = 20 Marks)

SECTION - B

Answer either (a) or (b) of each question.

Each question carries **5** marks.

6. (a) Distinguish between thermodynamic and kinetic controls of reaction.
 (b) Briefly explain Hammond postulates.
7. (a) Briefly explain the mechanism and an application of Beckmann rearrangement.
 (b) Discuss the mechanism of the following conversion:



8. (a) Discuss the aromaticity of annulenes.
 (b) What is intramolecular Diels-Alder reaction?
9. (a) Distinguish between sensitization and quenching.
 (b) Briefly explain the mechanism of Norrish Type II reaction.
10. (a) Discuss the structural differences between triterpene and sterols.
 (b) Briefly explain the determination of carbon skeleton of alkaloid by Hofmann degradation method.

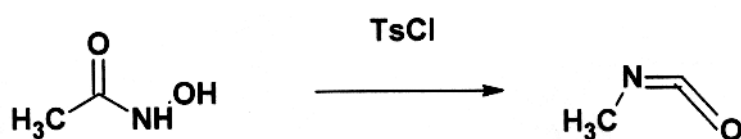
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SECTION – C

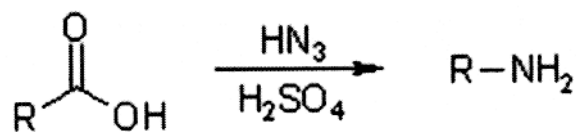
Answer **any three** questions.

Each question carries **10** marks.

11. What are phase transfer catalysts? What are its importances? Give two examples with their corresponding reactions. **10**
12. (a) Describe the mechanism of:



- (b) Explain the mechanism of the following reaction: **5+5**



13. Explain the applications of Diels-Alder reaction. **10**
14. (a) Discuss the photoreactions of dienes and arenes.
- (b) Explain the mechanism of Di- π methane rearrangement. **5+5**
15. (a) Explain the biosynthesis of terpenes from mevalonic acid.
- (b) Explain the synthesis of testosterone. **5+5**

(3 × 10 = 30 Marks)



(Pages : 3)

M – 5803

Reg. No. :

Name :

Fourth Semester M.Sc. Degree Examination, November 2021

Chemistry

CH/CL/CA 241 : CHEMISTRY OF ADVANCED MATERIALS

(2016 Admission Onwards)

(Special Examination)

Time : 3 Hours

Max. Marks : 75

SECTION – A

Answer any **two** sub questions, each carry **2** marks.

1. (a) What is meant by quantum confinement?
(b) What is colloidal precipitation method?
(c) Write two application of alloy nano particles.
2. (a) What are nanobiosensors, give examples?
(b) What are nano tweezers?
(c) Give two applications of Fullerenes.
3. (a) Explain chain transfer polymerisation.
(b) What is meant by free radical polymerisation?
(c) Explain conformation in polymers.

P.T.O.



4. (a) Give one method for preparation of polyacetylenes.
(b) What are photoresponsive polymers?
(c) What is meant by Degree of Crystallinity?
5. (a) What are thermoelectric materials?
(b) What are quinones?
(c) What are self healing polymers?

(10 × 2 = 20 Marks)

SECTION – B

Answer either (a) or (b) of each questions. **Each** question carries **5** marks.

6. (a) Explain surface Plasmon resonance and its application.
(b) Describe the Sol-Gel methods for the preparation of nanoparticles.
7. (a) Describe the application of IR spectroscopy.
(b) Explain the principle behind EDAX analysis.
8. (a) Distinguish between cationic and anionic polymerisation.
(b) Explain number average and mass average molecular weight of polymer.
9. (a) Describe synthesis and application of polyacetylenes.
(b) How polymers are used in drug delivery processes?
10. (a) What is the chemistry behind photochromism and its field of application?
(b) What are shape memory polymers?

(5 × 5 = 25 Marks)



SECTION – C

Answer any **three** questions. **Each** question carries **10** marks.

11. Explain determination of molecular weights by viscometry and light scattering methods.
12. Discuss the method and advantages of emulsion and suspension polymerisation methods.
13. Illustrate on various types of polymerisation technique with suitable example.
14. Give a briefing on nano technology application in effluent treatment and photocatalysis.
15. Explain the characterisation methods for nano materials.

(3 × 10 = 30 Marks)



(Pages : 3)

M – 5813

Reg. No. :

Name :

Fourth Semester M.Sc. Degree Examination, November 2021

Chemistry

CH 242(b) : ORGANIC CHEMISTRY — IV

(2016 Admission onwards)

Special Examination

Time : 3 Hours

Max. Marks : 75

SECTION – A

Answer **any two** among (a), (b) and (c) from EACH question. Each sub question carries **2** marks.

- (a) Explain host-guest complex formation with an example.

(b) What are calixarenes?

(c) What are the bases present in DNA? Give their structures.
- (a) Write a note on silanecarbanion.

(b) Describe any one method for the preparation of organocopper reagents.

(c) Discuss about the preparation of Gilman reagent.
- (a) Write a short note on supercritical CO₂ solvents.

(b) Briefly describe sonochemical synthesis.

(c) What is atom economy?

P.T.O.



4. (a) Discuss briefly the importance of pharmacophore identification.
(b) What is lipophilicity?
(c) What do you mean by drugaction?
5. (a) What is Hammett equation? Give the cause of non linearity in Hammett equation?
(b) Give an outline of protecting group chemistry.
(c) What are green solvents? Give any two examples.

(10 × 2 = 20 Marks)

SECTION – B

Answer (a) or (b) of each question and each question carries **5** marks.

6. (a) Discuss the advantages of clay catalysed reactions with suitable example.
(b) Explain the general principles of ultrasound assisted organic synthesis.
7. (a) Illustrate the uses of Grignard reagent in organic synthesis.
(b) Discuss about oxirane addition reactions.
8. (a) Write a note on protein biosynthesis.
(b) Write a note on cyclodextrins.
9. (a) Write a note on combinatorial synthesis.
(b) Discuss the synthesis of paracetamol and diazepam.
10. (a) Write any two techniques in protein sequencing.
(b) Explain the role of polymers in organic synthesis.

(5 × 5 = 25 Marks)



SECTION – C

Answer **any three** questions and each question carries **10** marks.

11. Explain the different forces involved in molecular recognition.
12. Give an account of the use and advantages of polymer supported reagents and catalysts in organic synthesis.
13. Write a note on the preparation and applications of the following :
 - (a) Dialkyl cadmium compounds
 - (b) Benzenetricarbonyl chromium
14. Explain the structure activity relation in the development of drugs.
15. Briefly discuss SPPS and its advantages.

(3 × 10 = 30 Marks)



Reg. No. :

Name :

Third Semester M.Sc. Degree Examination, February 2021

Chemistry / Polymer Chemistry

CH/CL/CA/CM/PC 231 – INORGANIC CHEMISTRY III

Common for Chemistry (2016 Admission onwards) and

Polymer Chemistry (2018 Admission onwards)

Time : 3 Hours

Max. Marks : 75

SECTION – A

Answer any **two** among (a).(b)and (c) from each question. **Each** sub question carries **2** marks.

1. (a) Explain the structure of bis (benzene) chromium.
(b) Explain the haptic nomenclature of organometallics with a suitable example.
(c) Give the mechanism of Zeigler-Natta polymerization of alkenes.
2. (a) What is macrocyclic effect?
(b) Explain photoaquation reactions in metal complexes with example.
(c) Explain the terms stability and lability of complexes?
3. (a) Explain the electron systems used in photosynthesis.
(b) What are metalloenzymes? Give examples.
(c) Explain the role of ferritin in biological systems.

P.T.O.



4. (a) What happens to CO stretching frequency in IR spectrum of acetylacetonate on metal ion coordination?
- (b) Explain the EPR spectra of $[\text{Cu}(\text{acac})_2]$.
- (c) What is the principle behind ^{19}F NMR?
5. (a) What is Mass defect? How is it related to binding energy?
- (b) Write a note on magic numbers?
- (c) What is meant by secular equilibria?

(10 × 2 = 20 Marks)

SECTION – B

Answer either (a) or (b) of each question. **Each** question carries **5** marks.

6. (a) Discuss the structure and bonding in Zeise's salt.
- (b) Write a note on fluxional molecules.
7. (a) Discuss the Marcus theory of outer sphere electron transfer reactions.
- (b) Explain spectrophotometric method to determine stability of complexes.
8. (a) Give a brief explanation on toxicity of metal ions.
- (b) Manganese plays an important role in production of oxygen in photosynthesis. Justify.
9. (a) Explain chemical shift and spin-spin coupling in NMR spectroscopy.
- (b) Write a note on CD spectra of metal complexes.
10. (a) Write a note on breeder reactor.
- (b) Write a note on nuclear shell model.

(5 × 5 = 25 Marks)



SECTION – C

Answer any **three** questions. **Each** question carries **10** marks.

11. Discuss briefly the application of organometallic compounds in organic synthesis and catalysis.
12. Give a brief account on the photochemical reactions of ruthenium complexes.
13. Discuss oxygen transport by heme proteins with special reference to pH dependence such as haemoglobin and myoglobin.
14. Discuss the theory behind Mossbauer spectroscopy. Explain the use of Mossbauer spectroscopy in studying iron complexes.
15. Write a note on GM counters and scintillation counters.

(3 × 10 = 30 Marks)

