



11912

II Semester M.Sc. Degree Examination, November 2023

(CBCS Scheme)

CHEMISTRY

C – 202 : Organic Chemistry – II

Time : 3 Hours

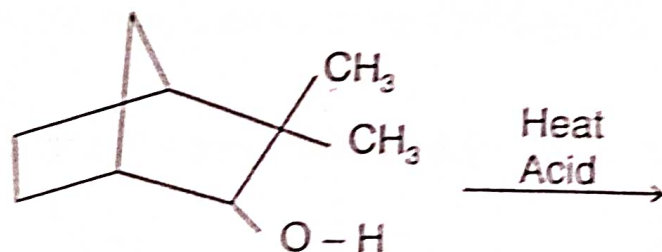
Max. Marks : 70

*Instruction : Answer Q.No. 1 and any five of the remaining.*

1. Answer any ten questions :

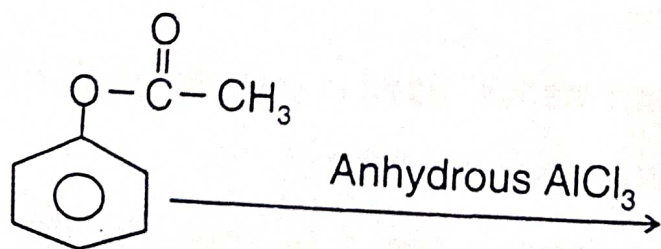
(10×2=20)

- What is Gattermann-Koch reaction ? Explain with an example.
- Sketch the mechanism of Smiles rearrangement reaction.
- What is Schiemann reaction ? Sketch the mechanism.
- What is stereoselectivity reaction ? Explain with an example.
- Give an example for the hydrogenation reaction of a double and triple bond.
- Sketch the mechanism for the below mentioned Wagner-Meerwein rearrangement reaction.



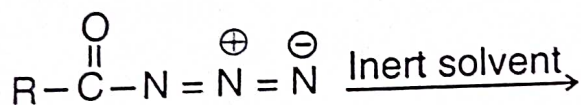
- Sketch the mechanism for Hoffmann Bromamide rearrangement reaction.
- Explain the mechanism of Pinacol-Pinacolone rearrangement reaction.
- Give the mechanism for Wittig rearrangement reaction, when alkylarylether reacts with phenyl lithium.
- Define the term "Peptidomimetics" used in peptide engineering.
- Explain "Racemization in peptide synthesis".
- Explain briefly cleavage of peptide bonds by chemical method.

2. a) Give an example for Vilsmeier-Haack reaction and explain its detail mechanism.
- b) Explain Benzyne mechanism and its significance with an example. (5+5=10)
3. a) Explain the mechanism of Bucherer reaction with an example.
- b) Explain Van-Richter reaction mechanism with an example. (5+5=10)
4. a) Sketch the detail mechanism of Ene synthesis. Give one example.
- b) Explain the mechanism of Mannich reaction by taking an example. (5+5=10)
5. a) How do you convert aldehyde or ketone to primary alcohol, secondary alcohol and tertiary alcohol with the help of Grignard reagent ?
- b) Explain the mechanism of metal hydride reduction of carbonyl compounds with lithium aluminium hydride.
- c) Sketch the mechanism for the addition of Grignard reagent to a carbonyl compound. (3+4+3=10)
6. a) Sketch the mechanism for Benzil-Benzilic acid rearrangement.
- b) Sketch the mechanism of Bayer-Villager oxidation, when ketones are treated with perbenzoic acid.
- c) Explain the mechanism of  $E_1$  – Elimination reaction and  $E_2$  – Elimination reaction. (3+3+4=10)
7. a) Sketch the mechanism of Benzidine rearrangement reaction, when hydrazobenzene is treated with acid.
- b) Predict the product and explain the mechanism below mentioned Fries rearrangement reaction.





- c) Explain the mechanism of Beckmann rearrangement reaction with an example.
- d) Sketch the mechanism for below mentioned Curtius rearrangement reaction and predict the product.



(3+2+3+2=10)

8. a) Explain the classification of peptides on the basis of organization and on the basis of function.
- b) Explain the use of D.C.C. and HOBt for peptide bond formation reaction.
- c) Explain briefly Sanger method of sequencing of peptides. (4+4+2=10)
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CHEMISTRY  
C – 204 : Spectroscopy – I

Time : 3 Hours

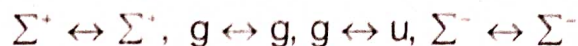
Max. Marks : 70

**Instruction :** Answer question no. 1 and any five of the remaining.

1. Answer any ten of the following. (10×2=20)
- Give the symmetry elements present in square planar  $AB_4$  molecule.
  - What point group is obtained by adding  $i$  to  $C_3$  and  $\sigma_h$  to  $C_{4v}$ ?
  - Write the significance of Mulliken symbols of  $A_{1g}$  and  $B_{1u}$ .
  - Classify the following molecules into microwave active or inactive justify your choice. i)  $C_2H_2$  ii) HCN iii)  $CO_2$  iv) HF.
  - Compare the potential energy curves of an harmonic oscillator with that of an anharmonic oscillator.
  - What is Predissociation?
  - Describe the rule of mutual exclusion.
  - Depict polarizability ellipsoid for  $CO_2$ .
  - What is Stark effect?
  - Antistokes lines are less intense than Stokes explain.
  - What is phosphorescence?
  - State Laporte rule for electronic transitions.
2. a) Determine the point group symmetry of the following molecule. (5+5=10)
- $C_6H_6$
  - $H_2O$
  - $CH_3$
  - $H-C \equiv C-H$
  - $CHCl_3$ .
- b) What is great orthogonality theorem? Mention the five rule irreducible representation.



3. a) State and explain the selection rules for electronic transitions. Classify the following transitions as allowed or forbidden. (5+5=10)



- b) Write a note on reducible and irreducible representation.

4. a) Sketch and compare the pure rotational spectra of rigid and non-rigid linear molecule. (5+5=10)

- b) How does the electric field affect the rotational energy levels of rigid rotor?

5. a) Explain with the help of Franck-Condon principle the variation in the intensity of electronic spectra with internuclear distance. (5+5=10)

- b) What are radiative and non-radiative transitions? Elaborate on internal conversion.

6. a) Write briefly on the main components of IR spectrometer. (3+3+4=10)

- b) Sketch schematically the normal modes of  $AB_3$  pyramidal molecule and comment on its IR and Raman activity.

- c) Describe the classical theory of Raman effect.

7. a) State the rule of mutual exclusion. Which of the following molecules obey this rule? Justify  $C_3O_2$ ,  $C_2H_2$ ,  $NO_2$ ,  $N_2O$  and  $HCl$ . (6+4=10)

- b) Explain the pre-dissociation phenomenon.

8. a) Give the quantum-mechanical interpretation of Raman effect. (5+5=10)

- b) Describe the various photo-physical pathways involved in decay of excited electronic states by Jablonski diagram.
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