

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc DEGREE EXAMINATION DECEMBER 2023
(Second Semester)

Branch – CHEMISTRY

ORGANIC REACTION MECHANISM AND RETROSYNTHESIS

Time: Three Hours

Maximum: 50 Marks

SECTION-A (5 Marks)

Answer ALL questions

ALL questions carry EQUAL marks

(5 x 1 = 5)

- 1 When the nucleophile -OR attacks the RX, Which of the following will be the resultant product?
(i) R – OH (ii) R: CN
(iii) ROR (iv) RNHR
- 2 Which of the following statements is correct?
(i) E2 is a concerted reaction in which bonds break and new bonds form at the same time in a single step
(ii) Order of reactivity of alkyl halides towards E2 dehydro halogenation is found to be $3^\circ > 2^\circ > 1^\circ$
(iii) In E2 elimination different stereoisomer (diastereomer) converts into different stereo product
(iv) All of the above
- 3 What type of reaction takes place upon treatment of a ketone with HCN to form a cyanohydrin?
(i) Nucleophilic addition (ii) Nucleophilic substitution
(iii) Electrophilic addition (iv) Electrophilic substitution
- 4 Which is the mildest reducing agent which reduces only carbonyl group in presence of nitro, carboxyl double bond and ester groups?
(i) LiAlH_4 (ii) Na-NH_3
(iii) NaBH_4 (iv) $\text{H}_2\text{-Ni}$
- 5 The synthetic equivalent of the given synthon is
(i) t-butylisocyanide (ii) t-butylcyanide
(iii) t-butylcyanate (iv) t-butylisocyanate

SECTION - B (15 Marks)

Answer ALL Questions

ALL Questions Carry EQUAL Marks

(5 x 3 = 15)

- 6 a Explain the factors affecting the rate of nucleophilic substitution reactions?
OR
b Write a note on Benzyne mechanism.
- 7 a Illustrate Hofmann's rule with example.
OR
b Explain mechanism of Clemmenson reaction.

Cont...

- 8 a Write a short note on Michael addition reaction with example.
OR
b Discuss the mechanism of Benzoin condensations.
- 9 a i. Predict the product in the following reactions
 $\text{RhCl}(\text{PPh}_3)_3 + \text{RCHO} \rightarrow ?$ (1 mark)
ii. Write a note on: Crown ethers (2 marks)
OR
b Describe the preparation and synthetic applications of Gilman's reagent.
- 10 a List out the difference between synthons and synthetic equivalents.
OR
b Discuss the protecting group for $-\text{CHO}$ and SH group. (2+1 mark)

SECTION -C (30 Marks)

Answer ALL questions

ALL questions carry EQUAL Marks

(5 x 6 = 30)

- 11 a. Compare $\text{S}_\text{N}1$ and $\text{S}_\text{N}2$ reactions.
OR
b Write a note on the following i). Zeigler alkylation ii). Chichibabin reaction. (3+3 marks)
12. a Explain the mechanisms of $\text{E}1$ and $\text{E}2$ reactions with evidences and its stereo specificity. (3+3 marks)
OR
b Write a short note on Meerwein Ponderoff Verley and Birch reduction. (3+3 marks)
- 13 a Write a short note on peroxide effect and epoxidation. (3+3 marks)
OR
b Write the mechanism of Mannich and Claisen reactions. (3+3 marks)
- 14 a Write the synthetic utility of the following reagents. (3+3 marks)
i) Wilkinson catalyst ii) LDA
OR
b Discuss the uses of the following reagents in organic synthesis and functional group transformation i) DDQ ii) LiAlH_4 (3+3 marks)
- 15 a Discuss one group C-X and two group C-X bond disconnections. (3+3 marks)
OR
b Explain the modern methods of functional group interconversions involving $-\text{OH}$ and $-\text{COOH}$. (3+3 marks)

Z-Z-Z

END