

(6 pages)

Reg. No. :

Code No. : 6395

Sub. Code : ZCHM 11

M.Sc. (CBCS) DEGREE EXAMINATION,
NOVEMBER 2022

First Semester

Chemistry – Core

AROMATICITY AND ORGANIC REACTION
MECHANISM

(For those who joined in July 2021 onwards)


Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)





Answer ALL questions.

Choose the correct answer :

1. The IUPAC name of  is

- (a) Bicyclo [0.1.2] pentane
- (b) Bicyclo [1.0.2] pentane
- (c) Bicyclo [1.0.1] pentane
- (d) Bicyclo [2.1.0] pentane

2. Which of the following compounds is not aromatic?

- (a)  (b) 
(c)  (d) 

3. What should be the free energy so that reaction is spontaneous?

- (a) Positive
- (b) Negative
- (c) Neutral
- (d) none of the mentioned

4. In Hammett constituent constant σ_p is negative for substituted benzoic acid is _____ then benzoic acid itself.

- (a) more acidic
- (b) neutral
- (c) more basic
- (d) less acidic

5. Carbenes are trapped as

- (a) Cyclopropane derivative
- (b) Oxidative product
- (c) Diels Alder reaction
- (d) Hydroxylamine derivative

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6. By which of the following techniques, free radicals can be detected

- (a) UV (b) NMR
(c) IR (d) ESR

7. In the E1 mechanism, the leaving group leaves first to generate a _____

- (a) Free radical (b) Carbene
(c) Carbocation (d) Carbanion

8. E1cB elimination reaction occurs under _____ conditions.

- (a) Neutral (b) Basic
(c) Less acidic (d) More acidic

9. The best medium for Mannich reaction is _____

- (a) Acidic (b) Aqueous
(c) Basic (d) Organic

10. Why is sodium borohydride an important reagent in reducing a ketone?

- (a) It is good for hydrolysis type reactions
(b) It is a good source of the hydride ion (H^-)
(c) It can act as a base
(d) It can act as a free radical initiator

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Narrate the aromaticity of annulenes.

Or

(b) Discuss the homo and anti-aromaticity in 2π and 8π electron systems.

12. (a) Write a brief account on Yukawa – Tsuno equation.

Or

(b) Write a note on Grunwald – Winstein equation.

13. (a) What are singlet and triplet carbenes? How do they react with alkenes?

Or

(b) Discuss the formation and stability of free radicals.

14. (a) Explain the role of neighbouring group participation with examples.

Or

(b) How does nucleophilic substitution take place at vinylic carbon? Illustrate with examples.



15. (a) How is benzyne intermediate generated?
Write two of its important properties.

Or

- (b) Write briefly on Michael addition.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Discuss the structure and synthesis of congressane.

Or

- (b) (i) Explain the structure of azulene.
(ii) How can adamantane be synthesized?
(iii) How are sydnones synthesized?

17. (a) (i) State and explain the principle of microscopic reversibility.
(ii) How are cross-over experiments useful in determining reaction mechanism?

Or

- (b) (i) With an example show how isotopic labelling can be used to ascertain the mechanism.
(ii) Why is Hammett equation a linear free energy relationship?

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18. (a) (i) What is Hofmann-Löffler reaction?
Discuss its mechanism.
(ii) Narrate the stability of carbenes.

Or

- (b) Give in detail the methods of generations and reactions of nitrene.

19. (a) Explain the mechanism and stereo chemistry of E2 reaction.

Or

- (b) (i) What are Saytzeff and Hoffmann orientations? Explain with examples.
(ii) Write a note on ambident nucleophile.

20. (a) Discuss in detail the mechanism of ortho-lithiation reaction and its applications.

Or

- (b) Briefly discuss the following :
(i) Birch reduction
(ii) Wittig reaction.

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