(6 pages) Reg. No. : .....

Code No. : 5406 **Sub. Code : ZCHM 11**

M.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2023.

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 bond length of C-C bonds in benzene is
   (a) 110 pm (b) 156 pm
   (c) 121 pm (d) 139 pm
2. Which of the following compound is not aromatic?
   (a)  (b) 
   (c)  (d) 
3. In pseudo unimolecular reactions :
   (a) Both the reactants are present in low concentration
   (b) Both the reactants are present in same concentration
   (c) One of the reactants is present in excess
   (d) One of the reactants is non-reactive
4. What does Hammett LFER tell us about a reaction?
   (a) Possible reaction pathways
   (b) Nature of the intermediates
   (c) Solvent effects towards a reaction
   (d) Kinetics and thermodynamics relationship of a reaction
5. What is the hybridization of singlet carbene?
   (a) sp (b) sp^3
   (c) $sp^3 d$ (d) sp^2
6. Nitrene is an intermediate in one of the following reactions
   (a) Schmidt rearrangement
   (b) Birch reduction
   (c) Baeyer-Villiger oxidation
   (d) Wolff rearrangement

7. ———— reaction converts N-oxide to an alkene and a hydroxylamine
   (a) Cope elimination
   (b) Hofmann degradation
   (c) Chugaev reaction
   (d) Pyrolytic elimination
8. Reaction of alcohol with $SOCl_2$ is ————
   (a) S_N1 (b) S_N2
   (c) S_NAr (d) S_Ni
9. Wittig reagent is ————
   (a) Ph_3P (b) $[Ph_3PCFH_3]^+I^-$
   (c) $Ph_3 P{=}CH_2$ (d) Ph_3PPh_3
10. $NaBH_4$ is a ————
    (a) Oxidation reagent
    (b) Reduction reagent
    (c) Photochemical reagent
    (d) Neutral reagent

PART B — (5 × 5 = 25 marks)

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

11. (a) Discuss about the aromaticity of Azulene and syndromes.

    Or

    (b) Explain the Musulin-Frost diagram with two examples.

12. (a) Write about cross over experiment and isotope labelling for trapping the intermediates in organic reaction.

    Or

    (b) Describe the Stereo chemical evidence of reaction with example.

13. (a) Write short notes or Simmons smith cycloproponation with example.

    Or

    (b) What is Fenton and MeCombie reactions explain its synthetic importance.

14. (a) Give mechanism of S_N2 and S_N1 process with example.

    Or

    (b) What are factors influencing the elimination reactions and give an example of each?

15. (a) What is Mannich reaction? Explain with example.

Or

(b) Write about Dieckmannn condensation with mechanism.

PART C — (5 × 8 = 40 marks)

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

16. (a) (i) Write an account on the structure, aromaticity and synthesis of annulenes and heteroannulenes. (6)

(ii) Cyclooctatetraene is antiaromatic, whereas its dianion aromatic, why and discuss with structure. (2)

Or

(b) Brief about structure and synthesis of Adamantane and Congressane.

17. (a) Give short notes on non-kinetic methods of determination of reaction mechanism with proper examples.

Or

(b) (i) Write about Grunwald-Winstein equation and its applications. (4)

(ii) Discuss about Primary and Secondary isotopic effects with example. (4)

18. (a) Write three methods of preparation of carbenes, three reactions of carbenes, difference between singlet and triplet carbenes and how can you differentiate the single and triplet carbenes by reactions.

Or

(b) (i) Brief about generation reactions of Nitrenes. (4)

(ii) Write the mechanism of Schmidt and Beckmann rearrangements. (4)

19. (a) (i) Describe about Neighboring group participation mechanism involving Non-classical Carbonium ion. (4)

(ii) Discuss about Chugaev and Cope elimination, mechanism and example. (4)

Or

(b) What are the factors influencing nucleophilic substitution reactions, give examples of each factor.

20. (a) Write about Sharpless epoxidation, Wittig reaction with mechanism.

Or

(b) Discuss about Bucherer reaction and Smiles rearrangement with mechanism.

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