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Reg. No. : .....

Code No.: 6526 **Sub. Code: ZCHM11**

M.Sc. (CBCS) DEGREE EXAMINATION,
NOVEMBER 2021

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. Which of the following is a characteristic of an aromatic compound?

   (a) Cyclic (b) Planar

   (c) (4n+2) π electrons (d) All of the above

2. Which of the following is not a characteristic property of arenes?

(a) Delocalisation of π-electrons

(b) Resonance

(c) Greater stability

(d) Electrophilic additions

3. The number of transition states in a two step reaction is _____.

(a) None (b) 1

(c) 2 (d) 4

4. Which pair of isotopes are likely to result in the greatest isotope effect?

(a) Carbon-12 and carbon-14

(b) Carbon-12 and carbon-13

(c) Hydrogen and deuterium

(d) Nitrogen-14 and nitrogen-15

5. Which types of isomers are formed in rearrangement reactions?

(a) Structural isomers

(b) Geometrical isomers

(c) Optical isomer

(d) Conformational isomers

6. What is the main difference between Hofmann and Curtius rearrangement?

(a) Products are different

(b) Intermediate formed is different

(c) Reactants are different

(d) Isomers

7. Which of the following statements regarding the EI mechanism is wrong?

(a) Reactions by the E1 mechanism are unimolecular in the rate-determining step.

(b) Reactions by the E1 mechanism are generally first order.

(c) Reactions by the E1 mechanism usually occur in one step.

(d) Reactions by the E1 mechanism are multi-step reactions.

8. Which of the following statements regarding the E2 mechanism is wrong?

(a) Reactions by the E2 mechanism are always bimolecular.

(b) Reactions by the E2 mechanism are generally second order.

(c) Reactions by the E2 mechanism usually occur in one step.

(d) Reactions by the E2 mechanism usually occur in two steps.

9. The compound below that would react fastest in a nucleophilic aromatic substitution reaction is

(a) p-nitrobromobenzene

(b) m-nitrohromobenzene

(c) 2,4-dinitrohromobenzene

(d) 3.4-dinitrobromobenzene

10. Using the benzyne mechanism for substitution of m-chlorotoluene by $NaNH_2$. the possibie products are

(a) o-methylaniline (b) m-methylaniline

(c) p-methylaniline (d) All of the above

PART B — ($5 \times 5 = 25$ marks)

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

Each answer should not exceed 250 words.

11. (a) What are the differences between beuzenoid and non- benzenoid compounds?

Or

(b) Explain delocalization and resonance.

12. (a) Explain Hammond postulates.

Or

(b) Explain principle of microscopic reversibility.

13. (a) What is Wolff rearrangement? Explain the mechanism of Wolff rearrangement.

Or

(b) What is Schmidt rearrangement? Explain the mechanism of Schmidt rearrangement.

14. (a) Explain the mechanism of S_N1 reaction with an example.

Or

(b) Explain the mechanism of S_N2 reaction with an example.

15. (a) Explain benzyne mechanism with example.

Or

(b) What is Bucherer Reaction? Explain the mechanism of Bucherer Reaction.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b)
Each answer should not exceed 600 words.

16. (a) What is Frost Musulin diagram? How does aromaticity affect the NMR spectra?

Or

(b) Explain aromaticity of annulenes and heteroannulenes. Explain Anternant and nonalternant hydrocarbons.

17. (a) Explain primary and secondary kinetic isotopic effects.

Or

(b) Explain the significance of Hammett equation.

18. (a) What is Beckmann rearrangement? Explain the mechanism of Beckmann rearrangement. Mention the applications of Beckmann rearrangement.

Or

(b) What is Hoffmann rearrangement? Explain the mechanism of Hoffmann rearrangement. Mention the applications of Hoffmann rearrangement.

19. (a) Explain the mechanism of S_Ni reaction with an example.

Or

(b) Write the mechanism of E1CB reaction with example. Compare Hoffmann elimination and Saytzeff elimination reactions.

20. (a) What is Smiles rearrangement? Discuss the mechanism of Smiles rearrangement.

Or

(b) What is Mannich reaction? Write the mechanism of Mannich reaction.

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