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University Examinations 2022/2023

THIRD YEAR, FIRST SEMESTER SPECIAL/SUPPLEMENTARY EXAMINATION FOR THE
DEGREE OF BACHELOR OF SCIENCE IN CHEMISTRY

SCH 3302: CHEMISTRY OF NON-BENZENOID AROMATIC COMPOUNDS

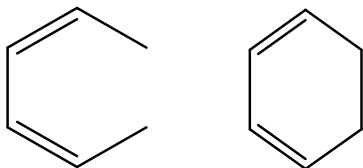
DATE: AUGUST 2023

TIME: 2 HOURS

INSTRUCTIONS: *answer question one and any other two questions*

QUESTION ONE (30 MARKS)

- a) Draw the structures of the following compounds (5 marks)
- β -Naphthol
 - Thiophene
 - Pyridine
 - 1, 2, 3, 4 – tetrahydronaphthalene
 - 2 – chlorofuran
- b) By giving the names of the compounds below, determine their aromatic character and describe their relationship in terms of stability (6 marks)



- c) Briefly explain the following observations
- Pyridine is less reactive than benzene towards electrophilic aromatic substitution reactions (2 marks)

- (ii) Pyrrole is a weaker base than pyridine (2 marks)
- (iii) Furan is less reactive than pyrrole in electrophilic aromatic substitution reactions (2 marks)
- (iv) Benzene is less reactive than thiophene towards electrophilic substitution reactions (2 marks)
- d) Briefly describe four uses of quinones (8 marks)
- e) (i) What are heterocyclic compounds? (1 mark)
- (ii) Give examples of 2 heterocyclic compounds (2 marks)

QUESTION TWO (20 MARKS)

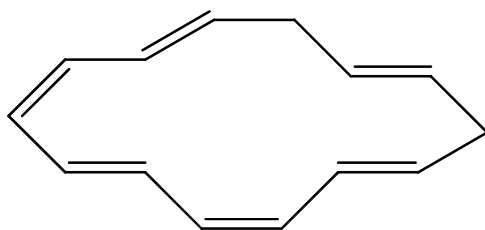
- a) Briefly describe the four structural criteria that must be satisfied for a compound to be considered as an aromatic compound (8 marks)
- b) Electrophilic aromatic substitution of pyridine take place at carbon 3. Describe using the relevant structures (8 marks)
- c) Differentiate between optically active and optical inactive substances (4 marks)

QUESTION THREE (20 MARKS)

- a) Bromination of 1-nitronaphthalene yields 5-bromo-1-nitronaphthalene and not a 3-bromo-1-nitronaphthalene. Briefly explain using relevant equations (6 marks)
- b) By use of relevant examples and reactions briefly describe kinetic versus thermodynamic control in organic reactions (8 marks)
- c) By use of relevant equations and structures show the synthesis of pyrrole (6 marks)

QUESTION FOUR (20 MARKS)

- a) Give the name of the structure below and describe its aromaticity (4 marks)



- b) Pyridine can be represented as a resonance hybrid of five structures. Draw the five resonance structures of pyridine (5 marks)
- c) By stating their structures indicate the order of reactivity in electrophilic substitution reactions for benzene, pyrrole, thiophene and furan. (5 marks)
- d) Giving an example of a compound, briefly explain why some molecules cannot easily convert from one chiral conformation to the mirror-image conformation (6 marks)