BOWEN UNIVERSITY, IWO, OSUN STATE
COLLEGE OF AGRICULTURE, ENGINEERING AND SCIENCE
INDUSTRIAL CHEMISTRY PROGRAMME
2022/2023 B.SC DEGREE FIRST SEMESTER EXAMINATION

Course Code: CHM 429 **Courses Title:** Natural Products Chemistry and Pericyclic Reactions. **Credit:** 3

Date: 11/02/2023 **Time Allowed:** 2.5 hours

INSTRUCTIONS: **Answer four (4) questions in all, at least one (1) question from each section**
Answer each main question on a fresh page
Each question carries 25 marks

SECTION A

QUESTION 1

a. In a step-by-step manner enumerate general methods of separation, purification, and structural determination of natural products.
   i. separation, **4 marks**
   ii. purification and **5 marks**
   iii. structural determination **4 marks**

b i. State the techniques used in the purification of organic compounds that are in solid and liquid states. **3 marks**
   ii. Give the definition of each technique mentioned in b (i) above. **6 marks**

c. What are the basic principles of solid-liquid filtration? **3 marks**

QUESTION 2

a. Define steroidal hormones and state their influence in biological activities in vertebrates. **4 marks**

b. Classify steroidal hormones based on the site of synthesis and secretion. **6 marks**

c. Cholesterol is a hydrophobic molecule; it is essentially insoluble in water. In the body, majority of cholesterol is associated with cell membranes, where it has an important role in maintaining membrane fluidity. During transport and storage, however, the 3-position hydroxyl is modified to increase the hydrophobicity of the molecule further by a chemical reaction with fatty acid. Name this chemical reaction and draw the structure of the product formed.
   5 marks

d. Based on human endocrine physiology, outline the major classes of steroid hormones.

   10 marks

QUESTION 3

a. Tanimola, your friend's cousin who is suffering from Strep throat, a bacterial infection wants to know which of the biologically active compounds will be potent against the bacterial infection. Which of the biologically active compound will you recommend and how is it prepared?
5 marks

b. List three biologically active compounds and their uses. **6 marks**

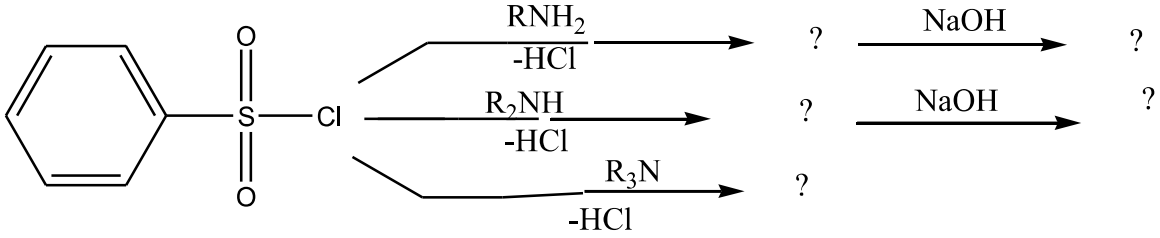
c. Structurally differentiate between N-methyl benzenesulfonamide and 4-amino benzenesulfonamide. **3 marks**

d. Write a short note on flavonoids? **6 marks**

e. Flavonoids are subdivided into different classes depending on the carbon atoms of the C ring on which the B ring is attached, and the degree of unsaturation and oxidation of the C ring. Based on this information, give two types of flavonoids showing their structures. **5 marks**

QUESTION 4

a. From your knowledge of the reaction of benzenesulfonyl chloride with amines, write the products of the reactions below. **10 marks**



b. Explain briefly the difference in the reaction between primary, secondary, and tertiary amine in the reactions above? **6 marks**

b. Define the following terms with suitable examples: **6 marks**

i. Natural Products
ii. Primary metabolites
iii. Secondary metabolites

c. Apart from the general classification of natural products, list another form of classification of the natural products that you know. **3 marks**

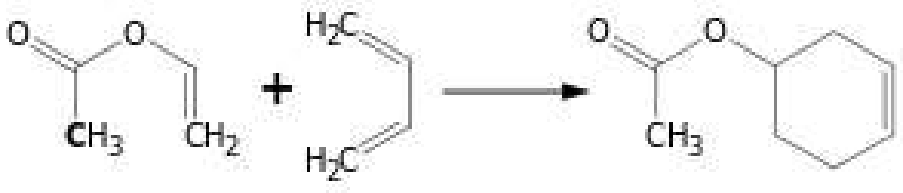
SECTION B

QUESTION 5

a. Briefly explain four types of pericyclic reaction with examples. **16 marks**

b. Classify the following pericyclic reactions appropriately and explain the mechanism of the reactions: **9 marks**

i.



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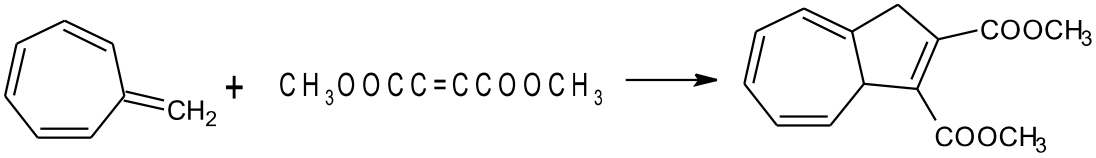

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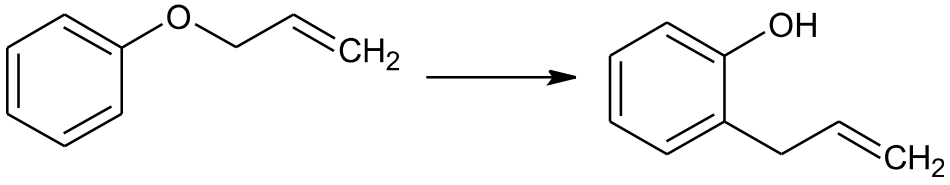
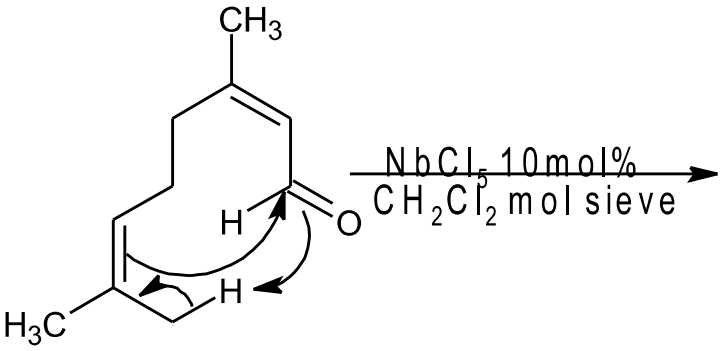


QUESTION 6

a. With the aid of an appropriate orbital diagram, identify the following terms: E_{HOMO}, E_{LUMO} and atomic orbitals. **6 marks**

b. Provide the appropriate product and names of the following reactions: **12marks**

i.



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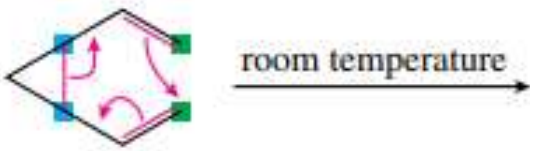

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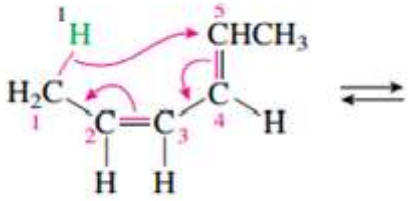
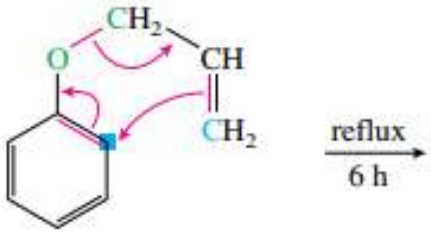


iv.



c. Explain the thermal cyclization of substituted buta-1,3-diene**.** **7marks**