REV-01
MSC/31/36

2024/05

SET A

M.SC. CHEMISTRY
FOURTH SEMESTER
ADVANCED ORGANIC CHEMISTRY
MSC - 402A

[USE OMR FOR OBJECTIVE PART]

Duration: 3 hrs. **Full Marks: 70**

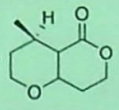
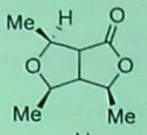
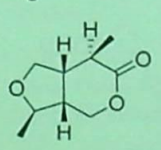
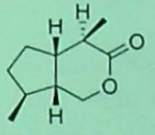
Objective

Time: 30 min. **Marks: 20**

Choose the correct answer from the following: ***1×20=20***

1. Fernisol is an example of
   a. monoterpene
   b. diterpene
   c. triterpene
   d. sesqueterpene

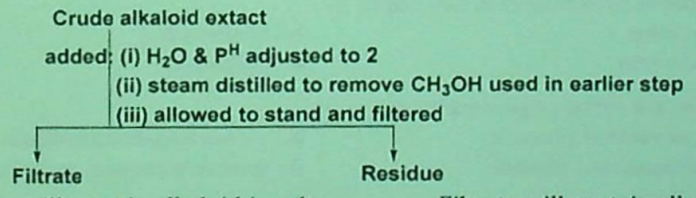
2. The example of cyclopentato monoterpene lactone is

   a. 
   b. 
   c. 
   d. 

3. Biosynthesis ofgeraniol, β-carotene and cholesterol has a common starting material, which is:
   a. L-Phenylalanine
   b. Shikimic acid
   c. $CH_3COSCoA$
   d. CoASH

4. Biosynthesis of Morphine starts from an amino acid which is
   a. L-Proline
   b. L-tyrosine
   c. L-Tryptophan
   d. Phenylalanine

5. The correct statement during extraction of an alkaloid, as shown in the following scheme:

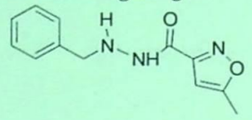


   a. Filtrate will contain alkaloid in salt form
   b. Filtrate will contain alkaloid in native form
   c. Residue will contain alkaloid in salt form
   d. Residue will contain alkaloid in native form

6. Which of the following is an example of inhibitory neurotransmitter
   a. GABA
   b. Epinephrine
   c. Norepinephrine
   d. Glutamate

7. Mephalan is an example of which of the following drug?
   a. Anti-inflammatory
   b. Anti-neoplastic
   c. Anti-tubercular
   d. Anti-histamine

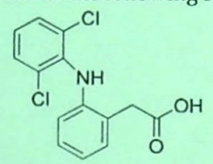
8. The name of the following drug is



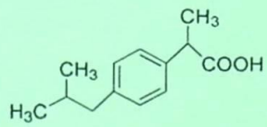
   a. Diphenhydramine
   b. Aspirin
   c. Isocarboxazid
   d. Halothane

9. Which of the following structures represents diclofenac?

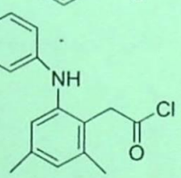
a.



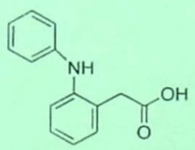
b.



c.



d.



10. Ethambutol belongs to which of the following drug?
    a. Anti-inflammatory
    b. Anti-neoplastic
    c. Anti-tubercular
    d. cardiovascular

11. Na^+ channel in lipid bilayer is developed by
    a. Crown ether
    b. Monensin A
    c. Cyclodextrin
    d. Spherand

12. Calixarenes are cyclic oligomers having
    a. p-functionalised phenols
    b. p-functionalised anilines
    c. m-functionalised phenols
    d. m-functionalised anilines

13. Lock-Key theory in supramolecular chemistry is given by
    a. Emil Fischer
    b. Paul Ehrlich
    c. Daniel Koshland
    d. None of them

14. Cyclodextrin is an example of
    a. Acyclic oligosaccharides
    b. Acyclic Amino-ethers
    c. Cyclic oligosaccharides
    d. Cyclic Amino-ethers

15. The Binding-energy of Host-Guest complex is calculated with the help of
    a. Contour plot
    b. Job's plot
    c. 3-D plot
    d. None of them

16. Hexagonal COFs can be designed by using the
    a. $[C_4 + C_2]$ and $[C_4 + C_4]$ combinations
    b. $[C_3 + C_2]$ and $[C_3 + C_3]$ combinations
    c. $[C_2 + C_2 + C_2]$ and $[C_3 + C_3]$ combinations
    d. $[C_4 + C_2]$ and $[C_3 + C_3 + C_2]$ combinations

17. MOF named MIL-101 and MIL-100 contain
    a. Fe metal
    b. Zn metal
    c. Cr metal
    d. Cu metal

18. In Metal-Organic Frameworks the pore size and shape determined by
    a. The size of the metal ions
    b. The length and flexibility of the organic ligands
    c. The temperature and pressure during synthesis
    d. The pH of the reaction mixture

19. The characteristic property of COF is
    a. Ionic bonding
    b. Porous structure
    c. Metallic bonding
    d. High electrical conductivity

20. The *dia* network in COF can be designed by the [Td + C2]
    a. $[T_d + C_2]$
    b. $[T_d + C_3]$
    c. $[C_2 + C_4]$
    d. $[T_d + C_2]$

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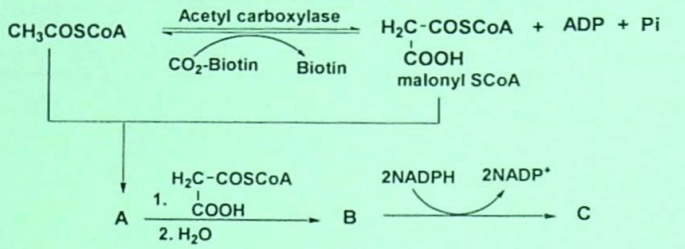
Descriptive

Time : 2 hrs. 30 mins. **Marks : 50**

[Answer question no.1 & any four (4) from the rest]

1. **a.** Write down the structure of A and B and C **3+2+3+2 =10**

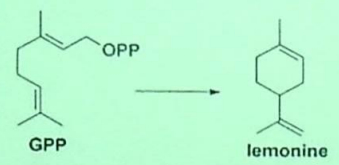


b. What are neurotransmitters? Mention its different classes with examples.

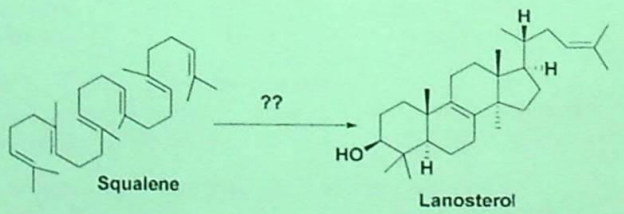
c. If the Host = [18] crown 6, Guest = K^+, Solvent = MeOH having $K = 10^6\ M^{-1}$ for host-guest complexation, find the value of ΔG^0 in K.J. mol^{-1}

d. Draw the structure of COF-1. Name linkage is there in COF-1.

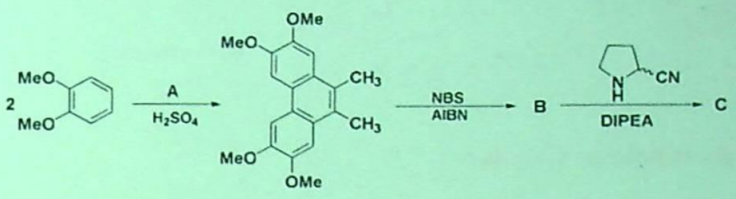
2. **a.** Sketch out biosynthetic route for synthesis of lemonine from geranyl pyrophosphate(GPP) **3+3+4 =10**



b. Sketch out the biosynthetic route for the following conversion? Justify the stereochemistry in the product.



c. Write down the structure of **A**,**B** and **C** in the following sequence of reactions. What is the role of **AIBN** in step II and **DIPEA** in step III? Give mechanism of formation of **C** from **B**.



3. a. What are anaesthetics? Explain the four different stages of anaesthetic activity. **3+4+3 =10**

b. What is enflurane? Draw its structure. Give the industrial scale synthesis of enflurane.

c. What is hepatotoxicity? Explain the oxidative metabolism of enflurane.

4. a. What are NSAIDs? Draw the R- and S- configurations of ibuprofen. **3+4+3 =10**

b. Describe the green synthesis of ibuprofen and justify that your method is green.

c. What are antidepressant drugs? Write the name and structure of two antidepressant drugs.

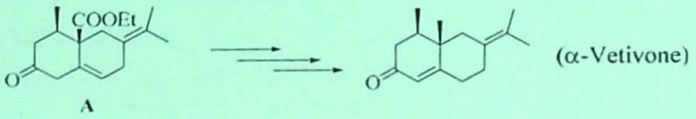
5. a. Discuss the Key-Lock concept in host guest chemistry **2+4+4 =10**

b. What is meant by molecular recognition? Discuss how the host-guest chemistry can be utilized for the sensing of metal ion?

c. What is Lariat Ether? Discuss its synthesis

6. **a.** What are primary and secondary metabolites? **2+3+5 =10**

b. Show the synthetic steps of α-Vetivone from compound **A**



A (α-Vetivone)

c. Write a short note on Catenane.

7. **a.** Mention two structure analysis techniques for COF materials and discuss. **4+4+2 =10**

b. When diboronic acid reacts with HHTP which COF will form? Write the full reaction.

c. Write the structure of building blocks of COF materials having C_3 symmetry and $-NH_2$ group.

8. **a.** What is MOF? Draw the schematic diagram of structure of MOF. **3+2+3+2 =10**

b. Draw the structure of ligands containing sulfur and phosphorous used for the synthesis of MOFs.

c. What is BioMOFs-explain. Write two applications of BioMOFs.

d. Mention one synthesis method for the preparation of COF material.

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