MANIPAL
ACADEMY of HIGHER EDUCATION
(Deemed to be University under Section 3 of the UGC Act, 1956)

DEPARTMENT OF SCIENCES, IV SEMESTER M. Sc. (CHEMISTRY)
END SEMESTER EXAMINATIONS, JUNE 2021

Chemistry of Natural Products [CHM 5013]

(REVISED CREDIT SYSTEM-2017)

Time: 2 Hours | Date:12-06-2021 | MAX. MARKS: 40

Note: (i) Answer **ANY 4** questions
(ii) Draw diagrams, and write equations wherever necessary

1A. Write the difference between Hoffmann and von-Brown degradation reaction 3

B. What are the structural variations that you observe in isomers of Vitamin A? How do you differentiate them by chemical tests? 3

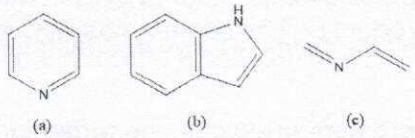
C Propose the structure of conhydrine, an alkaloid with empirical formula $C_8H_{17}NO$. This molecules consumes (a) 2 equivalents of acetyl chloride (b) 1 equivalent of MeI (c) oxidized product consumes 1 equivalent of 2,4-DNP (d) basic skeleton resembles pyridine 4

2A. What are the tests used to detect the different types of the carbonyl group in terpenoids? Explain with example. 3

B Write the chemical tests to distinguish primary, secondary and tertiary amines 3

C. Write the general reaction for the preparation of flavones and isoflavones 4

3A. Write Emde degradation product for the following molecules. 3



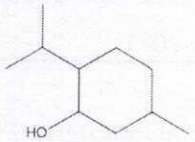
(a) (b) (c)

B. Describe the Baker-Venkatraman synthesis. Explain why this method cannot be employed for the synthesis of isoflavonoids. 3

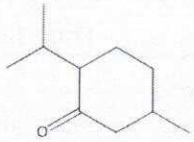
C. Identify the functional groups present in the plant extract having one N and three O atoms, from the following chemical reactions: 4
(a) Benzoylation gives mono derivative (b) Dibromo derivative results from Br_2 solution (c) Boiling with HCl eliminates CH_3Cl (d) Gives effervescence with $NaHCO_3$

4A. How do you analyze isolated and conjugated C=C bond qualitatively and quantitatively in an organic compound? 3

B. Menthol ($C_{10}H_{20}O$) and menthone ($C_{10}H_{18}O$) are having similar structure. Propose chemical reactions to differentiate these two molecules. Justify whether inter-conversion is possible between menthol and menthone. 3

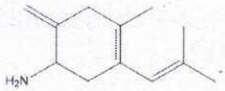


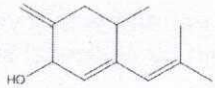
Menthol



Menthone

C. Write the product formed when the following molecules react with (a) ethane (b) ozone and (c) acetyl chloride 4





5A. Explain your reasoning. 3
(i) testosterone and androsterone are difficult to differentiate using chemical methods,
(ii) esterdiol to estertriol conversion is difficult
(iii) Carotenoids exhibit a large number of geometrical isomers and colour in the visible range

B. Explain the general method of isolating terpenoids from plant source. 3

C. Identify A to D from the following data; 4
Molecule A with empirical formula C_5H_8NOCl is treated with B to produce C. This compound further reacts with 2,4 DNP. Compound A consumes two equivalents of acetyl chloride and it can also exhibit keto-enol tautomerism. It also reacts with ethene to give different product D. The compounds A, C and D give a broad peak at 3400 cm^{-1} in the IR.

6A. Explain the nature of heteroatom present in the terpenoid ($C_{11}H_{22}O$) which does not react with acetyl chloride. 3

B. How do you differentiate the following functional groups present in alkaloids? 3
(i) Amide and ester (ii) R-NH_2 and R_2NH (iii) NCH_3 and OCH_3

C. Write the difference between (i) epiphasic and hypophasic carotenoids (ii) xanthophylls and carotenes. 4

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