

UNIT NO. 4: Natural Products

(A) Choose the correct alternative for each of the following and rewrite the sentence :

1. Terpenes are products.
(a) synthetic (b) **natural**
(c) organic (d) plant origin
2. Terpenes contain in its structure.
(a) pentene (b) nicotine
(c) **isoprene** (d) dipentene
3. Sesquiterpene contains number of isoprene units.
(a) 2 (b) 3
(c) 4 (d) **5**
4. Citral on mild oxidation gives
(a) citric acid (b) aldehyde
(c) **geranic acid** (d) geraniol
5. Citral is having group in its structure.
(a) alcohol (b) acid
(c) **aldehyde** (d) ketone
6. Citral is
(a) aromatic (b) cyclic
(c) **acyclic** (d) heterocyclic
7. Citral shows strong peak at in UV spectroscopy.
(a) 250 nm (b) 266 nm
(c) **238 nm** (d) 256 nm
8. Citral on reaction with KHSO_4 gives
(a) isoprene (b) geranic acid
(c) **p-cymene** (d) acetone
9. Nicotine contains ring in its structure.
(a) **pyridine** (b) pyrrol
(c) benzene (d) quinoline
10. Dehydration of α -terpineol with KHSO_4 gives
(a) **dipentene** (b) terebic acid
(c) terpenylic acid (d) geranic acid
11. Nicotine on oxidation with mild oxidant like silver oxide yielded
(a) **nicotyrine** (b) nicotine
(c) geraniol (d) geranic acid
14. Reduction of cis-citral gives
(a) geranic acid (b) geraniol
(c) **nerol** (d) terebic acid
15. The method that cannot be used to open the heterocyclic ring of an alkaloid is method.
(a) Emde's (b) Von-Braun
(c) **Herzig** (d) Hoffmann
16. Quaternary ammonium hydroxide lacking β -hydrogen atoms do not undergo reaction.

- (a) Herzig-Meyer's (b) Zerewitinoff's
(c) Hoffmann's (d) Zeisel's
17. Estimation of alkoxy group of alkaloid is done by method.
 (a) Zerewitinoff's **(b) Hoffmann's**
 (c) Zeisel's (d) Herzig-Meyer's
18. Which of the following is NOT an example of a primary metabolite?
 A) Amino acids B) DNA **C) Terpenoids** D) Vitamins
19. Which classification of natural products is based on the biosynthetic pathway?
 A) Type 1 **B) Type 2** C) Type 3 D) Organic natural products
20. What is the basic building block of terpenoids?
A) Isoprene B) Ethylene C) Propylene D) Butadiene
21. Which method is widely used for the isolation of mono and sesquiterpenoids?
 A) Extraction with fat and lard **B) Steam distillation** C) Solvent extraction D) Expression
22. Which class of terpenoids is derived from four isoprene units?
 A) Monoterpenoids B) Sesquiterpenoids **C) Diterpenoids** D) Triterpenoids
23. What is the term used for the link between isoprene units in terpenoids?
 A) Head-to-head link B) Tail-to-tail link **C) Head-to-tail link** D) Isoprene bond
24. Which analytical method is used to measure the specific rotation of optically active terpenoids?
 A) Mass spectrometry B) Refractive index measurement **C) Polarimetry** D) X-ray analysis
25. Which reaction helps in locating the position of double bonds in a terpenoid molecule?
 A) Epoxidation **B) Ozonolysis** C) Hydrogenation D) Dehydration
26. Which terpenoid is used as an aroma compound in perfumery and flavoring agent?
 A) Squalene B) Phytol **C) Geraniol** D) Polyterpenoids
27. What is the major component of citrus fruit peel oil, providing a lemon-like odor?
A) Citral B) Geraniol C) Squalene D) Myrcene
28. How many isoprene units are present in sesterterpenoids?
 a) Four **b) Five** c) Six d) Eight
29. What is the general method used for the determination of molecular formula of terpenoids?
 a) Infrared spectroscopy b) Mass spectrometry **c) Elemental analysis** d) X-ray analysis
30. What is the name of the aldehyde-containing acyclic monoterpene made up of two isoprene units?
 a) Geraniol **b) Citral** c) Linalool d) Limonene
31. Which spectroscopic method is frequently used for elucidating the structure of terpenoids?
 a) Infrared spectroscopy b) Ultraviolet spectroscopy

- c) Nuclear magnetic resonance spectroscopy d) Mass spectroscopy
32. Which technique is NOT commonly used for the structure determination of terpenoids?
a) Chemical methods b) Physical methods **c) Synthesis** d) Spectroscopic methods
33. What is the main structural feature of nicotine?
a) It contains a pyrrole ring. **b) It contains a pyridine ring.**
c) It contains an indole ring. d) It contains a tropane ring.
34. What chemical method is used to detect the presence of a hydroxyl group in alkaloids?
a) Zeisel method b) Emde's degradation
c) Hoffmann's exhaustive methylation method d) Von-Braun's method
35. The molecular formula of isoprene unit is.....
A) $C_{10}H_8$ **B) C_5H_8** C) $C_{10}H_{18}$ D) C_5H_{10}

(D) Long Answer Type Questions :

- (a) How will you establish the structure of citral on the basis of analytical and synthetic evidences ?
- (b) How will you establish the structure of nicotine on the basis of analytical and synthetic evidences ?
- (c) Give the synthesis of : (i) Citral, (ii) Nicotine.
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