

Organic Chemistry in the Natural World

Organic Chemistry · Practice Test · 25 Questions

1. Which polyunsaturated fatty acid, synthesized by marine algae and crucial for the health of marine ecosystems, is the primary source of Omega-3 in the oceanic food web?

- A) Docosahexaenoic acid (DHA)
- B) Oleic acid
- C) Palmitic acid
- D) Stearic acid

2. The bioluminescence in fireflies (*Photinus pyralis*) is produced by the oxidation of which organic substrate catalyzed by the enzyme luciferase?

- A) Luciferin
- B) Aequorin
- C) Coelenterazine
- D) Chlorophyll

3. Which toxic organic compound is sequestered by the Monarch butterfly (*Danaus plexippus*) from milkweed plants to deter avian predators?

- A) Cardiac glycosides
- B) Alkaloid nicotine
- C) Reserpine
- D) Cyanogenic glycosides

4. What is the primary organic component of the adhesive silk produced by orb-weaver spiders, which provides its unique elasticity and strength?

- A) Fibroin proteins
- B) Chitin
- C) Keratin
- D) Cellulose

5. The characteristic 'petrichor' smell of rain hitting dry soil is primarily caused by the release of which volatile organic compound produced by *Streptomyces* bacteria?

- A) Geosmin
- B) Isoprene
- C) Limonene
- D) Benzene

6. Which aromatic organic compound, found in the defensive spray of certain millipedes, is derived from the metabolic pathway involving mandelonitrile?

- A) Hydrogen cyanide
- B) Formaldehyde
- C) Acetic acid
- D) Methanol

7. What class of organic pigments is responsible for the red, orange, and yellow coloration in flamingos, derived from their diet of crustaceans and algae?

- A) Carotenoids
- B) Anthocyanins
- C) Porphyrins
- D) Flavonoids

8. The venom of the Platypus contains defensin-like peptides, but the primary organic chemical class causing intense localized pain in their victims is not yet fully elucidated; however, which toxic organic family is commonly associated with animal venoms?

- A) Polypeptides
- B) Steroids
- C) Terpenes
- D) Phenols

9. Which organic compound, commonly found in the waxes of honeybees (*Apis mellifera*), is a long-chain ester formed from palmitic acid and melissyl alcohol?

- A) Myricyl palmitate
- B) Triacontanyl palmitate
- C) Cetyl palmitate
- D) Stearyl stearate

10. What volatile organic compound is emitted by plants in response to herbivore damage to attract parasitic wasps that prey on the attacking larvae?

- A) (Z)-3-hexenyl acetate
- B) Ethylene
- C) Methane
- D) Ethanol

11. Which polycyclic aromatic hydrocarbon is a known environmental pollutant that bioaccumulates in the fatty tissues of marine mammals like orcas?

- A) Benzo[a]pyrene
- B) Naphthalene
- C) Anthracene
- D) Phenanthrene

12. What organic molecule serves as the primary energy storage lipid in the seeds of oilseed crops like canola (*Brassica napus*)?

- A) Triacylglycerol
- B) Phospholipid
- C) Sphingolipid
- D) Wax ester

13. The defense mechanism of the bombardier beetle involves a violent reaction between hydroquinone and which other organic chemical?

- A) Hydrogen peroxide
- B) Hydrochloric acid
- C) Sulfuric acid
- D) Nitric acid

14. Which alkaloid, found in the skin secretions of the poison dart frog (*Phyllobates terribilis*), is a potent voltage-gated sodium channel blocker?

- A) Batrachotoxin
- B) Strychnine
- C) Atropine
- D) Nicotine

15. What is the primary organic molecule in the cell walls of fungi, serving as a structural polysaccharide?

- A) Chitin
- B) Cellulose
- C) Amylose
- D) Pectin

16. Which organic molecule, produced by many conifers, acts as a natural resin to seal wounds and deter boring insects?

- A) Terpenoid
- B) Steroid
- C) Amino acid
- D) Nucleotide

17. The blue color in certain deep-sea crustaceans is produced by a complex formed between a protein and which carotenoid molecule?

- A) Astaxanthin
- B) Lutein
- C) Zeaxanthin
- D) Beta-carotene

18. Which volatile organic compound is the primary pheromone component in the alarm signal released by many aphid species?

- A) (E)-beta-farnesene
- B) Geraniol
- C) Linalool
- D) Menthol

19. What is the main organic acid involved in the defensive secretion of the Formica genus of ants?

- A) Formic acid
- B) Acetic acid
- C) Butyric acid
- D) Lactic acid

20. Which organic sulfur compound is responsible for the characteristic pungent odor released by skunks (Mephitis mephitis)?

- A) (E)-2-butene-1-thiol
- B) Dimethyl sulfide
- C) Methanethiol
- D) Hydrogen sulfide

21. Which complex organic polymer, making up the woody tissue of plants, is formed by the dehydrogenative polymerization of coniferyl, coumaryl, and sinapyl alcohols?

- A) Lignin
- B) Cellulose
- C) Hemicellulose
- D) Suberin

22. Which organic compound is the primary nitrogenous waste product excreted by reptiles and birds to conserve water?

- A) Uric acid
- B) Urea
- C) Ammonia
- D) Creatinine

23. The 'fishy' odor of decaying marine organisms is largely attributed to the presence of which organic amine?

- A) Trimethylamine
- B) Methylamine
- C) Ethylamine
- D) Propylamine

24. Which terpene is the primary component of citrus oil and serves as an effective natural insecticide?

- A) Limonene
- B) Pinene
- C) Camphene
- D) Myrcene

25. Which organic molecule is the primary component of the structural protein 'silk fibroin' in silkworms?

- A) Glycine-serine-alanine polymer
- B) Glutamic acid polymer
- C) Proline-hydroxyproline polymer
- D) Lysine-arginine polymer