12 BASIC CONCEPTS OF ORGANIC CHEMISTRY

12.1 Introduction to organic chemistry and organic compounds

1. Organic chemistry is defined as
   a. the scientific study of compounds obtained from living things
   b. the scientific study of naturally occurring compounds
   c. the scientific study of compounds obtained from minerals
   d. the scientific study of hydrocarbons and their derivatives
2. Which of the following is a principal element in organic compounds
   a. Oxygen b. Nitrogen c. Carbon d. Chlorine

12.2 Reasons for the separate study of organic compounds from inorganic compounds

3. Which of the following is the wrong statement?
   a. Boiling and melting points of organic compounds are generally low.
   b. Organic compounds generally involve electrovalent bonds.
   c. Hydrocarbons are the compounds formed by covalent bonds between hydrogen and carbon.
   d. Inorganic compounds generally involve simple and rapid ionic reactions.
4. Which property is not common in organic compounds?
   a. Low melting point c. Slow chemical reaction b. Isomerism d. Fast chemical reaction
5. Organic compounds are generally soluble in
   a. Water c. nonpolar covalent solvents
   b. Ionic solvents d. highly polar solvents
6. Consider the following two statements. [A] Generally inorganic compounds are combustible. [B] Generally, organic compounds are noncombustible
   a. A is right, and B is wrong c. B is right, and A is wrong
   b. Both A and B are wrong d. Both A and B are right
7. Which of the following is not a characteristic of organic compounds
   a. They possess covalent bonds.
   b. They are bad conductors of electricity.
   c. They are soluble in non-polar solvents.
   d. They have ionic bonds.
8. Which of the following is not a characteristic of organic compounds
   a. They involve simple rapid reactions occurring at ordinary conditions.
   b. They are bad conductors of electricity.
   c. They are soluble in organic solvents.
   d. Their main sources are living things.
9. Which of these is not a property of organic compounds?
   a. flammable c. isomerism b. directional character of bonds d. none

12.3 Tetra-covalency and **Catenation** property of carbon

10. The atomic number and valency of carbon are respectively
    a. 4 and 6 b. 6 and 12 c. 2 and 6 d. 6 and 4

11. In stable organic compounds, carbon always forms
    a. 3 covalent bonds c. 4 covalent bonds
    b. 3 ionic bonds d. 4 ionic bonds
12. The property of carbon forming long chain, branched chain and cyclic form is called
    A. Polymerization B. Isomerism C. Homology D. catenation
13. Which property is responsible for the existence of a large number and variety of organic compounds?
    a. Covalent bonding c. Tetrahedral nature
    b. Multiple bonding d. Catenation
14. Catenation property is shown by
    a. Hydrogen b. Helium c. Lithium d. carbon
15. Catenation refers to
    a. the property of carbon by virtue of which it can bond with other carbon, forming long chains
    b. hydrocarbon part of the organic compounds
    c. the property of carbon by virtue of which it can form 4 covalent bonds
    d. the reactive(functional) part of the organic compounds
16. Catenation is the property of the C atom which describes its ability to
    a. Bond with other carbon atoms
    b. Form double bonds and triple bonds
    c. Exist in plant and animal form
    d. Form bonds in its ground state.

12.4 Classification of organic compounds

17. Saturated hydrocarbons contain
    a. Only one carbon-carbon bond
    b. Only double carbon-carbon bonds
    c. Contain carbon-carbon multiple bonds
    d. Only single carbon-carbon bonds
18. Cyclic organic compounds possessing the properties of aliphatic compounds is
    a. Aromatic b. Carbocyclic c. Homocyclic d. Alicyclic
19. Carbocyclic compounds resembling open chain compound are called
    a. Aromatic B. Heterocyclic c. Unsaturated d. alicyclic
20. Heterocyclic compound means
    a. a chain of C-C compound
    b. a cyclic compound of carbon with at least one element other than carbon
    c. a cyclic compound of carbon
    d. more than one benzene ring attached to each other
21. Which of the following compounds is a heterocyclic compound?
    a. Benzene d. Cyclopropane b. Naphthalene c. Pyridine
22. An example of an alicyclic compound is
    a. Benzene c. Hexane b. Cyclohexane d. Furan
23. Benzene formula:
    A) C_6H_6 B) CH_4 C) C_2H_4 D) CH_2

12.5 Alkyl groups, functional groups, and homologous series

24. The first four alkyl groups are respectively
    a. Methyl, propyl, butyl & pentyl c. Methyl, ethyl, propyl & butyl

b. Ethyl, propyl, butyl & heptyl d. Ethyl, methyl, hexyl & butyl

25. The main characteristics of an organic compound are determined by
    a. functional group c. molecular weight
    b. functional group and alkyl group d. alkyl group

26. The functional group -CHO is called
    a. Ketone b. aldehyde c. alcohol d. ether

27. Which one is not true?
    a. Functional group of alcohols is –OH.
    b. Functional group of amines is $-NO_2$.
    c. Alkanes and alkenes are called saturated hydrocarbons.
    d. 2-methylbutane is an example of a branched-chain hydrocarbon.

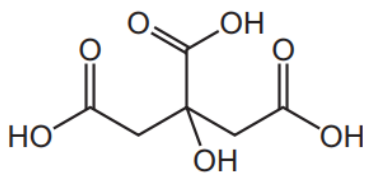
Homologous series

28. Which of the following is not typical of a homologous series?
    a. Each successive member differs by CH
    b. Its members have a general formula
    c. They have similar methods of preparation
    d. Their physical properties show a gradual change as the size of the compounds increases
29. Which of the following is not true about homologous series?
    a. Adjacent members of the group differ by one $-CH_2$ group
    b. Adjacent members of the group differ by a mass of 14 amu
    c. Members of a group have the same chemical and physical properties
    d. Members of a group can be prepared by the same general methods
30. Two consecutive members of a homologous series differ by
    a. $-CH_2-$ b. $-CH_3$ c. -CH= d. $-CH_3$

12.6 Idea of structural formula, contracted formula and bond line structural formula

31. Which of the following represents the simplest whole number ratio of different atoms present in one molecule of a compound
    a. Molecular formula c. Condensed formula b. Electron dot formula d. Empirical formula
32. The symbolic representation of a molecule of an element or a compound is called
    a. Contracted formula d. Empirical formula
    b. Molecular formula e. Structural formula
    c. Bond line structural formula f. Condensed formula
33. The diagram shows the skeletal formula of citric acid.

citric acid



What is the molecular formula of citric acid?
A $C_6H_8O_7$ **B** $C_6H_4O_7$ **C** $C_8H_8O_7$ **D** $C_{10}H_8O_7$

34. For which hydrocarbon are the molecular and empirical formulae the same?
    A butane **B** ethane **C** pent-1-ene **D** propane

12.7 Preliminary idea of cracking and reforming, quality of gasoline, Octane number, Cetane number and gasoline additives

1. Pyrolysis or cracking

35. Quality of gasoline is generally measured as "Octane number". A fuel contains 2,2,4-trimethylpentane and n-heptane in a ratio of 70 to 30 by volume. What will be the respective octane number of the given fuel.
    a. 30 b. 100 c. 40 d. 70
36. Gasoline is used as
    a. Oil b. Food c. Fuel d. lubricants
37. Petroleum is a mixture of mainly
    a. Alkanes b. Alkenes c. Alkynes d. Alkyl halides
38. Cracking of hydrocarbons is the process in which
    a. Lower boiling hydrocarbons are changed into higher boiling hydrocarbons.
    b. Higher boiling hydrocarbons are changed into lower boiling hydrocarbons by the application of heat.
    c. Production of petroleum from crude oil.
    d. Separation of smaller hydrocarbons from their mixture.
39. Which of the following compounds is assigned an octane number of 0?
    a. n-octane b. iso-octane c. n-heptane d. iso-heptane
40. Which hydrocarbon has the highest octane number?
    A) Triptane B) Ethane C) Iso-octane D) Methane
41. Which of the following compounds is assigned the octane number 100?
    a. 2,2,4-trimethylpentane c. 2,2,3-trimethylpentane
    b. 2,2,3-triethylpentane d. 2,4,4-trimethylpentane
42. Which of the following compounds is assigned the Cetane number 100?
    a. Isooctane c. α-methyl naphthalene b. n-hexadecane d. Benzene
43. Which of the following compounds is used as anti-knocking agent?
    a. Lead acetate c. Ethyl lithium b. Lead chloride d. Tetra ethyl lead
44. Which of the following is not true?
    a. Most commonly used gasoline additive is TEL.
    b. Gasolines are graded on the basis of their octane number.
    c. Straight chain gasolines have a higher octane number.
    d. Knocking reduces the efficiency of the engine.
45. Octane number of fuel can be increased by
    a. Isomerization c. Reforming b. Alkylation d. All
46. Which one is not true?
    a. Functional group of carboxylic acid is -COOH
    b. Functional group of amines is $-NH_2$
    c. Ethyl, methyl, and propyl are the first three alkyl groups, respectively.
    d. Inorganic compounds undergo slow, complex reactions that occur under specific conditions and are molecular in nature.
47. Refining of petroleum involves:
    a) Simple distillation b) Fractional distillation c) Steam distillation d) Distillation under reduced pressure
48. Catalytic cracking is generally used to manufacture:
    a) Petrol b) Diesel c) Kerosene d) Light oil

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