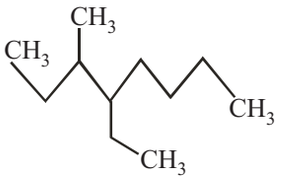
7 Carbon and Its Compounds

Multiple Choice Questions (MCQs)

DIRECTIONS : *This section contains multiple choice questions. Each question has four choices (a), (b), (c) and (d) out of which only one is correct.*

1. The correct name of the given compound is:



(a) 2, 3-diethyl heptane (b) 5-ethyl-6-methyl octane

(c) 4-ethyl-3-methyl octane (d) 3-methyl-4-ethyl octane

2. Which of the following options is false about a soap?

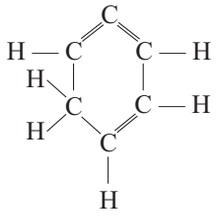
(a) The soap solution in water is neutral and can be used to wash all kinds of fabrics.

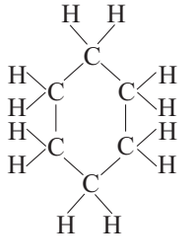
(b) Soap forms lather only in soft water.

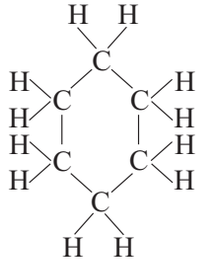
(c) Soap is a metallic salt of higher fatty acids.

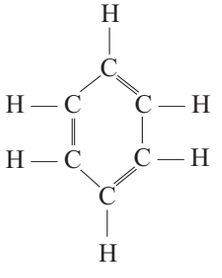
(d) Soap cannot be used in slightly acidic medium.

3. Structural formula of benzene is:

(a) 

(b) 

(c) 

(d) 

4. What does isomerism explain?

(a) A difference in molecular formulae.

(b) A difference in molecular weights.

(c) A difference in chemical properties and structural formulae.

(d) A difference in molecular composition.

5. Buckminister fullerene is an allotropic form of

(a) phosphorus (b) sulphur

(c) carbon (d) tin

6. The number of 4° carbon atoms in 2,2,4,4-tetramethyl pentane is –

(a) 1 (b) 2

(c) 3 (d) 4

7. Which is a general formula of alkenes?

(a) C_nH_{2n+2} (b) C_nH_{2n}

(c) C_nH_{2n-2} (d) None of these

8. The functional group represent alcohol is –

(a) – OH (b) – CHO

(c) – COOH (d) > C = O

9. Which of the following is the purest form of carbon?

(a) charcoal (b) coal

(c) diamond (d) graphite

10. Organic compounds will always contain –

(a) carbon (b) hydrogen

(c) nitrogen (d) sulphur

11. Methane, ethane and propane are said to form a homologous series because all are –

(a) hydrocarbons

(b) saturated compounds

(c) aliphatic compounds

(d) differ from each other by a CH_2 group

12. When methane is burnt in an excess of air, the products of combustion are –

(a) C and H_2O (b) CO and H_2O

(c) CO_2 and H_2 (d) CO_2 and H_2O

13. Which of the following gases is called 'marsh gas'?

(a) H_2 (b) CH_4

(c) C_2H_4 (d) C_2H_2

14. The final product of chlorination of methane in the sun light is –

(a) CH_3Cl (b) CH_2Cl_2

(c) $CHCl_3$ (d) CCl_4

15. The number of oxygen molecules used in the combustion of 1 molecule of ethanol is –

(a) 1 (b) 2

(c) 3 (d) 4

16. General formula of alkyne is –

(a) C_nH_{2n+2} (b) C_nH_{2n}

(c) C_nH_{2n-2} (d) C_nH_n

17. When vanaspati oil reacts with hydrogen then it is converted into vanaspati ghee. In this process catalyst used is :

(a) Fe (b) Mo

(c) V (d) Ni

18. Observe the following pairs of organic compounds :

(I) C_4H_9OH and $C_5H_{11}OH$

(II) $C_7H_{15}OH$ and $C_5H_{11}OH$

(III) $C_6H_{13}OH$ and C_3H_7OH

Which of these pair is a homologous series according to increasing order of carbon atom?

(a) (III) only (b) (II) only

(c) (I) only (d) All of these

19. Carbon exists in the atmosphere in the form of :

(a) carbon monoxide only.

(b) carbon monoxide in traces, and carbon dioxide.

(c) carbon dioxide only.

(d) coal

20. Oils on treating with hydrogen in the presence of palladium or nickel catalyst form fats. This is an example of :

(a) addition reaction

(b) substitution reaction

(c) displacement reaction

(d) oxidation reaction

21. Chlorine reacts with saturated hydrocarbons at room temperature in the

(a) absence of sunlight

(b) presence of sunlight

(c) presence of water

(d) presence of hydrochloric acid

22. Pentane has the molecular formula C_5H_{12}. It has

(a) 5 covalent bonds (b) 12 covalent bonds

(c) 16 covalent bonds (d) 17 covalent bonds

23. Carbon forms four covalent bonds by sharing its four valence electrons with four univalent atoms, *e.g.* hydrogen. After the formation of four bonds, carbon attains the electronic configuration of:

(a) helium (b) neon

(c) argon (d) krypton

24. Which of the following does not belong to the same homologous series?

(a) CH_4 (b) C_2H_6

(c) C_3H_8 (d) C_4H_8

25. The enzyme involved in the oxidation of ethanol to form vinegar is –

(a) zymase (b) oxidase

(c) acetobacter (d) invertase

26. Glacial acetic acid is –

(a) 100% acetic acid free of water

(b) solidified acetic acid

(c) gaseous acetic acid

(d) frozen acetic acid

27. When ethanoic acid is heated with $NaHCO_3$ the gas evolved is –

(a) H_2 (b) CO_2

(c) CH_4 (d) CO

28. During decarboxylation of ethanoic acid with sodalime (NaOH + CaO), CO_2 is removed as –

(a) CO_2 (b) CO

(c) Na_2CO_3 (d) $CaCO_3$

29. When ethanoic acid reacts with ethanol, a sweet smelling product is formed. The functional group in the product is

(a) aldehyde (b) ketone

(c) alcohol (d) ester

30. Detergents can lather well in –

(a) soft water (b) hard water

(c) river water (d) any one of the above

31. 'Drinking alcohol' is very harmful and it ruins the health. 'Drinking alcohol' stands for –

(a) drinking methyl alcohol

(b) drinking ethyl alcohol

(c) drinking propyl alcohol

(d) drinking isopropyl alcohol

32. The treatment of acetic acid with lithium aluminium hydride produces –

(a) methanol (b) ethanol

(c) ethanal (d) methanal

33. The fermentation reactions are carried out in temperature range of –

(a) 20-30°C (b) 30-40°C

(c) 40-50°C (d) 50-60°C

34. Soaps are sodium salts of fatty acids. Which of the following fatty acids does not form soap?

(a) butyric acid (b) oleic acid

(c) palmitic acid (d) stearic acid

35. The OH group of an alcohol or the —COOH group of a carboxylic acid can be replaced by —Cl using :–

(a) phosphorus pentachloride

(b) hypochlorous acid

(c) chlorine

(d) hydrochloric acid

36. Which compound represents the vinegar?

(a) HCOOH (b) CH_3CHO

(c) HCHO (d) CH_3COOH

37. A & B both compounds give H_2 gas with sodium. If A & B react in presence of acid catalyst then they form ethyl acetate. Thus, A & B would be -

(a) CH_3COOH, CH_3OH

(b) HCOOH, CH_3COOH

(c) CH_3COOH, C_2H_5OH

(d) C_3H_7COOH, C_3H_7OH

38. During the cleansing action of soap dirt is surrounded by soap molecules. Soap molecule is like a tadpole which has a head and tail. These head and tail respectively are:

(a) hydrophobic and hydrophilic

(b) hydrophobic and hydrophobic

(c) hydrophilic and hydrophilic

(d) hydrophilic and hydrophobic

39. The total number of electrons and the number of electrons involved in the formation of various bonds present in one molecule of propanal (C_2H_5CHO) are respectively.

(a) 32 and 20 (b) 24 and 20

(c) 24 and 18 (d) 32 and 18

40. The number of structural isomers of the compound having molecular formula C_4H_9Br is

(a) 3 (b) 5

(c) 4 (d) 2

41. A sweet smelling compound formed by reacting acetic acid with ethanol in the presence of hydrochloric acid is

(a) $CH_3COOC_2H_5$ (b) C_2H_5COOH

(c) $C_2H_5COOCH_3$ (d) CH_3OH

42. Percentage of nitrogen in urea (NH_2CONH_2) is

(a) 23.3% (b) 46.7%

(c) 69.9% (d) 11.66%

43. The molecular formula of carboxylic acid that differs from the rest is

(a) $C_{13}H_{26}O_2$ (b) $C_2H_4O_2$

(c) $C_9H_{18}O_2$ (d) $C_7H_{12}O_2$

44. During laboratory preparation CH_4 gas is collected by downward displacement of water because

(a) CH_4 is lighter than Air

(b) CH_4 is poisonous gas

(c) It does not dissolve in water

(d) All the above statements are correct

45. Which one of the following statement is incorrect about graphite and diamond ?

(a) Graphite is smooth and slippery.

(b) Diamond is good conductor of heat.

(c) Graphite is a good conductor of electricity.

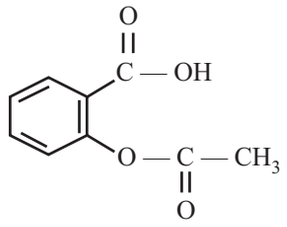
(d) Physical and chemical properties of graphite and diamond are same.

46. A compound 'X' reacts with a compound 'Y' , to produce a colourless and odourless gas. The gas turns lime water milky. When 'X' reacts with methanol in the presence of concentrated H_2SO_4, a sweet smelling substance is produced. The molecular formula of the compound 'X' is –

(a) C_2H_4O (b) $C_2H_4O_2$

(c) C_2H_6O (d) $C_2H_6O_2$

47. The functional groups present in the following compound are –



(a) alcohol, ketone and ester

(b) ester and carboxylic acid

(c) carboxylic acid and ketone

(d) ester and alcohol

48. A compound of carbon, hydrogen and nitrogen contains these elements in the ratio of their atomic mass 9 : 1 : 3.5, if its molecular mass is 108 u. What is its molecular formula?

(a) C_2H_2N (b) C_3H_4N

(c) C_2HN_2 (d) $C_6H_8N_2$

49. How many grams of oxygen gas will be needed for complete combustion of 2 moles of 3rd member of alkyne series ?

(a) 186 g (b) 256 g

(c) 352 g (d) 372 g

50. A hydrocarbon 'A' (C_3H_8) on treatment with chlorine in presence of sunlight yielded compound 'B' as major product Reaction of 'B' with aqueous KOH gave 'C' which on treatment with concentrated H_2SO_4 yielded 'D'. Hydrogenation of 'D' gave back 'A'. The sequence of reactions involved in above conversion is:

(a) substitution, substitution, addition, dehydration

(b) substitution, substitution , dehydration, addition

(c) substitution, dehydration, addition, addition

(d) addition, substitution, dehydration, substitution.

51. An organic liquid 'A' with acidified potassium dichromate gave product 'B'. The compound 'B' on heating with methanol in presence of concentrated sulphuric acid formed compound 'C' which on subsequent treatment with sodium hydroxide formed two product 'D' and 'E'. The product 'D' is known to affect the optic nerve causing blindness. Intake of 'D' in very small quantities can cause death. What are compound 'A', 'B', 'C', 'D' and 'E'?

(a) A = Ethanol, B = Ethanoic acid, C = Methanol D = Sodium acetate, E = Methyl ethanoate

(b) A = Ethanol, B = Ethanoic acid, C = Methyl ethanoate D = Methanol, E = Sodium acetate

(c) A = Sodium acetate, B = Ethanoic acid, C = Methyl ethanoate, D = Methanol, E = Ethanol

(d) A = Ethanol, B = Ethanoic acid, C = Methyl ethanoate, D = Sodium acetate, E = Methanol

52. In shaving creams_____ is added to prevent rapid drying.

(a) Methanol (b) Glycerol

(c) Ethanol (d) Glycol

53. An organic compound A on heating with concentrated H_2SO_4 gave product B and on warming with alkaline $KMnO_4$ gave compound C. Compound A on heating with compound C in presence of concentrated H_2SO_4 formed compound D, which has fruity smell. Identify the compounds A, B, C and D:

(a) A = Alcohol, B = Carboxylic acid, C = Alkene, D = Ester

(b) A = Carboxylic acid, B = Ester, C = Alkene, D = Alcohol

(c) A = Alcohol, B = Alkene, C = Carboxylic acid, D = Ester

(d) A = Alkene, B = Alcohol, C = Ester, D = Carboxylic acid

54. Two organic compounds 'A' and 'B' react with sodium metal and both produce the same gas 'X', but with sodium hydrogen carbonate, only compound B reacts to give a gas 'Y'. Identify 'A', 'B', 'X' and 'Y':

(a) A = Ethylene, B = Ethyl alcohol, X = Carbon dioxide, Y = Hydrogen

(b) A = Ethyl alcohol, B = Acetic acid, X = Hydrogen, Y = Carbon dioxide

(c) A = Methyl alcohol, B = Ethyl alcohol, X = Hydrogen, Y = Carbon dioxide

(d) A = Acetic acid, B = Formic acid, X = Carbon dioxide, Y = Hydrogen

55. Fermentation of sugarcane juice produces

(a) Ethanol (b) Ethanal

(c) Acetic acid (d) Gluconic acid

56. Antiknocking compound in gasoline is :

(a) Triethyl lead (b) Trimethyl lead

(c) Tetramethyl lead (d) Tetraethyl lead

57. Identify the correct order of boiling points of the following compounds-

(A) $CH_3CH_2CH_2CH_2OH$

(B) $CH_3CH_2CH_2CHO$

(C) $CH_3CH_2CH_2COOH$

(a) (A) > (B) > (C) (b) (C) > (A) > (B)

(c) (A) > (C) > (B) (d) (C) > (B) > (A)

58. Ethane with the molecular formula C_2H_6 has :

(a) 6 covalent bonds (b) 7 covalent bonds

(c) 8 covalent bonds (d) 9 covalent bonds

59. Butanone is four-carbon compound with the functional group :

(a) carboxylic acid (b) aldehyde

(c) ketone (d) alcohol

60. While cooking, if the bottom of the vessel is getting blackened on the outside, it means that :

(a) the food is not cooked completely.

(b) the fuel is not burning completely.

(c) the fuel is wet.

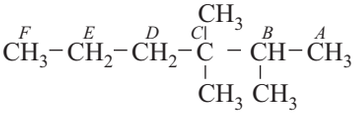
(d) the fuel is burning completely.

Case/Passage Based Questions

DIRECTIONS : *Study the given case/passage and answer the following questions.*

Case/Passage - 1

A carbon atom attached to one, two, three and four other carbon atoms is called primary, secondary, tertiary and quaternary carbon respectively. Now consider following compound and answer the following questions.



61. In above compound how many carbon atom are primary?

(a) 7 (b) 5

(c) 6 (d) 4

62. In above compound how many carbon atoms are secondary?

(a) 2 (b) 1

(c) 3 (d) 0

63. In above compound which carbon atom is quaternary?

(a) *B* (b) *D*

(c) *F* (d) *C*

Case/Passage - 2

Reactions in which an atom or a group of atoms is replaced by some other atom or another group of atoms without causing any change in the structure of the remaining part of the molecule, are called substitution reactions.

All organic compounds containing double or triple bonds give addition reactions, i.e., alkenes, alkynes and aromatic hydrocarbons give addition reactions.

Reactions in which the compounds react with oxygen and form carbon dioxide and water is known as combustion reaction. This process occurs with release of great amount of heat.

64. The reaction

$CH_4 + Cl_2 \longrightarrow CH_3Cl + HCl$ is :

(a) substitution reaction

(b) addition reaction

(c) rearrangement reaction

(d) elimination reaction

65. The reaction $CH_2 = CH_2 + H_2 \longrightarrow CH_3 - CH_3$ is :

(a) substitution reaction

(b) addition reaction

(c) rearrangement reaction

(d) elimination reaction

66. The reaction $C_2H_6 + O_2 \longrightarrow 2CO_2 + 3H_2O$ is :

(a) substitution reaction

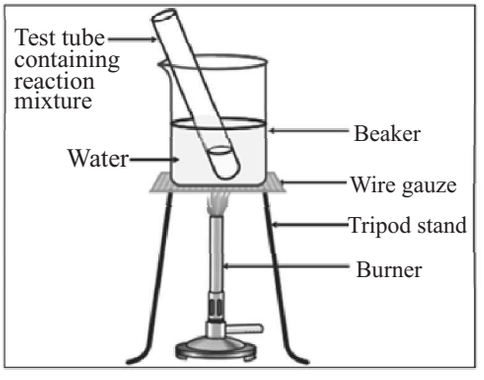
(b) rearrangement reaction

(c) addition reaction

(d) combustion reaction

Case/Passage - 3

The given diagram represent an experiment in which a test tube contains 1 mL of ethanol (absolute alcohol) and 1 mL glacial acetic acid along with a few drops of concentrated H_2SO_4. Observe the diagram and answer the following questions.



67. Name the type of reaction taking place in this experiment.

68. Write the chemical equation.

69. Why reverse of this reaction is known as saponification reaction?

70. Give two uses of the resulting product.

Case/Passage - 4

Food, clothes, medicines, books, or many of the things are all based on this versatile element carbon. In addition, all living structures are carbon based. The earth's crust has only 0.02% carbon in the form of minerals. The element carbon occurs in different forms in nature with widely varying

physical properties. Both diamond and graphite are formed by carbon atoms, the difference lies in the manner in which the carbon atoms are bonded to one another. Carbon has the unique ability to form bonds with other atoms of carbon, giving rise to large molecules. This property is called catenation.

71 From the given alternatives, whose chemical and physical properties are *not* same?
(a) Graphite and Diamond
(b) Phosphorous and Sulphur
(c) Carbon and Hydrogen
(d) Methyl alcohol and Acetic acid

72. Which of the following statements is not correct?
(a) Graphite is much less dense than diamond
(b) Graphite is black and soft
(c) Graphite has low melting point
(d) Graphite feels smooth and slippery

73. Which of the following are isomers?
(a) Butane and isobutene
(b) Ethane and ethene
(c) Propane and propyne
(d) Butane and isobutane

74. Which one of the following is not an allotrope of carbon?
(a) Soot (b) Graphite
(c) Diamond (d) Carborundum

75. Pentane has the molecular formula C_5H_{12}. It has
(a) 5 covalent bonds (b) 12 covalent bonds
(c) 16 covalent bonds (d) 17 covalent bonds

Assertion & Reason

DIRECTIONS : *Each of these questions contains an assertion followed by reason. Read them carefully and answer the question on the basis of following options. You have to select the one that best describes the two statements.*

(a) If both **Assertion** and **Reason** are **correct** and Reason is the **correct explanation** of Assertion.

(b) If both **Assertion** and **Reason** are correct, but Reason is **not the correct explanation** of Assertion.

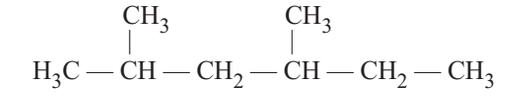
(c) If **Assertion** is **correct** but **Reason** is **incorrect**.

(d) If **Assertion** is **incorrect** but **Reason** is **correct**.

76. **Assertion:** Ethanoic acid is called as glacial acetic acid.

Reason: On cooling it freezes to form ice-like flakes. They appear like a glaciers.

77. **Assertion :** The correct IUPAC name for the compound



is 2, 4 dimethyl hexane not 3, 5 dimethyl hexane

Reason: When the parent chain has two or more substitutents, numbering must be done in such a way that the sum of the locants on the parent chain is the lowest possible.

78. **Assertion:** Vegetable oil is converted into vegetable ghee by hydrogenation process in presence of nickel catalyst.

Reason: Unsaturated hydrocarbons add hydrogen to give saturated hydrocarbon in presence of a catalyst.

79. **Assertion:** Unsaturated hydrocarbon burns with sooty flame in excess supply of air.

Reason: Saturated hydrocarbon has more carbon content.

80. **Assertion : Following are the members of a homologous series :**
CH3OH, CH3 CH2OH, CH3CH2CH2OH
Reason : A series of compounds with same functional group but differing by – CH2 – unit is called a homologous series.

81. **Assertion :** Diamond and graphite are allotropes of carbon.

Reason : Some elements can have several different structural forms in the same physical state. These differing forms are called allotropes.

82. **Assertion :** Carbon monoxide is extremely poisonous in nature.

Reason : Carbon monoxide is formed by complete combustion of carbon.

83. **Assertion :** Carbon has ability to form long carbon chains.

Reason : Carbon has a unique property to form long straight and branched chains called catenation.

84. **Assertion :** All alcohols have similar chemical properties.

Reason : All alcohols contains similar hydroxy (–OH) functional group.

85. **Assertion :** Hydrogenation converts an oil into a fat, called vegetable ghee.

Reason : Hydrogenation is carried out in presence of a catalyst, usually finely divided nickel.

Match the Following

DIRECTIONS : *Each question contains option given in two columns. options (A, B, C, D) in column I have to be matched with options (p, q, r, s) in column II.*

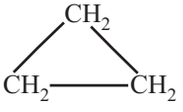
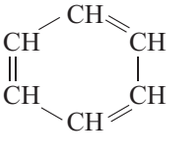
86.

	Column I	Column II
(A)	Combustion reaction	(p) $C_3H_8 + Cl_2 \xrightarrow{\text{UV light}} C_3H_7Cl + HCl$
(B)	Oxidation reaction	(q) $CH_2= CH_2+H_2 \xrightarrow{\text{Ni/Pd}} CH_3- CH_3$
(C)	Addition reaction	(r) $2CH_4+ O_2(g) \xrightarrow[\text{Molybdenum oxide}]{300\ ^\circ C} HCHO + 2H_2O$
(D)	Substitution reaction	(s) $C_2H_5OH + 3O_2 \longrightarrow 2CO_2 + 3H_2O$

87.

	Column I	Column II
(A)	— CHO	(p) Azo compounds
(B)	— $CONH_2$	(q) Aldehydes
(C)	— NH_2	(r) Acid amides
(D)	— N = N —	(s) Amines

88.

	Column I	Column II
(A)	$CH_2 = CH_2$	(p) Saturated
(B)		(q) Unsaturated
(C)	$CH_3 – CH_2 – CH_3$	(r) Acyclic
(D)		(s) Cyclic

Fill in the Blanks

DIRECTIONS : *Complete the following statements with an appropriate word / term to be filled in the blank space(s).*

89. The ability of carbon to form chains gives rise to a ..... series of compounds.

90. Newly discovered allotrope of carbon is ..... .

91. The soft crystalline form of carbon is ..... .

92. Next homologue of ethane is ..... .

93. Valency of carbon in ethylene is ..... .

94. Ethylene burns in air to form CO_2 and ..... .

95. The molecular mass of any two adjacent homologues differ by ..... amu.

96. The purest form of carbon is ..... .

97. The general formula of alcohols is ..... .

98. The functional group present in carboxylic acids is .....

99. Detergents cause ..... pollution.

True / False

DIRECTIONS : *Read the following statements and write your answer as true or false.*

100. Carbon is a versatile element.

101. Carbon forms covalent bonds with itself and other elements such as hydrogen, oxygen, sulphur, nitrogen and chlorine.

102. Carbon and its compounds are some of our major sources of fuels.

103. Graphite is a good conductor of electricity.

104. The simplest saturated hydrocarbon is methane.

105. Ethanol is the first member of the alcohol homologous series.

106. Diamond is a good conductor of electricity.

107. Graphite is used in pencils.

108. When hydrocarbons burn in air, carbon dioxide and hydrogen are produced with heat energy.

109. If a hydrocarbon has double or triple covalent bond, it is saturated.

110. Unsaturated hydrocarbons give addition reactions.

111. By hydrogenation, vegetable oils are converted into vanaspati ghee.

112. Invertase and amylase are two enzymes involved in fermentation of ethanol from sugar.

ANSWER KEY & SOLUTIONS

1. **(c)** The name of the compound is 4-ethyl-3-methyl octane.

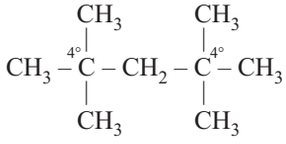
2. **(a)** The soap solution in water is not neutral and cannot be used to wash all kinds of fabrics.

3. **(c)** Benzene molecule contains alternate single and double bonds. Its formula is C_6H_6.

4. **(c)** Isomers have same molecular formula, molecular weight and molecular composition but different chemical properties and structural formulae because the properties are based on the position of atoms.

5. **(c)**

6. **(b)**



7. **(b)**

8. **(a)** – OH ⇒ alcohol

– CHO ⇒ aldehyde

– COOH ⇒ Carboxylic acid

$>C=O$ ⇒ Ketone

9. **(c)** Diamond is the purest form of carbon.

10. **(a)**

11. **(d)** Methane (CH_4), ethane (C_2H_6) and propane ($CH_3CH_2CH_3$) differ from each other by CH_2 group. Hence these are said to form a homologous series.

12. **(d)** **13. (b)** **14. (d)**

15. **(c)** $C_2H_5OH + 3O_2 \longrightarrow 2CO_2 + 3H_2O$

16. **(c)**

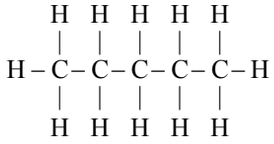
17. **(d)** Catalysts like Pd, Pt or Ni are used in hydrogenation process.

18. **(c)** C_4H_9OH and $C_5H_{11}OH$ represent homologous series in increasing order of C atoms, other two also represent homologous series, but in decreasing order because they differ from each other by a CH_2 group.

$CH_3CH_2CH_2CH_2OH$, $CH_3CH_2CH_2CH_2CH_2OH$

19. **(b)** **20. (a)** **21. (b)**

22. **(c)**



Pentane has 16 covalent bonds

(12C – H and 4C – C bonds)

23. **(b)** **24. (d)** **25. (c)** **26. (a)**

27. **(b)** $\underset{\text{Ethanoic acid}}{CH_3COOH} + NaHCO_3 \longrightarrow CH_3COONa + H_2O + CO_2$

28. **(c)**

29. **(d)** $CH_3COOH + CH_3CH_2OH \xrightarrow{\text{acid}} \underset{\text{ester}}{CH_3COCH_2CH_3}$

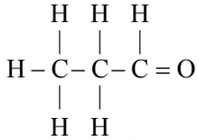
30. **(d)** **31. (b)**

32. **(b)** $\underset{\text{Acetic acid}}{CH_3COOH} \xrightarrow{LiAlH_4} \underset{\text{Ethanol}}{CH_3CH_2OH}$

33. **(a)** **34. (a)** **35. (a)** **36. (d)**

37. **(c)** **38. (d)**

39. **(a)**



Propanal

Total no. of electrons of C atoms = 3 × 6 = 18

Total no. of electrons of O atoms = 1 × 8 = 8

Total no. of electorns of H atoms = 6 × 1 = 6

Total no. of electrons in one molecule

= 18 + 8 + 6 = 32 electrons

Total no. of bonds = 10

Each bond contains $2e^-$. Therefore no. of electrons involved in bonding.

= 2 × 10 = 20 electrons.

40. **(c)** (a) $\underset{\text{1 – Bromobutane}}{CH_3CH_2\ CH_2CH_2 - Br}$

(b) $CH_3 - \underset{\underset{Br}{|}}{CH} - CH_2 - CH_3$

2-Bromobutane

(c) $CH_3 - \underset{\underset{CH_3}{|}}{CH} - CH_2Br$

1-Bromo-2-methyl propane

(d) $CH_3 - \underset{\underset{Br}{|}}{\overset{\overset{CH_3}{|}}{C}} - CH_3$

2-Bromo-2-methyl propane

41. (a) Acetic acid reacts with ethanol in the presence of hydrochloric acid to produce ethyl acetate (ester) which is a sweet smelling compound.

$$\underset{\text{Acetic acid}}{CH_3COOH} + \underset{\text{Ethanol}}{C_2H_5OH} \longrightarrow \underset{\text{Ethyl acetate}}{CH_3COOC_2H_5} + H_2O$$

42. (b) $NH_2CONH_2 \longrightarrow$ Molecular mass = 60

% of N = (28/60) × 100 = 46.7%

43. (d) $C_{13}H_{26}O_2$, $C_2H_4O_2$, $C_9H_{18}O_2 \longrightarrow$ These acids contains single bond between carbon atoms (C–C). Its general formula is ($C_nH_{2n}O_2$).

$C_7H_{12}O_2 \longrightarrow$ It contains double bond (C = C). Its general formula is ($C_nH_{2n-2}O_2$).

44. (c) CH_4 is non-polar compound, so it cannot be dissolved in water.

45. (d) Graphite and diamond show different physical and chemical properties. Diamond is colourless transparent substance. It does not conduct electricity. Graphite is greyish black. It is good conductor of electricity.

46. (b) X + Y $\longrightarrow$ gas (Colourless, odourless)

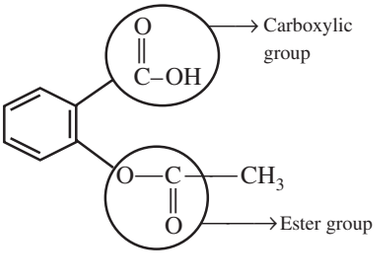
$$\underset{\text{(Acetic acid)}}{CH_3COOH} + NaHCO_3 \rightarrow CH_3COONa + CO_2\uparrow + H_2O$$

$$CO_2 + \underset{\text{(lime water)}}{Ca(OH)_2} \rightarrow \underset{\text{(Milky water)}}{CaCO_3} + H_2O$$

$$\underset{\text{(X)}}{CH_3COOH} + CH_3OH \xrightarrow{H_2SO_4} CH_3COOCH_3 + H_2O$$

Here compound (X) is acetic acid.

47. (b)



48. (d) $C_6H_8N_2$ i.e. 12 × 6 + 8 × 1 + 14 × 2 = 108 u.

49. (c) $2C_4H_6 + 11O_2 \longrightarrow 8CO_2 + 6H_2O$

For 2 moles of hydrocarbon, 11 moles of O_2 is required

$\therefore$ 11 moles = 11 × 32 = 352 g

50. (b) C_3H_8(A) is propane.

(i) $\underset{\text{(A)}}{CH_3CH_2CH_3} + Cl_2 \xrightarrow{\text{Sunlight}}$

$\underset{\text{(B)}}{CH_3CH_2CH_2Cl}$ + HCl (Substitution)

(ii) $\underset{\text{(B)}}{CH_3CH_2CH_2Cl}$ + aq. KOH $\longrightarrow$

$\underset{\text{(C)}}{CH_3CH_2CH_2OH}$ + KCl (Substitution)

(iii) $\underset{\text{(C)}}{CH_3CH_2CH_2OH} \xrightarrow{\text{conc. } H_2SO_4}$

$\underset{\text{(D)}}{CH_3CH{=}CH_2} + H_2O$ (Dehydration)

(iv) $\underset{\text{(D)}}{CH_3CH{=}CH_2} + H_2 \xrightarrow{Ni/Pt/Pd}$

$\underset{\text{(A)}}{CH_3CH_2CH_3}$ (Addition)

51. (b) $\underset{\text{(A)}}{CH_3CH_2OH} \xrightarrow[K_2Cr_2O_7]{\text{Acidified}} \underset{\text{(B)}}{CH_3COOH}$

$$\underset{\text{(B)}}{CH_3COOH} + \underset{\text{(D)}}{CH_3OH} \xrightarrow[H_2SO_4]{\text{conc.}} \underset{\substack{\text{Methyl ethanoate}\\ \text{(C)}}}{CH_3COOCH_3} + H_2O$$

$$CH_3COOCH_3 \xrightarrow{NaOH} \underset{\text{(E)}}{CH_3COONa} + \underset{\text{(D)}}{CH_3OH}$$

52. (b) Glycerol is added to shaving cream to prevent rapid drying.

53. (c) When ethanol (A) *i.e.* organic compound reacts with conc. H_2SO_4, it forms ethene (B) along with water. When ethanol (A) reacts with alk. $KMnO_4$, it will get oxidised to ethanoic acid (C). Ethanol reacts with ethanoic acid to form an ester called ethyl ethanoate (D), which gives a fruity smell.

$$\underset{\text{(A)}}{CH_3CH_2OH} \xrightarrow[443\ K/\Delta]{\text{Concentrated } H_2SO_4} \underset{\text{(B)}}{CH_2 = CH_2} + H_2O$$

$$\underset{\text{(A)}}{CH_3CH_2OH} \xrightarrow[\text{Heat}]{\text{Alkaline } KMnO_4} \underset{\text{(C)}}{CH_3COOH}$$

$$\underset{\text{(A)}}{CH_3CH_2OH} + \underset{\text{(C)}}{CH_3COOH} \xleftrightarrow{\text{Concentrated } H_2SO_4} \underset{\text{(D)}}{CH_3COOC_2H_5} + H_2O$$

54. (b) When alcohol *i.e.* ethanol (A) and acid *i.e.* acetic acid (B) reacts with a sodium metal, then it liberates hydrogen gas (X).

$$2CH_3CH_2OH + 2Na \longrightarrow \underset{(X)}{2CH_3CH_2\,O\,Na} + H_2\uparrow$$
(A)

$$2CH_3COOH + 2Na \longrightarrow \underset{(X)}{2CH_3\,COONa} + H_2\uparrow$$
(B)

When an acid reacts with carbonates or bicarbonates, it librates CO_2 gas. So, when acitic acid(B) reacts with $NaHCO_3$, it librates CO_2(Y) gas.

$$\underset{(B)}{CH_3COOH} + NaHCO_3 \longrightarrow CH_3\,COO\,Na + H_2O + \underset{(X)}{CO_2}\uparrow$$

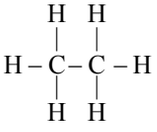
55. (a) Fermentation of sugarcane produces ethanol.

56. (d) Antiknocking agent in gasoline is tetraethyl lead (TEL). It raises the octane value of gasoline.

57. (b) Carboxylic acid molecule has higher extent of H-bonding than alcohol, therefore order of b.p. is

$$CH_3CH_2CH_2COOH > CH_3CH_2CH_2CH_2OH > CH_3CH_2CH_2CH\,O$$

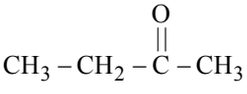
58. (b)



i.e., it has seven covalent bonds.

(6 C – H bonds and one C – C bond)

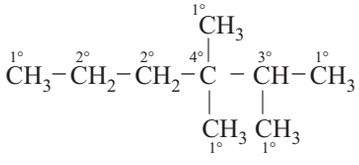
59. (c) The structure of butanone is



it has  (ketonic group) as its functional group.

60. (b) The fuel is not burning completely, hence produce carbon particles which get deposited on the bottom of vessel.

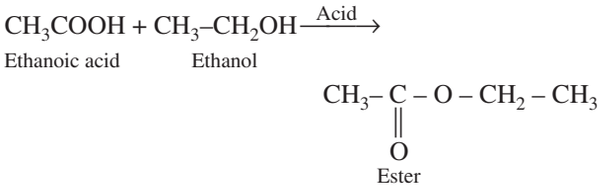
61. (b) **62. (a)** **63. (d)**



64. (a) **65. (b)** **66. (d)**

67. Esterification reaction

68.



Ethanoic acid Ethanol Ester

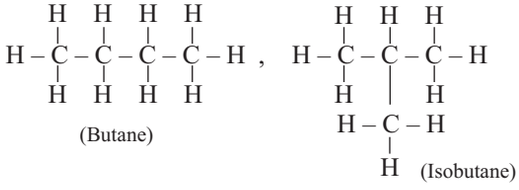
69. Reverse reaction is known as saponification reaction because it is used in the prepration of soap.

70. Esters are used in making perfumes and as a flavouring agent.

71. (d) Due to presence of different functional groups methyl alcohol and acetic acid. Possess different physical and chemical properties.

72. (c)

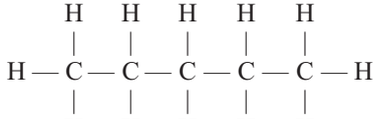
73. (d) Butane and isobutane have same chemical formula but different arrangement of atoms and have different structure.



(Butane) (Isobutane)

74. (d) Carborundum is SiC (silicon carbide).

75. (c)

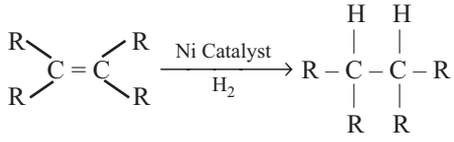


pentane

76. (a) Ethanoic acid is also known as glacial acetic acid.

77. (a) The correct IUPAC name for the compound is 2, 4-dimethyl hexane not 3, 5 dimethyl hexane.

78. (a)



79. (c) Unsaturated hydrocarbon has more carbon content as compare to saturated hydrocarbon of comparable molecular mass.

80. (a) CH_3OH, CH_3CH_2OH, $CH_3CH_2CH_2OH$ belongs to same homologous series with – OH functional group and each member is differ by $–CH_2$ – unit.

81. (a) **82. (c)** **83. (a)** **84. (a)**

85. (b) Hydrogenation or hardening of oil converted various unsaturated fatty glycerides to saturated glycerides

by the addition of hydrogen in the presence of a catalyst, usually finely divided nickel.

86. A – (s), B – (r), C – (q), D – (p)

87. A – (q), B – (r), C – (s), D – (p)

88. A – (q, r), B – (p, s), C – (p, r), D – (q, s)

89. homologous **90.** fullerene

91. graphite **92.** propane

93. 4 **94.** water

95. 14 **96.** diamond

97. $C_nH_{2n+1}OH$ **98.** –COOH

99. water

100. True **101.** True **102.** True

103. True **104.** True **105.** False

106. False **107.** True **108.** False

109. False **110.** True **111.** True

112. False