4. Carbon and Its Compounds

Very Short Answer Type Questions-Pg-220

1. Question

Name the element whose one of the allotropic forms is Buck minster fullerence.

Answer

Carbon is the element whose one of the allotropic forms is buck minster fullerence.

2. Question

What are the two properties of carbon which lead to the formation of a large number of carbon compounds?

Answer

Catenation and tetravalency are two properties of carbon which lead to the formation of large number of carbon compounds.

3. Question

State whether the following statement is true or False:

Diamond and graphite are the covalent compounds of carbon element (C).

Answer

This statement is false because diamond and graphite are allotropes of carbon element.

4. Question

Name the scientist who disproved the ‘vital force theory’ for the formation of organic compounds.

Answer

Friedrich Wholer disproved the ‘vital force theory” for the formation of organic compounds.

5. Question

Name the element whose allotropic form is graphite.

Answer

Diamond and graphite are allotropic form of carbon.

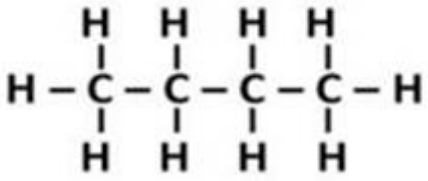
6. Question

In addition to some propane and ethane, LPG cylinders contain mainly two isomers of another alkane. Name the two isomers and write their condensed structural formulae.

Answer

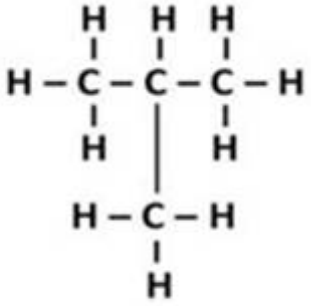
The two other isomers of alkane found in LPG cylinders are N-butane and iso-butane.

(i)



n - butane

(ii)



Iso - butane

7. Question

Buckminsterfullerence is a spherical molecule in which 60 carbon atoms are arranged in interlocking hexagonal and pentagonal rings of carbon atoms.

(a) How many hexagons of carbon atoms are present in one molecule of buckministerfullerene?

(b) How many pentagons of carbon atoms are present in one molecule of buckministerfullerence ?

Answer

(a) One C_{60} molecule contains 20 hexagons of carbon atoms.

(b) One C_{60} molecule contains 12 pentagons of carbon atoms.

8. Question

Name the black substance of pencil. Will the current flow through the electrical circuit when we use the sharpened ends of the pencil to complete the circuit?

Answer

Graphite is the black substance of pencil. When we use the sharpened ends of the pencil to complete the circuit, the current will flow through the electric circuit because graphite is a good conductor of electricity.

9. Question

How does graphite act as a lubricant?

Answer

In graphite, each carbon atom is bonded with 3 other carbon atoms to form hexagonal rings which join together by weak Vander Waal forces to form layers. Due to the weak force, these layers can slide over each other and therefore, graphite can be used as a lubricant.

10. Question

Name the hardest natural substance known.

Answer

Diamond is the hardest natural substance known.

11. Question

Which of the following molecules is called buckministerfullerene?

C_{90} C_{60} C_{70} C_{120}

Answer

C_{60} is called buckministerfullerence.

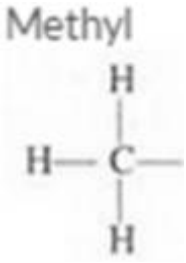
12. Question

Give the name and structural formulae of an alkyl group.

Answer

Methyl

Structural formulae:



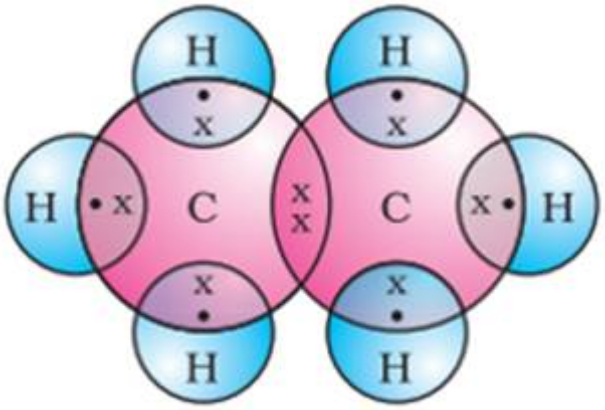
13. Question

Write the electron-dot structure for:

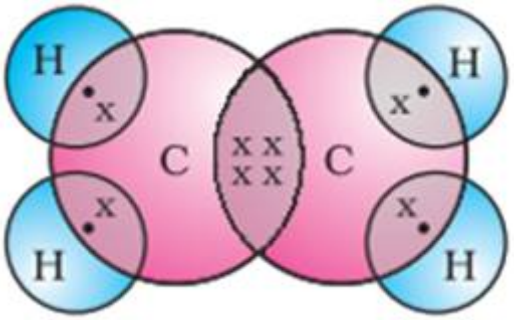
(i) ethane, (ii) ethane, and (iii) ethyne.

Answer

(i) The electron-dot structure for ethane is:



(ii) The electron-dot structure for ethene is:



(iii) The electron-dot structure for ethyne is:

14. Question

Give the IUPAC name of the following compound: C_2H_6

Answer

The IUPAC name of is C_2H_6 ethane.

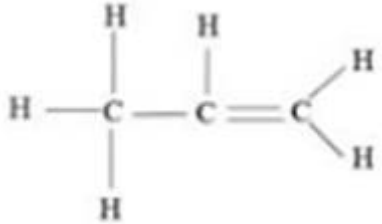
15. Question

Write the structural formulae of propene.

Answer

The structural formulae of propene is:

(C_3H_6)



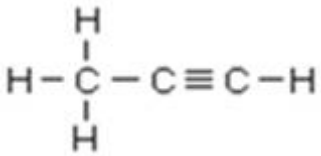
16. Question

Write the structural formulae of propyne.

Answer

The structural formulae of propane is:

(C_3H_4)



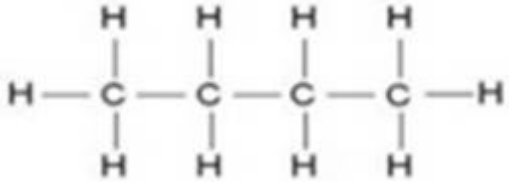
17. Question

write the structural formula of butane.

Answer

The structural formula of butane is:

(C_4H_{10})



18. Question

What do you call the compounds having the same molecular formula but different structural arrangement of atoms?

Answer

Organic compounds with identical molecular formula but different structures are called isomers.

19. Question

write the names of any two isomers represented by the molecular formula C_5H_{12}.

Answer

Isopentane and neopentane are two isomers represented by the molecular formula C_5H_{12}.

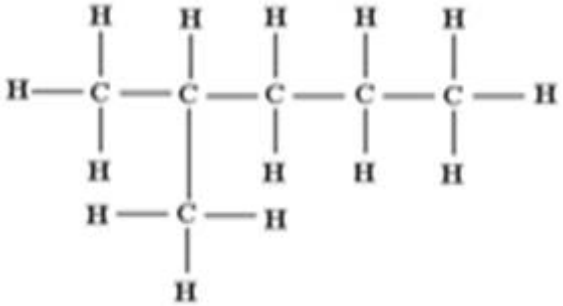
20. Question

Write down (i) structural formula, and (ii) electron-dot formula, of any one isomer of hexane (C_6H_{14}), other than n-hexane.

Answer

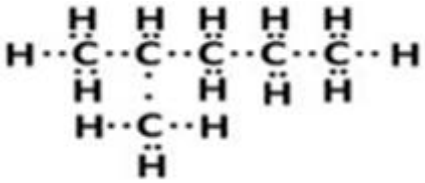
(i) Isomer of hexane (C_6H_{14}) is 2-methylpentane.

Structural formula of 2-methylpentane (Isomer of hexane)



(ii) Electron-dot formula:

(ii) electron-dot formula:



21. Question

Fill in the following blanks with suitable words:

(a) The form of carbon which is known as black leas is ……

(b) The form if carbon which is used as a lubricant at high temperature is ……..

(c) Compounds of carbon with hydrogen alone are called……..

(d) C_nH_{2n} is the general formula of…….. hydrocarbons.

(e) Hydrocarbons having the general formula C_nH_{2n-2} are called ……

(f) Ethene and ethyne are example of …….. hydrocarbons.

(g) Ethyne has …….carbon-hydrogen single bonds.

(h) Carbon compounds have usually …….. melting points and boiling points because they are…….. in nature.

(i) The property of carbon atoms to form long chains in compounds is called ……..

(j) The general formula C_nH_{2n} for cycloalkanes is the same as that of ……..

(k) The IUPAC name of ethyne is ……..

(l) The IUPAC name of acetylene is ……

Answer

(a) graphite

(b) graphite

(c) hydrocarbons

(d) alkene

(e) alkynes

(f) unsaturated

(g) two

(h) low; covalent

(i) catenation

(j) alkenes

(k) ethane

(l) ethyne

Short Answer Type Questions-Pg-221

22 A. Question

What is the atomic number of carbon. Write its electronic configuration.

Answer

The atomic number of electronic carbon is 6. Its configuration is 2, 4. Therefore, it contains 4 electrons in its outermost shell and it needs to gain or loss 4 electrons to attain stable noble gas configuration.

22 B. Question

What type of chemical bonds are formed by carbon? Why?

Answer

Carbon forms four covalent bonds to attain the novel gas configuration by sharing its valence electrons.

22 C. Question

Name the three allotropic forms of carbon.

Answer

Graphite, diamond and buckminsterfullerene are three allotropic forms of carbon.

23 A. Question

What is the general name of all the compounds made up of carbon and hydrogen?

Answer

The general name of all the compounds made up of carbon and hydrogen is hydrocarbons.

23 B. Question

Why does carbon form compounds mainly by covalent bonding?

Answer

Carbon forms compounds mainly by forming covalent bonds because it can attain the novel gas configuration by sharing its valence electrons.

24 A. Question

What is meant by catenation? Name two elements which exhibit the property of catenation.

Answer

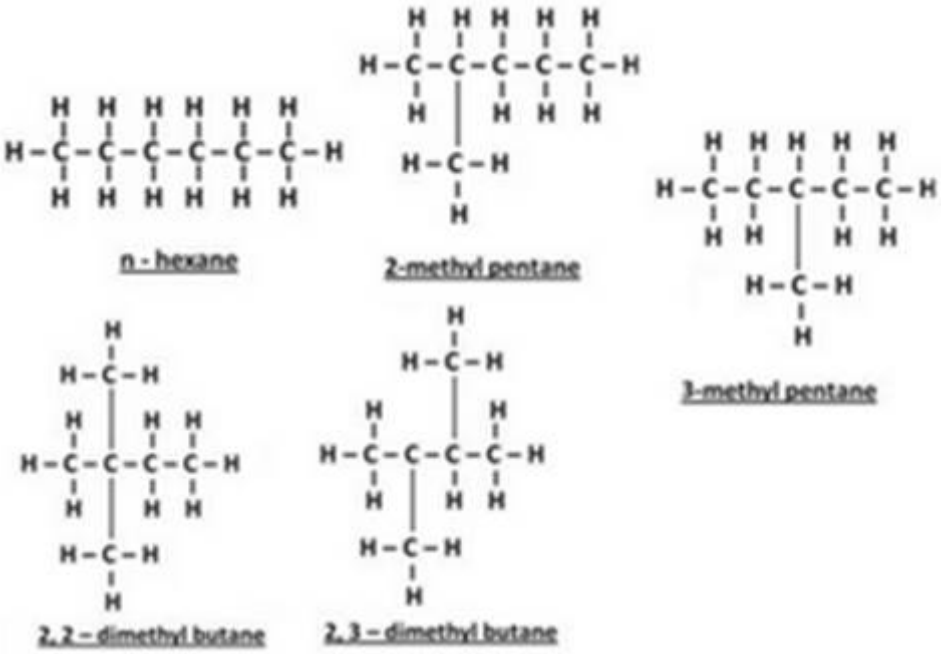
Carbon atoms have the unique ability to form bonds with other carbon atoms to form to large molecules. This property is called catenation. Carbon and silicon elements exhibit the property of catenation.

24 B. Question

Write the names and structural formulae of all the possible isomers of hexane.

Answer

Isomers of hexane:



25 A. Question

What is buckminsterfullerence? How is it related to diamond and graphite?

Answer

Buckminsterfullerene is an allotrope of carbon that was discovered in 1985 containing clusters of 60 carbon atoms joined together to form spherical molecules. When it is burnt, it forms carbon dioxide leaving nothing behind which means it is only made up of carbon and this is how it is related to diamond and graphite.

25 B. Question

Why is diamond used for making cutting tools (lie glass cutters) but graphite is not?

Answer

Diamond is used for making cutting tools because of its hardness but graphite is not used as it is soft.

25 C. Question

Why is graphite used for making dry cell electrodes but diamond is not?

Answer

Graphite is a good conductor of electricity while diamond is not and that's why graphite is used for making dry cell electrodes but diamond is not.

26 A. Question

Give the general formula of an: (i) alkane (ii) alkene (iii) alkyne.

Answer

The general formula of

(i) Alkane: C_nH_{2n+2}

(ii) Alkene: C_nH_{2n}

(iii) Alkyne: C_nH_{2n-2}

26 B. Question

Classify the following compounds as alkanes, alkenes, an alkynes:

C_2H_4, C_3H_4, C_4H_8, C_5H_8, C_3H_8, C_5H_{12}

Answer

Alkane_- C_3H_8, C_5H_{12}; Alkene: C_2H_4, C_4H_8; Alkyne: C_3H_4, C_5H_8,

27 A. Question

(i) Friedrich Wohler converted an inorganic compound into an organic compound in the laboratory.

(ii) Write the name and formula of organic compound formed.

Answer

(i) Friedrich Wohler disproved the vital force theory by preparing urea from inorganic compound called ammonium cyanate (NH_4 CNO).

(ii) Formed organic compound is urea $CO(NH_2)_2$

27 B. Question

Give the molecular formula of butane and mention the names of its two isomers. Name one fuel which contains both these isomers.

Answer

Molecular formula of butane is C_4H_{10}. The isomers of butane are n-butane and 2-methylpropane. LPG (a fuel) contains both these isomers.

28 A. Question

Give IUPAC names and formulae of an organic compound containing single bonds and the other containing both a triple bond.

Answer

The IUPAC name of an organic compound which has single bonds is ethane. The molecular formula of propane is C_2H_6.

The IUPAC name of an organic compound which has triple bond is ethyne. The molecular formula of ethyne is C_2H_2.

28 B. Question

Which of the following is the molecular formula of benzene?

C_6H_6, C_6H_{10}, C_6H_{12}, C_6H_{14},

Answer

The molecular formula of benzene is C_6H_6.

28 C. Question

Which of the two has a branches chain: isobutene or normal butane?

Answer

Isobutane has branches chain.

29. Question

Catenation is the ability of an atom to form bonds with other atoms of the same element. It is exhibited by both carbon and silicon. Compare the ability of catenation of the two elements. Give reasons.

Answer

Carbon forms very strong bonds with other elements and makes the carbon compound very stable whereas silicon forms compound with hydrogen which have chains of upto seven or eight atoms, but these compounds are very reactive because of weak bonds.

30 A. Question

how can diamonds be made artificially? How do synthetic diamonds differ from natural ones?

Answer

Diamonds can be synthesised by subjecting pure carbon to very high pressure and temperature. These synthetic diamonds are small but are otherwise indistinguishable from natural diamonds.

30 B. Question

Give any two differences between the properties of diamond and graphite. What causes these differences?

Answer

(i) Diamond is a bad conductor of electricity whereas graphite is a good conductor of electricity.

(ii) Diamond is a hard substance whereas graphite is soft.

The difference in the physical properties of diamond and graphite arises because of the arrangements of carbon atoms different in both diamond and graphite.

31 A. Question

Why does the element carbon form a large number of carbon compounds?

Answer

The element carbon forms a large number of carbon compounds because carbon atoms can get linked to each other by covalent bonds to form long chains.

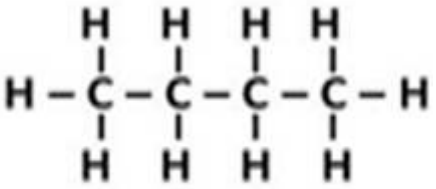
31 B. Question

Write down the structure and name of two isomers of butane (C_4H_{10}).

Answer

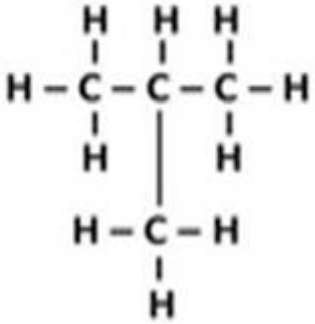
Isomer of butane (C_4H_{10}):

(i)



n - butane

(ii)



Iso - butane

32 A. Question

Give the name and structure formula of one member each of the following:

(i) alkane

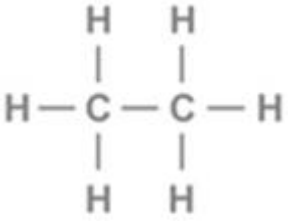
(ii) alkene

(iii) alkyne

(iv) cycloalkane

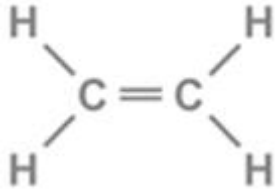
Answer

(i) alkane:



Ethane

(ii) Alkene:

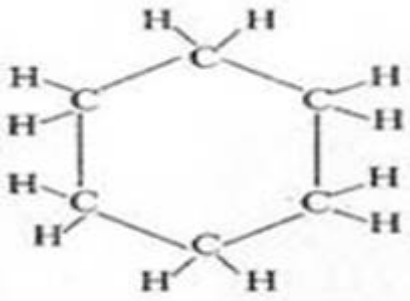


Ethene

(iii) Alkyne:

Ethyne

(iv) Cycloalkane:



Cyclohexane

32 B. Question

Give the common name of (i) ethyne, and (ii) ethane.

Answer

(i) The common name of ethyne is acetylene.

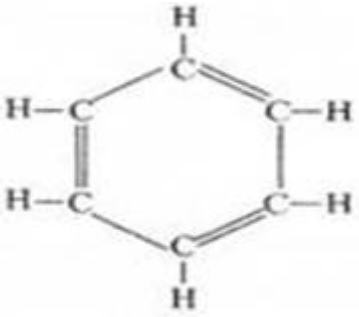
(ii) The common name of ethane is ethylene.

32 C. Question

Write the molecular formula and structure of benzene.

Answer

The molecular formula of benzene is C_6H_6.



33 A. Question

What is the unique property of carbon atom? How is the property helpful to us?

Answer

The unique property of carbon atoms is their ability to link with each other through covalent bonds. This property is useful for us as it can give rise to a large number of carbon compounds.

33 B. Question

Explain why, diamond is hard while graphite is soft (though both are made of carbon atoms).

Answer

in a diamond crystal, each carbon atom is bonded to 4 other carbon atoms through strong covalent bonds. These four atoms form four vertices of a regular tetrahedron which form a rigid structure and thus make it hard. The structure of graphite is very different from that of diamond. A graphite crystal consists of layers of carbon atoms or sheets of carbon atoms and these layers are held together by weak Van der Waals forces making it a soft substance.

34 A. Question

Giving their structures, state the number of single bonds and triple bonds (if any) in the following compounds:

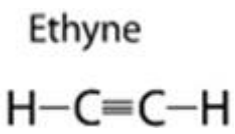
(i) ethyne

(ii) ethane

(iii) benzene

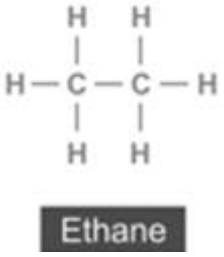
Answer

(i) Ethyne:



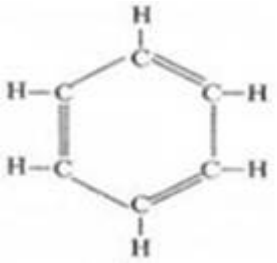
In ethyne, single bond is two and triple bond is one.

(ii) Ethane:



In ethane, single bond is seven and no triple bond.

(iii) Benzene:



In benzene, single bond is nine and no triple bond.

34 B. Question

Write the molecular formula and structure of cyclohexane. How many covalent bonds are there in a molecular of cyclohexane?

Answer

Molecular formula of cyclohexane is C_6H_{12}. No of covalent bonds in cyclohexane molecule is 18.

35 A. Question

Write the points of different in the structure of diamond and graphite.

Answer

Diamond	Graphite
It is a giant molecule of carbon atoms in which each carbon atom is linked to four other carbon atoms by strong covalent bonds.	It is a sheet of carbon atoms in which each carbon atom is linked to three other carbon atoms by weak Vander Waal forces.
A diamond crystal has a tetrahedral arrangement of carbon atoms.	A graphite crystal has flat hexagonal rings structure.

35 B. Question

Explain why, graphite can be used as a lubricant but diamond and graphite.

Answer

In graphite, each carbon atom is bonded with 3 other carbon atoms to form hexagonal rings which join together by weak Vander Waal forces to form layers. Due to the weak force, these layers can slide over each other and therefore, graphite can be used as a lubricant. Whereas diamond being extremely hard cannot be used as a lubricant.

35 C. Question

Explain why, diamond can be used in rock drilling equipment but graphite cannot.

Answer

In diamond, each carbon atom is bonded to 4 other carbon atoms through strong covalent bonds. These four atoms form four vertices of a regular tetrahedron which form a rigid structure and thus make it hard. Hence, it is used in rock drilling equipments but graphite is soft and hence not used in rock drilling equipments.

35 D. Question

State one use of diamond which depend on its ‘extraordinary brilliance’ and use of graphite which depends on its being ‘black and quite soft.’

Answer

Diamonds are used in making jewellery because of its extraordinary brilliance while graphite is used for making pencils leads because of its black and soft nature.

Long Answer Type Questions-Pg-222

36 A. Question

What is diamond? Of what substance is diamond made?

Answer

Diamond is a well-known allotrope of carbon. It is a colourless transparent substance having extraordinary brilliance due to its high refractive index. It is made up carbon which is black.

36 B. Question

Describe the structure of diamond.

Answer

A diamond crystal is a giant molecule of carbon atoms in which each carbon atom is linked to four other carbon atoms by strong covalent bonds forming a rigid three-dimensional network structure, which is responsible for its hardness.

36 C. Question

Explain why, diamond has a high melting point.

Answer

In diamond crystal, each carbon atom is covalently bonded to other four carbon atoms to form three-dimensional network structure. This network is very strong and rigid. A lot of energy is required to break the network of strong covalent bonds in the diamond crystal. This makes the diamond's melting point very high.

36 D. Question

State any two uses of diamond.

Answer

Uses of diamond:

(i) It is used in knives for cutting marble, granite and glass.

(ii) It is used in making jewellery.

37 A. Question

What is graphite? Of what substance is graphite made?

Answer

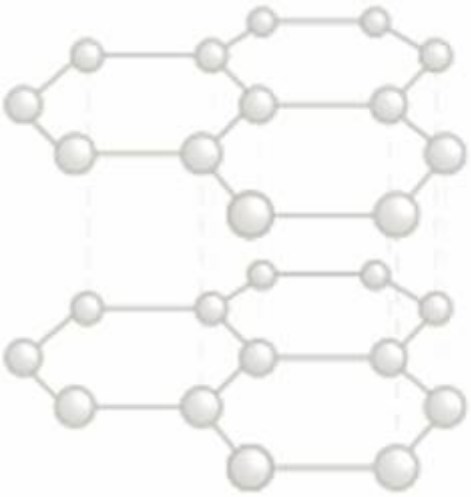
Graphite is an allotrope of carbon. It is a greyish black opaque substance. Graphite is formed by carbon atoms.

37 B. Question

Describe the structure of graphite with the help of a labeled diagram.

Answer

A graphite crystal consists of layers of carbon atoms or sheets of carbon atoms. In graphite, each carbon atom is bonded to three other carbon atoms by covalent bonds in the same plane giving a hexagonal array.



37 C. Question

Why is graphite a good conductor of electricity but diamond is a non- conductor of electricity?

Answer

Graphite is good conductor of electricity because of presence of free electron whereas diamond doesn't have free electrons and is a non-conductor of electricity.

37 D. Question

State any two uses of graphite.

Answer

Uses of graphite:

(i) It is used in making electrode in cells.

(ii) It is used as a powered lubricant for the parts of machinery.

38 A. Question

Explain the term 'isomers'. Give one example of isomers.

Answer

Isomers: Organic compounds with identical molecular formula but different structures are called isomers. Iso-pentane and neopentane are two isomers represented by the molecular formula C_5H_{12}.

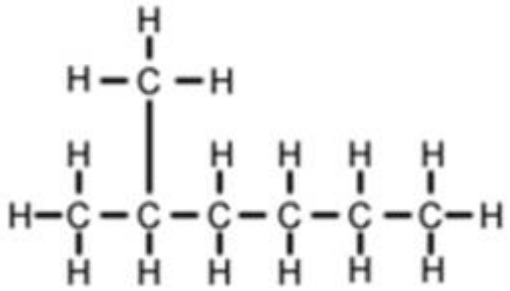
38 B. Question

Write (i) structural formula, and (ii) electron-dot structure, of any one isomer of n-heptane (C_7H_{16}).

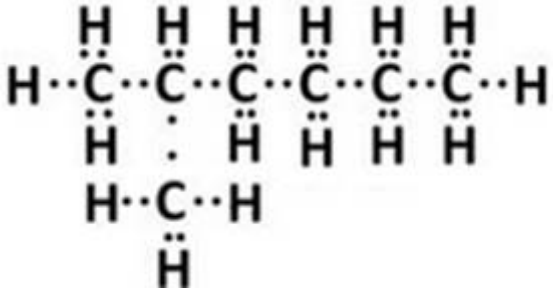
Answer

Isomer of n-heptane: 2-methylhexane

(i) Structural formula of 2-methylhexane:



(ii) Electron-dot structure of 2-methylhexane:



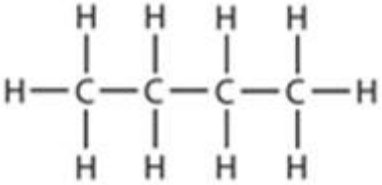
38 C. Question

Write IUPAC name of the compound having the formula n-C_4H_{10}.

Answer

The IUPAC name of of the compound having the formula n-C_4H_{10} is butane.

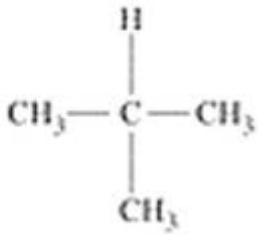
n-C_4H_{10}



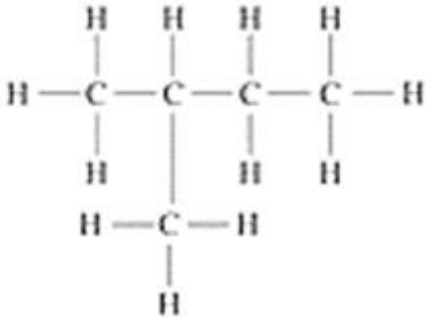
38 D. Question

Give the IUPAC names for the following:

(i)



(ii)



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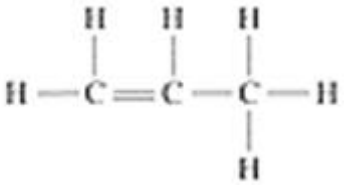
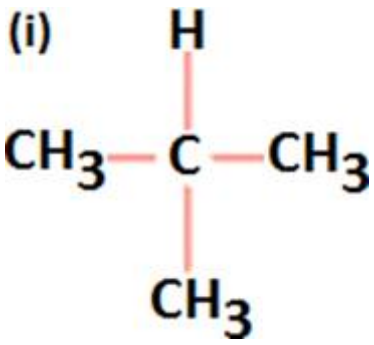


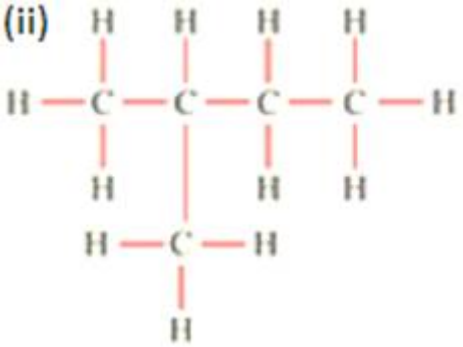
Answer

(i)



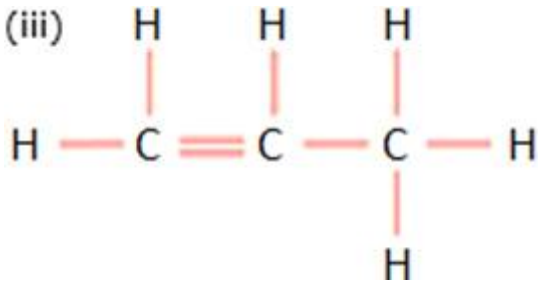
IUPAC name: 2-methylpropane

(ii)



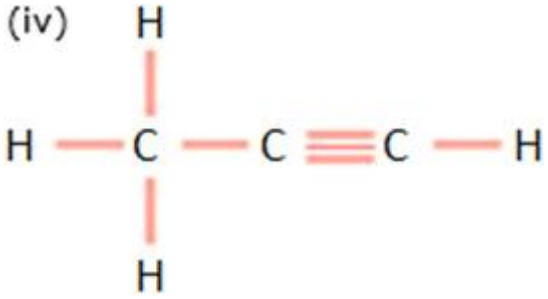
IUPAC name: 2-methylbutane

(iii)



IUPAC name: Propene

(iv)



IUPAC name: Propyne

39 A. Question

What are hydrocarbons? Explain with examples.

Answer

Hydrocarbons: All compounds which contain just carbon and hydrogen are called hydrocarbons. For example: Methane (CH_4), Ethane (C_2H_6), Propane (C_3H_8), Ethene(C_2H_4) and ethyne (C_2H_2) are examples of hydrocarbons because these are made up of only carbon and hydrogen.

39 B. Question

Explain the meaning of saturated and unsaturated hydrocarbons with two examples each.

Answer

Saturated hydrocarbons: The hydrocarbons in which all the carbon atoms are connected by only single bonds are called saturated hydrocarbons or alkanes.

The general formula of saturated hydrocarbons is C_nH_{2n+2}, where, n=number of carbon atoms in a one molecule of hydrocarbon.

Example: Methane (CH_4), Ethane (C_2H_6), Butane (C_4H_{10})

Unsaturated hydrocarbons: The hydrocarbons in which atleast one double or triple bond is present along with single bonds are called unsaturated hydrocarbons.

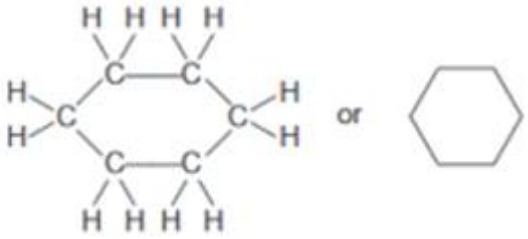
39 C. Question

Give the names and structure formulae of one saturated cyclic hydrocarbon and one unsaturated hydrocarbon.

Answer

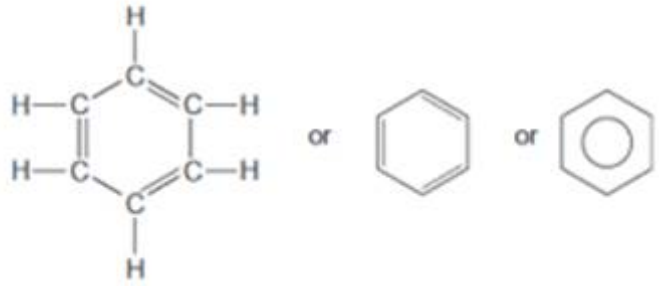
Cyclohexane (C_6H_{12}) is a saturated cyclic hydrocarbon.

Cyclohexane (C_6H_{12})



Benzene (C_6H_6) is an unsaturated cyclic hydrocarbon.

Benzene (C_6H_6)

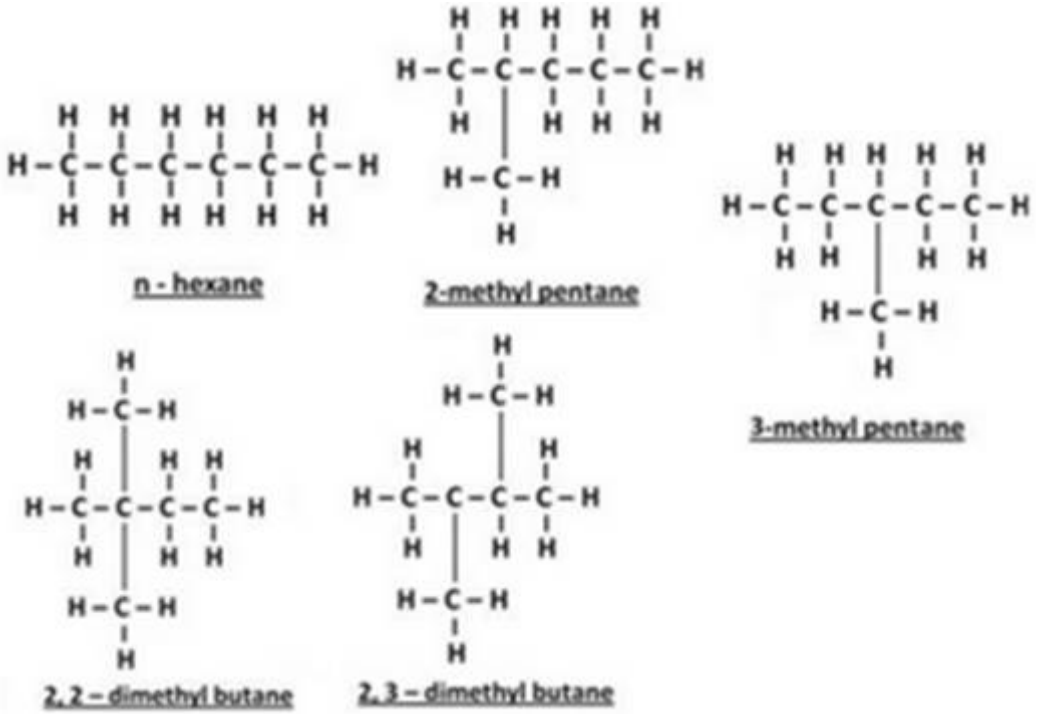


39 D. Question

Give one example of a hydrocarbon, other than pentane, having more than three isomers.

Answer

Hexane is an example of a hydrocarbon which having more than three isomers. The isomers of hexane are:



39 E. Question

How many isomers of the following hydrocarbons are possible?

(i) C_3H_8,

(ii) C_4H_{10},

(iii) C_5H_{12},

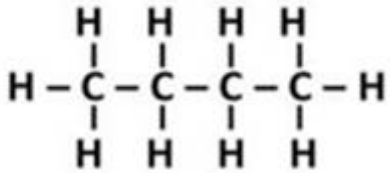
(iv) C_6H_{14},

Answer

(i) There is no isomers of propane (C_3H_8).

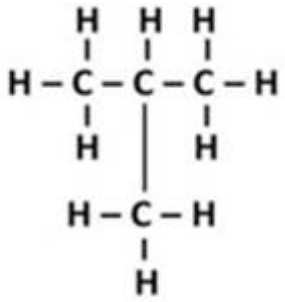
(ii) C_4H_{10}: Butane has two isomers-n-butane and iso-butane.

(i)



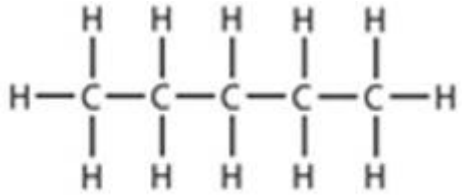
n - butane

(ii)

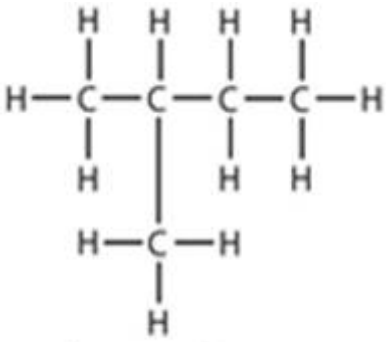


Iso - butane

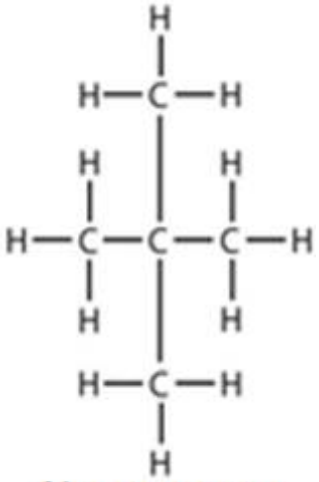
(iii) C_5H_{12}: Pentane has thee isomers. Isomers of pentane (C_5H_{12}):



Pentane

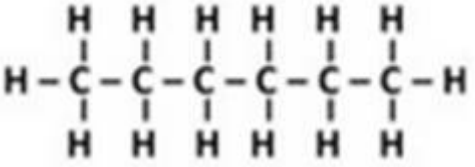


Isopentane

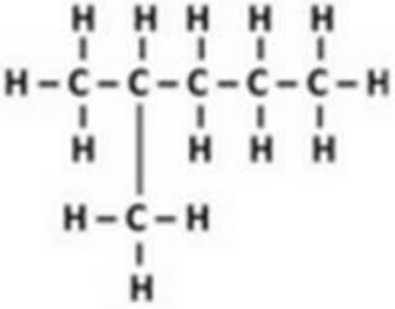


Neopentane

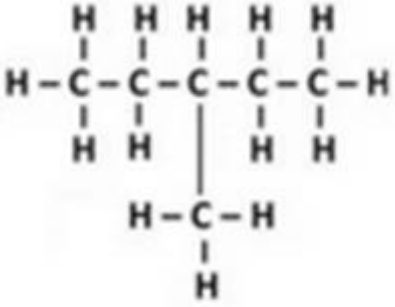
(iv) C_6H_{14}: Hexane (C_6H_{14}) has five isomers. The isomers of hexane (C_6H_{14}) are:



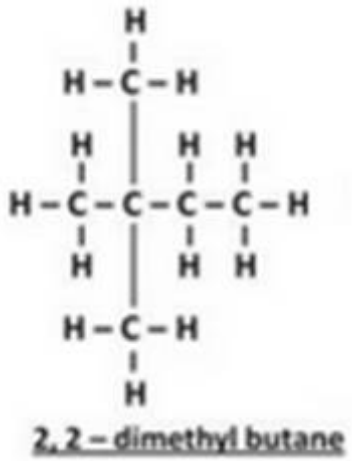
n - hexane



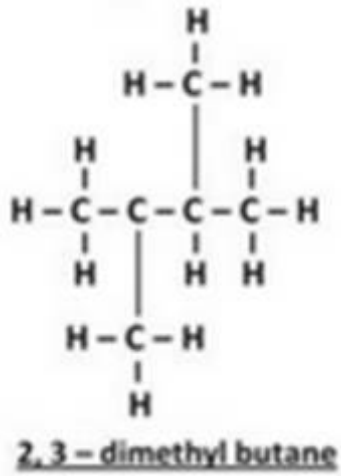
2-methyl pentane



3-methyl pentane



2, 2 – dimethyl butane



2, 3 – dimethyl butane

Multiple Choice Questions (MCQs)-Pg-223

40. Question

Buckministerfullerence is an allotropic form of the element: A. phosphorus

B. fluorine

C. carbon

D. Sulphur

Answer

Diamond, graphite and buckministerfullerence are allotropic form of carbon. Buckminsterfullerene was discovered in 1985 containing clusters of 60 carbon atoms joined together to form spherical molecules.

41. Question

Out of the following pairs of compounds, the unsaturated compounds are: A. C_2H_6 and C_4H_6,

B. C_6H_{12} and C_5H_{12}

C. C_4H_6 and C_6H_{12}

D. C_2H_6 and C_4H_{10}

Answer

The hydrocarbons in which at least one double or triple bond is present along with single bonds are called unsaturated hydrocarbons. C4H6 and C6H12 are examples of unsaturated hydrocarbons.

42. Question

The number of covalent bonds in pentane (molecular formula C_5H_{12}) is A. 5

B. 12

C. 17

D. 16

Answer

The number of covalent bonds in pentane (C5H12) is 16. Pentane is a saturated hydrocarbon in which all the carbon atoms are connected by only single bonds.

43. Question

The property of self- combination of the same element to form long chains is known as: A. protonation

B. Carbonation

C. coronation

D. catenation

Answer

The property of self-linking of the same elements through covalent bonds to form long straight chain or cyclic rings is called catenation. Carbon and silicon elements exhibit the property of catenation.

44. Question

A cyclic hydrocarbon having carbon-carbon single bonds as well as carbon-carbon double bonds in its molecule is: A. C_6H_{12}

B. C_6H_{14}

C. C_6H_6

D. C_6H_{10}

Answer

Benzene is an example of unsaturated cyclic hydrocarbon which having carbon-carbon single bonds as well as carbon-carbon double bonds in its molecule.

45. Question

The hydrocarbon 2-methylbutane is an isomer of: A. n-pentane

B. n-butane

C. propane

D. iso-butane

Answer

The hydrocarbon 2-methylbutane is an isomer of n-pentane.

46. Question

An unsaturated hydrocarbon having a triple covalent bond has 50 hydrogen atoms in its molecule will be: A. 24

B. 25

C. 26

D. 28

Answer

Those unsaturated hydrocarbons which have one or more triple bonds along with the single bonds are called alkynes. The general formula of alkynes is CnH2n-2. For example, if an unsaturated hydrocarbon has 50 hydrogen atoms in its molecule, then number of carbon atom in its molecule will be 26. C26H26X2-2 = C26H50

47. Question

An alkyne has seventy-five carbon atoms in its molecule. The number of hydrogen atoms in its molecule will be: A. 150

B. 148

C. 152

D. 146

Answer

Those unsaturated hydrocarbons which have one or more triple bonds along with the single bonds are called alkynes. The general formula of alkynes is CnH2n-2. Here, n is number of carbon atoms. If number of carbon atoms (n)=75 Then, CnH2n-2 = C75H75X2-2 =C75H148 The number of hydrogen atoms is 148.

48. Question

A diamond-toothed saw is usually used for cutting: A. steel girders

B. logs of wood

C. marble slabs

D. asbestos sheets

Answer

A diamond-toothed saw is usually used for cutting marble slabs because of its hardness.

49. Question

The organic compound prepared by Wohler from an inorganic compound called ammonium cyanate was: A. glucose

B. urea

C. uric acid

D. vinegar

Answer

Friedrich Wohler disproved the vital force theory by preparing urea from inorganic compound called ammonium cyanate (NH4 CNO).

50. Question

One of the following is not an allotrope of carbon. This is:

A. diamond

B. graphite

C. cumene

D. buckministerfullerence

Answer

Diamond, graphite and buckministerfullerence are allotrope of carbon.

51. Question

The number of carbon atoms in the organic compound named as 2, 2-dimethylpropane is: A. two

B. five

C. three

D. four

Answer

2, 2-dimethylpropane has 5 carbon atoms in its molecule.

52. Question

The pair of elements which exhibits the property of catenation is: A. sodium and silicon

B. chlorine and carbon

C. carbon and sodium

D. silicon and carbon

Answer

The property of self-linking of the same elements through covalent bonds to form long straight chain or cyclic rings is called catenation. Carbon and silicon elements exhibit the property of catenation.

53. Question

A saturated hydrocarbon has fifty hydrogen atoms in its molecule. The number of carbon atoms in its molecule will be: A. twenty-five

B. twenty-four

C. twenty-six

D. twenty-seven

Answer

The general formula of saturated hydrocarbon is CnH2n+2. Here n is number of carbon atoms. If a saturated hydrocarbon has fifty hydrogen atoms in its molecule, then the number of carbon atoms in its molecule will be 24. C24H2X24+2 = C24H50

54. Question

A hydrocarbon having one double bond has 100 carbon atoms in its molecule. The number of hydrogen atoms in its molecule will be: A. 200

B. 198

C. 202

D. 196

Answer

Hydrocarbons having at least one double bond between two carbon atoms are called alkenes. The general formula of alkenes is CnH2n. Here, n is number of carbon atoms. If number of carbon atom is (n)=100 Then, CnH2n=C100H200

55. Question

The hydrocarbon which has alternate single and double bonds arranged in the form of a ring is: A. cyclobutane

B. benzene

C. butene

D. hexane

Answer

Benzene is an organic compound with the molecular formula C6H6. It is a six-carbon ring in which carbon atoms are joined by alternating single and double bonds.

56. Question

Which of the following cannot exhibit isomerism? A. C_4H_{10}

B. C_5H_{12}

C. C_3H_8

D. C_6H_{14}

Answer

At least four carbon atoms are required for hydrocarbons to show isomerism. Thus propane (C3H8) has three carbon atoms in its molecule so it does not exhibit isomerism.

57. Question

The pencil leads are made of mainly: A. lithium

B. charcoal

C. lead

D. graphite

Answer

Graphite is used for making lead for pencil as it is soft and leaves black mark on the paper.

58. Question

The number of isomers formed by the hydrocarbon with molecular formula C_5H_{12} is: A. 2

B. 5

C. 3

D. 4

Answer

Three structural isomers are possible for pentane (C5H12): (i) n-pentane CH2 – CH2 – CH2 – CH2 – CH3 (ii) 2-methylbutane (iii) 2,2 dimethyl propane

59. Question

The number of carbon atoms joined in a spherical molecule of buckministerfullerence is: A. fifty

B. sixty

C. seventy

D. ninety

Answer

Buckminsterfullerene is an allotrope of carbon that was discovered in 1985 containing clusters of 60 carbon atoms joined together to form spherical molecules.

Questions Based on High Order Thinking Skills (HOTS)-Pg-224

60. Question

A solid element X has four electrons in the outermost shell of its atom. An allotrope Y of this element is used as a dry lubricant in machinery and also in making pencil leads.

(a) What is element X?

(b) Name the allotrope Y?

(c) State whether allotrope Y is a good conductor or non-conductor of electricity.

(d) Name one use of allotrope Y (other than lubrication and pencil leads)

(e) Name two other allotropes of element X.

Answer

(a) Element X is carbon.

(b) Allotrope Y is graphite.

(c) Allotrope Y is a good conductor of electricity (due to the presence of free electron).

(d) Allotrope Y is used for making electrodes of cells.

(e) Diamond and Buckministerfullerence are allotropes of element X.

61. Question

Two organic compounds A and B have the same molecular formula C_6H_{12}. Write the names and structural formulae:

(a) if A is cyclic compound

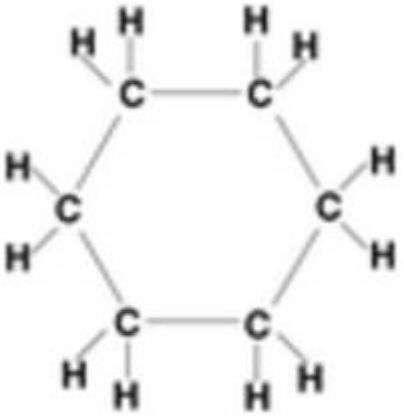
(b) if B is an open chain compound

(c) Which compound contains single bonds as well as a double bond?

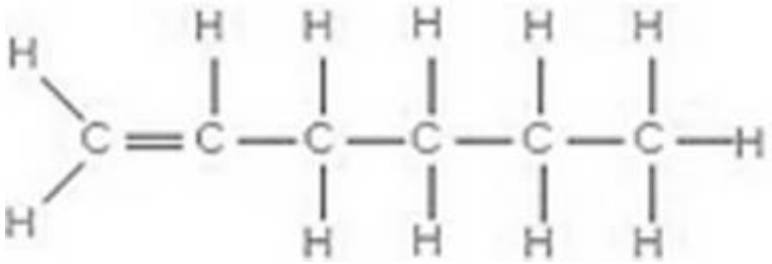
(d) Which compound contains only single bonds?

Answer

(a) (A) Cyclohexane C_6H_{12}



(b) Hexene (B) C_6H_{12}



(c)Compound B contains single bonds as well as a double bond.

(d) Compound A contains only single bonds.

62. Question

The solid element A exhibits the property of catenation. It is also present in the form of a gas B in the air which is utilized by plants in photosynthesis. An allotrope C of this element is used in glass cutters.

(a) What is element A?

(b) What is the gas B?

(c) Name the allotrope C.

(d) State another use of allotrope C (other than in glass cutters)

(e) Name another allotrope of element A which exists as spherical molecules.

(f) Name a yet another allotrope of element A which conducts electricity.

Answer

(a) Element A is carbon.

(b) The gas B is carbon dioxide (CO_2).

(c) The allotrope C is diamond.

(d) Allotrope C is used for making jewellery.

(e) Buckministerfullerence is also allotrope of carbon which exists as spherical molecules.

(f) Graphite is an allotrope of carbon which conducts electricity.

63. Question

An element E exist in three allotrope forms A, B and C. in allotrope A, the atoms of element E are joined to form a sheet like structure. In allotrope B, each atom of element E is surrounded by four other E atoms to form a rigid structure.

(a) Name the element E.

(b) What is allotrope A?

(c) What is allotrope B?

(d) What is allotrope C?

(e) Which allotrope is used in making jewellery?

(f) Which allotrope is used in making anode of a dry cell?

Answer

(a) The element E is carbon.

(b) The allotrope A is graphite.

(c) The allotrope B is diamond.

(d) The allotrope C is buckministerfullerence.

(e) The allotrope B is used in making jewellery.

(f) The allotrope A is used in making anode of a dry cell.

64. Question

You are given the following molecular formulae of some hydrocarbons:

C_5H_8; C_7H_{14}; C_5H_{10}; C_7H_{12}; C_6H_{12};

(a) Which formula represent cyclohexane as well as hexane?

(b) Which formula represent benzene?

(c) Which three formulae represent open chain

(d) Which two formulae represent unsaturated hydrocarbons having double bonds?

(e) Which three formulae can represent cyclic hydrocarbons?

Answer

65. Question

Which of the following compounds can have a triple bond?

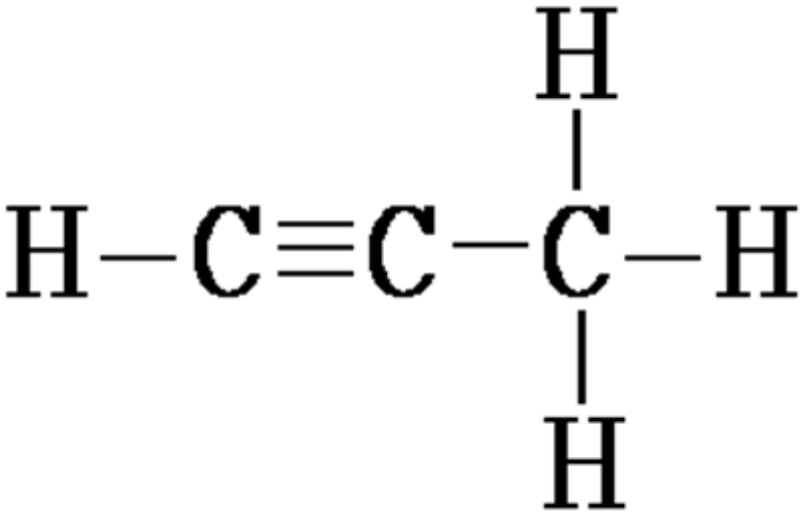
C_2H_4, C_3H_4, C_3H_6,

Answer

The hydrocarbons which having triple bond are called alkyne. The general formula of alkyne is C_nH_{2n-2}. Here, n is number of carbon atoms.

In alkyne, the number of hydrogen atom is 2 less than double the number of carbon atoms.

Thus, the compound C_3H_4 (Propyne) have a triple bond.



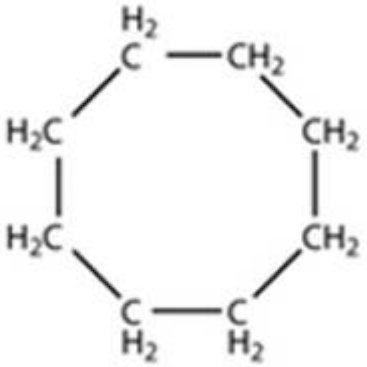
66. Question

Write the molecular and structural formula of a cyclic hydrocarbon whose molecule contains 8 atoms of carbon.

Answer

The molecular formula is C_8H_{16}.

The structural formula is

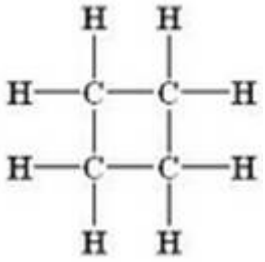


67. Question

What is the molecular formula and structural formula of a cyclic hydrocarbon whose one molecule contains 8 hydrogen atoms?

Answer

The molecular formula of cyclic hydrocarbon is C_4H_8 (Cyclobutane). The structural formula of a cyclic hydrocarbon:



68. Question

Write the molecular formula of: (i) an alkane (ii) an alkene, and (iii) an alkyne, each having 20 carbon atoms?

Answer

(i) The molecular formula of al alkane is C_nH_{2n+2}. Here, n is number of carbon atoms.

If number of carbon atoms (n)=20

Then, the molecular formula of alkane is $C_{20}H_{42}$.

(ii) The molecular formula of al alkene is C_nH_{2n}. Here, n is number of carbon atoms.

If number of carbon atoms (n)=20

Then, the molecular formula of alkene is $C_{20}H_{40}$.

(iii) The molecular formula of al alkyne is C_nH_{2n-2}. Here, n is number of carbon atoms.

If number of carbon atoms (n)=20

Then, the molecular formula of alkyne is $C_{20}H_{38}$.

69. Question

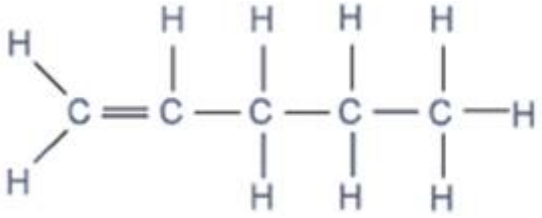
Which of the following compounds can have a double bond?

C_4H_{10}; C_5H_8; C_5H_{10};

Answer

The compound having a double bond is called an alkene. The general formula of alkene is C_nH_{2n}.

In alkene, the number of hydrogen bond is exactly equal to double the number of carbon atoms. Thus, the compound C_5H_{10} have a double bond.



70. Question

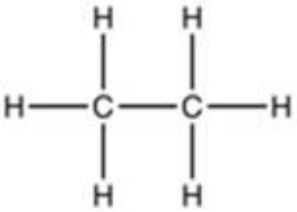
Which of the following hydrocarbons is unsaturated?

C_3H_4; C_2H_6;

Answer

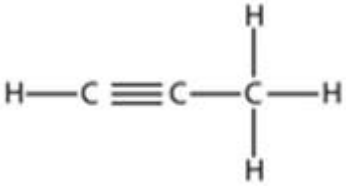
C_2H_6 is a saturated hydrocarbon because if the number of hydrogen atoms is 2 more than double the number of carbon atoms, then it will be an alkane or saturated hydrocarbon. The general formula of alkane is C_nH_{2n+2}. Here, n is number of carbon atoms.

Thus, C_2H_6 (ethane) is a saturated hydrocarbon.



If the number of hydrogen atoms is 2 less than double the number of carbon atoms, then it will be an alkyne. The general formula of alkyne is C_nH_{2n-2}. Here, n is number of carbon atoms. Alkynes are unsaturated hydrocarbons.

Thus, C_3H_4 (Propyne) is an unsaturated hydrocarbon.



Very Short Answer Type Questions-Pg-239

1. Question

Write the molecular formula of ethanol.

Answer

The molecular formula of ethanol is C_2H_5OH.

2. Question

What is the next higher homologue of methanol (CH_3OH)?

Answer

The next higher homologue of methanol is ethanol (C_2H_5OH).

3. Question

Identify the functional group present in the following compound and name it according to IUPAC system: CH_3OH

Answer

The functional group present in the CH_3OH is alcohol (-OH). The IUPAC name of CH_3OH is: Methanol.

4. Question

Give the common name and IUPAC name of the simplest aldehyde.

Answer

The common name of simplest aldehyde is formaldehyde.

The IUPAC name of formaldehyde is methanal.

5. Question

What is the common name of methanol?

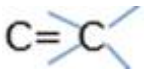
Answer

The common name of methanol is methyl alcohol.

6. Question

Write the names of the following functional group:

(a) $-C \equiv C -$

(b) 

Answer

(a) Alkyne (b) Alkene

7. Question

Name the simplest ketone.

Answer

The simplest ketone is acetone (CH_3COCH_3). It is also known as propanone.

8. Question

What is the common name of propanone?

Answer

The common name of propanone is acetone.

9. Question

Write the IUPAC names of the following:

(i) CH_3COCH_3

(ii) $CH_3COCH_2CH_3$

Answer

(i) The IUPAC name of CH_3COCH_3: Propanone

(ii) The IUPAC name of $CH_3COCH_2CH_3$: Butanone

10. Question

Write the name and chemical formula of the simplest organic acid.

Answer

The simplest organic acid is formic acid (HCOOH).

11. Question

Write the IUPAC names, common names and formulae of the first two members of the homologous series of carboxylic acids.

Answer

IUPAC name	Common name	Formula
Methanoic acid	Formic acid	HCOOH
Ethanoic acid	Acetic acid	CH_3COOH

12. Question

What is the common name of:

(a) methanoic acid, and (b) ethanoic acid?

Answer

(a) The common name of methanoic acid is formic acid.

(b) The common name of ethanoic acid is acetic acid.

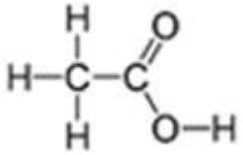
13. Question

Draw the structure for the following compounds:

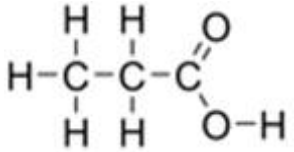
(a) Ethanoic acid (b) Propanoic acid

Answer

(a) Ethanoic acid



(b) Propanoic acid:



14. Question

Give the common names and IUPAC names of the following compounds:

(a) HCOOH

(b) CH_3COOH

Answer

(a) HCOOH:

Common name: Formic acid

IUPAC Name: Methanoic acid

(b) CH_3COOH

Common name: Acetic acid

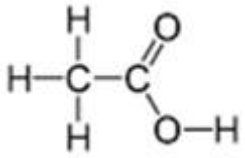
IUPAC Name: Ethanoic acid

15. Question

Give the name and structural formula of one homologue of HCOOH.

Answer

Ethanoic acid (CH_3COOH) is homologue of HCOOH.



16. Question

Write the formulae of:

(a) methanoic acid, and

(b) ethanoic acid.

Answer

(a) The molecular formula of methanoic acid is HCOOH.

(b) The formula of ethanoic acid is CH_3COOH.

17. Question

Give the common name and IUPAC name of C_2H_5OH.

Answer

The common name of C_2H_5OH is ethyl alcohol. The IUPAC name is ethanol.

18. Question

Give the IUPAC name of the following compound:

C_3H_7OH

Answer

The IUPAC name of C_3H_7OH is propanol.

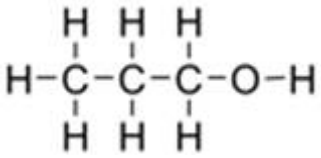
19. Question

Give the name and structural formula of one member of the following:

Alcohols

Answer

Propanol (C_3H_7OH)



20. Question

Give IUPAC name of the following compounds:

(a) C_4H_9OH

(b) $C_5H_{11}OH$

Answer

(a) IUPAC name of C_4H_9OH: Butanol

(b) IUPAC name of $C_5H_{11}OH$: Pentanol

21. Question

What is the common name of ethanol?

Answer

The common name of ethanol is methyl alcohol.

22. Question

What is the difference between two consecutive homologues:

(i) in terms of molecular mass?

(ii) in terms of number and kind of atoms per molecule?

Answer

(i) The 14 u is the difference in the molecular masses of any two adjacent homologues.

(ii) The two adjacent homologues differ by one carbon atom and two hydrogen atoms in their molecular formulae.

23. Question

What type of fuels:

(a) burn with a flame?

(b) burn without a flame?

Answer

(a) The fuels which are vaporizable (can be converted to vapours) burns with flame. For example, petrol, candle and LPG in the gas burns with flame.

(b) The fuels which do not vaporize, burn without flame. For example; coal burns without flame.

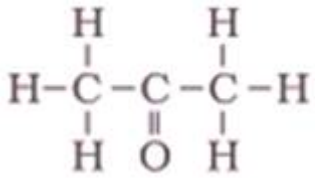
24. Question

State whether the following statements is true or false:

The minimum number of carbon atoms in a ketone molecule is two.

Answer

This statement is false because ketone has minimum three number of carbon atoms in its molecule.



Propanone

25. Question

Fill in the following blanks with suitable words:

(a) The next higher homologues of ethanol is ……

(b) The next homologues of C_2H_5OH is …….

(c) The next higher homologues of ethane is ……..

(d) The functional group present in ethanol is ……..

(e) Organic compounds having ----- PICTURE---- OH functional group are known as …….

Answer

(a) Propanol (b) C_3H_7OH (c) Propane

(d) -OH (alcohol) (e) carboxylic acids

Short Answer Type Questions-Pg-240

26. Question

Give the general name of the class of compounds having the general formula C_nH_{2n-2}. Write name of the first member of this homologues series.

Answer

The general name of the class of compounds having the general formula C_nH_{2n-2} is alkynes. The first member of the alkynes homologues series is ethyne.

26. Question

The general formula of a homologues series of carbon compounds is C_nH_{2n}. Write the molecular formulae of the second and fourth members of the series.

Answer

The general formula of homologues series of alkenes is C_nH_{2n}. The molecular formula of second member of alkenes series is C_3H_6. The second member of alkenes series contains three carbon atoms.

The molecular formula of fourth member of alkenes series is C_5H_{10}.

26 C. Question

Write the molecular formulae of the third and fifth members of homologues series of carbon compounds represented by the general formula C_nH_{2n+2}

Answer

The molecular formula of third and fifth members of alkanes series are C_3H_8 and C_5H_{12}.

27. Question

(a) Give the names and structural formulae of the next two higher homologues of methane.

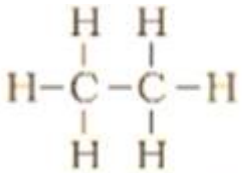
(b) The molecular formula of a hydrocarbon is C_2H_5. Name its homologues series.

(c) Select the hydrocarbons which are members of the same homologues series. Give the name of each series. C_5H_{10}; C_3H_8; C_4H_{10}; C_7H_{12}; C_8H_{16}

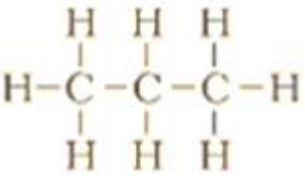
Answer

(a) The next two Higher homologues of methane are ethane and propane.

Ethane C_2H_6



Propane C_3H_8



(c) Homologous series is a series of organic compounds having similar properties in which the successive members differ by a $-CH_2$ group.

Alkanes: C_3H_8; C_4H_{10}

Alkenes: C_5H_{10}; C_8H_{16}

Alkynes: C_7H_{12}

28 A. Question

(a) Give the molecular formula of one homologue of each of the following:

(i) C_3H_6

(ii) C_2H_6

(iii) C_2H_2

Answer

(i) C_4H_8 (ii) C_3H_8 (iii) C_3H_4

28 B. Question

What is the difference in the molecular mass of any two adjacent homologues?

Answer

The 14 u is the difference in the molecular mass of any two adjacent homologues.

28 C. Question

By how many carbon atoms and hydrogen atoms do any two adjacent homologues differ?

Answer

Any two adjacent homologues differ by 1 carbon atom and 2 hydrogen atoms in their molecular formulae.

29 A. Question

Write the formula of the functional group present in carboxylic acids.

Answer

The formula of the functional group present in carboxylic acids is -COOH.

29 B. Question

Name the functional group present in $CH_3 – C \equiv CH$.

Answer

The functional group present in $CH_3 – C \equiv CH$ is  .This Functional Group is an **Alkyne Group** which contain carbon- carbon Triple bond.

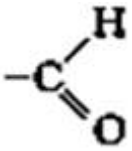
29 C. Question

Name the functional groups present in the following compounds

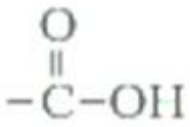
(i) CH_3CHO (ii) CH_3CH_2COOH (iii) CH_3COCH_3 (iv) $CH_3CH_2CH_2OH$

Answer

(i) Aldehyde



(ii) Carboxylic acid



(iii) Ketone

(iv) Alcohol

30 A. Question

Write the IUPAC name and common name of CH_3CI.

Answer

The IUPAC name of CH_3CI: Chloromethane

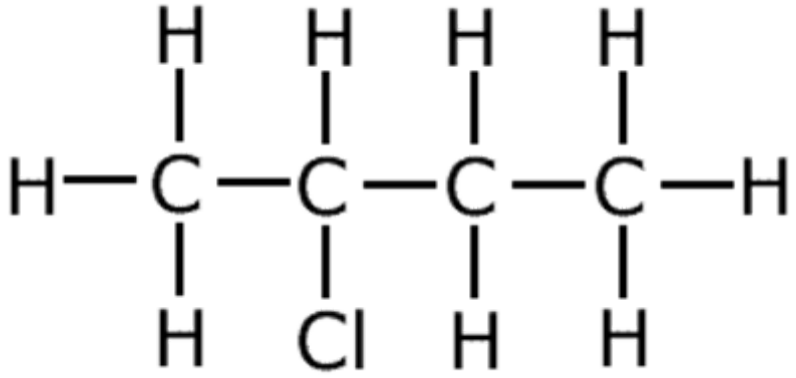
Common name of CH_3CI: Methyl chloride

30 B. Question

Draw the structure of chlorobutane.

Answer

Chlorobutane:

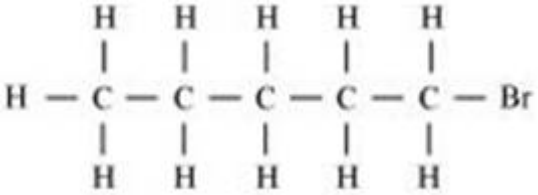


30 C. Question

Draw the structure for bromopentane. Are structural isomers possible for bromopentane?

Answer

Bromopentane:



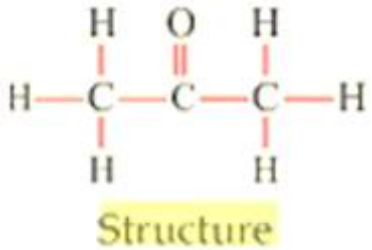
Yes, Structural isomers are possible for bromopentane.

31 A. Question

Write the name and formula of an organic compound containing a ketone functional group.

Answer

Acetone (CH_3COCH_3) is an organic compound which contains a ketone as functional group. It is a simplest ketone. The IUPAC name of CH_3COCH_3 is propanone.

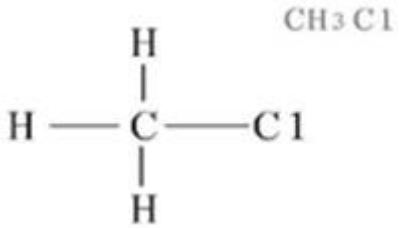


31 B. Question

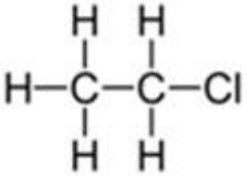
Write the names and formulae for the first three members of the homologues series of chlorolkanes.

Answer

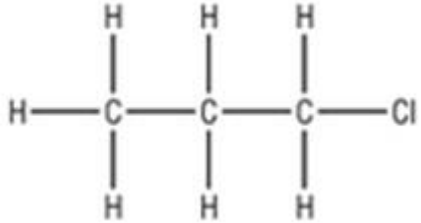
(i) Chloromethane (CH_3Cl):



(ii) Chloroethane (C_2H_5Cl):



(iii) Chloropropane (C_3H_7Cl):



31 C. Question

How would you name the following compound?

CH_3-CH_2-BR

Answer

The name of CH_3-CH_2-BR: Ethylbromide

32 A. Question

What is the general name of the organic compounds containing the- —CO— group.

Answer

Ketones are the organic compounds containing the -CO- group.

32 B. Question

Which of the following compounds contains a carboxylic acid group?

CH_3OH, CH_3COOH, CH_3CHO, CH_3COCH_3

Answer

CH_3COOH compound contains a carboxylic acid (-COOH) group.

32 C. Question

How would you name the compound?

HCOOH

Answer

The common name of methanal (HCHO) is formaldehyde.

33 A. Question

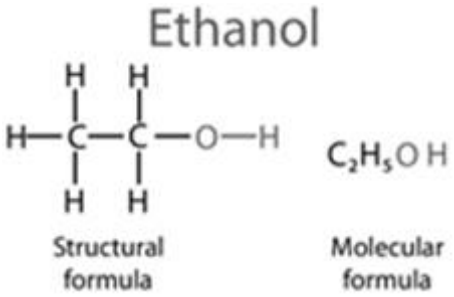
Define a homologues series. Give the name and structural formula of one homologues of the following:

CH_3OH

Answer

A series of organic compounds in which hydrogen in a carbon chain is replaced by the same functional group, is called homologous series. Any two adjacent homologues differ by ($-CH_2$) in their molecular formulae.

Ethyl alcohol (C_2H_5OH) is a successive homologous of methyl alcohol (CH_3OH). The IUPAC name of ethyl alcohol is ethanol.



33 B. Question

Write the molecular formula of the third member of the homologues series of carbon compounds with general formula $C_nH_{2n+1}OH$.

Answer

The general formula of homologous series of alcohol is C_nH_{2n+1} -OH. Here, n is the number of carbon atoms in alcohol molecule.

If number of carbon atom (n)=3

Then, C_3H_{2X3+1} OH= C_3H_7OH

Thus, the molecular formula of the third member of the homologues series of alcohol is C_3H_7OH. The IUPAC name of C_3H_7OH is propanol.

33 C. Question

Name any two fossil fuels.

Answer

Coal and petroleum are called fossil fuels because they were formed by the remains of prehistoric plants and animals buried under the earth long ago.

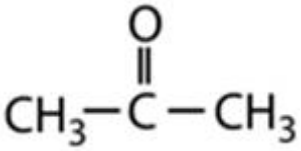
34 A. Question

Draw the structure for the following compounds:

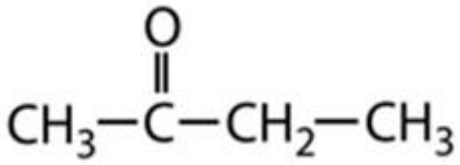
(i) Propanone (ii) Butanone

Answer

(i) Structure of Propanone (CH_3COCH_3):



(ii) Structure of butanone ($CH_3CH_2COCH_3$)



34 B. Question

Write the IUPAC names of the following:

(i) HCHO (ii) CH_3CHO (iii) CH_3CH_2CHO (iv) $CH_3CH_2CH_2CHO$

Answer

(i) The IUPAC name of HCHO is Methanal.

(ii) The IUPAC name of CH_3CHO is Ethanal.

(iii) The IUPAC name of CH_3CH_2CHO is Propanal.

(iv) The IUPAC name of $CH_3CH_2CH_2CHO$ Butanal.

34 C. Question

Which functional group is likely to be present in an organic compound having the molecular formula $C_4H_{10}O$? Write formula of the organic compound.

Answer

Alcohol group (-OH); The formula of organic compound is C_4H_9OH.

35 A. Question

(a) Match the formulae in group A with appropriate names from group B:

Group A: CH_3COOH, CH_3CHO, CH_3OH

Group B: Ethanol, Methanol, Ethanal, Ethanoic acid

Answer

CH_3COOH: Ethanoic acid;

CH_3CHO: Ethanal;

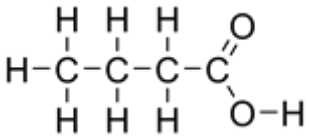
CH_3OH: Methanol

35 B. Question

Draw the structure of butanoic acid.

Answer

Structure of butanoic acid ($CH_3CH_2CH_2COOH$)



35 C. Question

What is the IUPAC name of acetic acid ?

Answer

IUPAC name of acetic acid (CH_3COOH) is Ethanoic acid.

36 A. Question

Which functional group do you think can be present in an organic compound having the molecular formula $C_5H_{10}O_2$? Write the formula of the organic compound.

Answer

Carboxylic acid group (-COOH); The formula of the organic compound is C_4H_9COOH.

36 B. Question

Give one example each of the compounds having the following functional groups:

(i) Aldehyde group (ii) Alcohol group (iii) Carboxylic acid group (iv) Halo group

Answer

(i) Methanal -HCHO

(ii) Ethanol -CH_3CH_2OH

(iii) Ethanoic acid-CH_3COOH

(iv) Chloroethane-CH_3CH_2Cl

36 C. Question

Give one example each of the compounds having the following functional groups:

(i) Aldehyde group

(ii) Alkyne group

Answer

(i) Ethanal -CH_3CHO

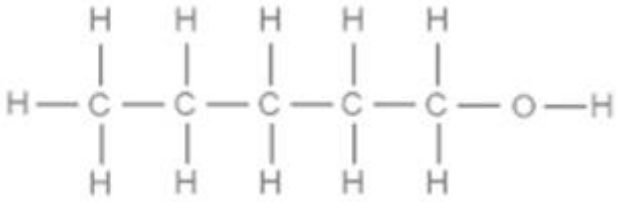
(ii) Ethyne -C_2H_2

37 A. Question

What is the molecular formula and structure of the alcohol which can be thought to be derived from pentane?

Answer

Molecular formula of the alcohol is $C_5H_{11}OH$ or $C_5H_{12}O$.



37 B. Question

Write the names of the following functional groups:

(i) –CHO (ii) –OH (iii) –COOH (iv) C=O (v) 

Answer

Functional Group	Name
(i) –CHO	Aldehyde group
(ii) –OH	Alcohol group
(iii) –COOH	Carboxylic acid group
(iv) -CO-	Ketone group
(v) –X	Holo group

37 C. Question

What makes the candle flame yellow and luminous?

Answer

When a candle is lighted, the wax melts and converted into vapors. In candle, there is no provision for the proper mixing of wax vapors and air, so incomplete combustion occurs. And,

some unburnt small carbon particles are produce which rise and get heated and glow to give out yellowish light. This makes the candle flame yellow and luminous.

Long Answer Type Questions-Pg-241

38 A. Question

What is homologues series? Explain with an example.

Answer

A series of organic compounds in which hydrogen in a carbon chain is replaced by the same functional group, is called homologous series. Any two adjacent homologues differ by ($-CH_2$) in their molecular formulae.

All the compounds of a homologous series show similar chemical properties.

Example of homologous series: Alkynes.

All the members of homologous series of alkynes have similar structure and similar chemical properties, so they can be grouped together into the homologous series. The general formula of homologous series of alkynes is C_nH_{2n-2}. Where, n is the number of carbon atoms in alkyne molecule. The members of alkyne homologous series are:

ï‚·ï¿½ Ethyne (C_2H_2)-First member of alkyne homologous series.

ï‚·ï¿½ Propyne (C_3H_4)-Second member of alkyne homologous series.

ï‚·ï¿½ Butyne (C_4H_6)-Third member of alkyne homologous series.

ï‚·ï¿½ Pentyne (C_5H_8)-Four member of alkyne homologous series.

ï‚·ï¿½ Hexyne (C_6H_{10})-Five member of alkyne homologous series.

38 B. Question

State two characteristics of a homologous series.

Answer

Characteristics of homologous series:

(i) Any two adjacent homologues differ by one carbon atom and two hydrogen atoms in their molecular formulae.

(ii) All the compounds of homologous series show similar chemical properties.

38 C. Question

The molecular formula of an organic compound is $C_{18}H_{36}$. Name its homologous series.

Answer

It is the homologous series of alkenes. The general formula of homologous series of alkenes is C_nH_{2n}. Here, n is number of carbon atoms in one molecule of alkene.

38 D. Question

Select the hydrocarbons which belong to the same homologous series. Give the name if of each series.

CH_4, C_2H_2, C_2H_4, C_2H_6, C_4H_{10}, C_3H_4, C_3H_6,

Answer

(i) Homologous series: Alkanes- CH_4, C_2H_6, C_4H_{10}

(ii) Homologous series: Alkenes- C_2H_4, C_3H_6

(iii) Homologous series: Alkynes- C_2H_2, C_3H_4

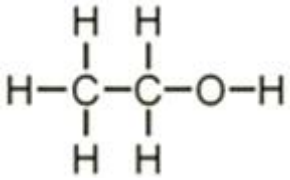
38 E. Question

What is meant by 'heteroatom'? Give examples. Write the names and formulae of two organic compounds containing different heteroatoms.

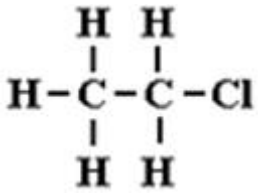
Answer

In a hydrocarbon chain, any atom other than carbon and hydrogen is referred as heteroatom. Examples: Halogens, oxygen, nitrogen and sulphur.

Ethanol- (CH_3CH_2OH)



Chloroethane- (CH_3CH_2Cl)



39 A. Question

What is meant by a functional group? Explain with an example.

Answer

A atom or group of atoms which determine the properties of compound is known as functional group. Example; alcohol (-OH), aldehyde (-CHO), etc.

Alcohol group (-OH) is a functional group which is present in ethanol (C_2H_5OH).

39 B. Question

Write three common functional groups present in organic compounds. Give their symbols/formulae.

Answer

Functional Group	Formula of functional group
Alcohol	-OH
Aldehyde	-CHO
Carboxylic acid group	-COOH

39 C. Question

Name the functional groups present in the following compounds:

(i) CH_3COOH (ii)$CH_3CH_2CH_2CHO$ (iii) C_2H_5OH (iv) $CH_3COCH_2CH_3$

Answer

(i) Carboxylic acid group (-COOH)

(ii) Aldehyde group(-CHO)

(iii) Alcohol group (-OH)

(iv) Ketone group (-CO-)

39 D. Question

Name the functional group which always occurs in the middle of a carbon chain.

Answer

Ketone group always occurs in the middle of a carbon chain.

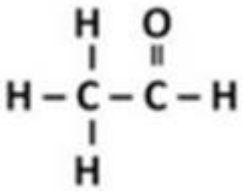
39 E. Question

Draw the structures for the following compounds:

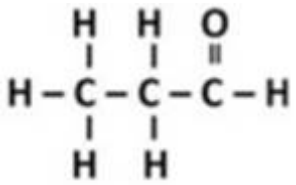
(i) Ethanal (ii) Propanal (iii) Butanal (iv) Pentanal

Answer

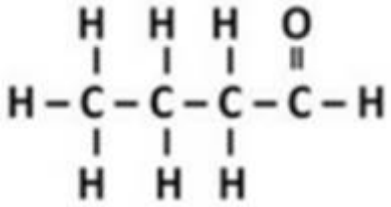
(i) Ethanal (CH_3CHO)



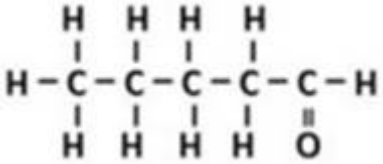
(ii) Propanal (CH_3CH_2CHO)



(iii) Butanal ($CH_3CH_2CH_2CHO$)



(iv) Pentanal ($CH_3CH_2CH_2CH_2CHO$)



40 A. Question

What happens when carbon burns in air? Write the chemical equation of the reaction which takes place.

Answer

The burning of carbon in the presence of air is called combustion. In the combustion process, CO_2 and H_2O are formed and energy is released in the form of heat and light.

$C + O_2 \rightarrow CO_2$ + Heat + Light

40 B. Question

Why are coal and petroleum called fossil fuels?

Answer

Coal and petroleum are called fossil fuels because they were formed by the remains of prehistoric plants and animals buried under the earth long ago.

40 C. Question

Explain how coal was formed in the earth.

Answer

Millions of years ago, the forests were buried under the surface of the earth due to natural processes like storms, floods and earthquakes. These got compressed and covered with sand, clay and water. When they got buried deep in the soil, they were exposed to very high pressure and temperature. Under these conditions, wood slowly got converted into coal.

40 D. Question

Describe how petroleum was formed in the earth.

Answer

Millions of years ago, the microscopic plants and animals which lived under the sea died and their bodies were covered with mud and sand at the bottom of the sea. In the absence of air or

oxygen, the chemical effects of pressure, heat and bacteria converted these remains into petroleum oil and natural gas. The petroleum thus formed got trapped between two layers of impervious rocks (non-porous rocks) forming an oil trap.

40 E. Question

Name a fossil fuel other than coal and petroleum.

Answer

Natural gas is also a fossil fuel other than coal and petroleum.

Multiple Choice Questions (MCQs)-Pg-242

41. Question

The molecular formula of a homologue of butane is: A. C_4H_8

B. C_3H_6

C. C_4H_6

D. C_3H_8

Answer

Butane is a member of homologous series of alkanes. The general formula of homologous series of alkanes is CnH2n+2. Where, n is the number of carbon atoms in the one molecule of alkane. Thus, C3H8 is a member of homologous series of alkanes.

42. Question

One of the following molecular formula can represent two organic compounds having different functional groups. This molecular formula is : A. $C_5H_{12}O$

B. $C_5H_{10}O$

C. $C_5H_{12}O_2$

D. C_5H_{12}

Answer

The molecular formula C5H10O represents the two organic compounds having different functional groups like aldehyde or ketone group.

43. Question

The number of carbon atoms present in the molecule of fifth member of the homologous series of alkynes is: A. four

B. five

C. six

D. seven

Answer

The fifth member of the homologous series of alkynes contains six carbon atoms in its molecule.

44. Question

One of the following burns without producing a flame. This is: A. wood

B. charcoal

C. LPG

D. candle

Answer

Charcoal burns without producing a flame.

45. Question

The functional group which always occurs in the middle of a carbon chain is : A. alcohol group

B. aldehyde group

C. carboxyl group

D. ketone group

Answer

ketone group always occurs in the middle of a carbon chain.

46. Question

The molecular formulae of some organic compounds are given below. Which of these compounds contains an aldehyde group? A. C_3H_8O

B. $C_3H_6O_2$

C. C_3H_6O

D. C_3H_7CI

Answer

The molecular formula of organic compounds having aldehyde group is CnH2nO. Thus, the molecular formula (C3H6O) represent the organic compound having aldehyde group.

47. Question

The organic compounds which are isomeric with one another are: A. alcohols and aldehydes

B. aldehydes and carboxylic acids

C. ketones and aldehydes

D. alcohols and ketones

Answer

The organic compounds which are isomeric with one another are ketones and aldehydes. For example; a molecular formula C3H6O could be either propanal (an aldehyde) or propanone (a ketone).

48. Question

The fuel which usually burns with a blue flame is: A. coal

B. LPG

C. candle wax

D. kerosene (in lamp)

Answer

LPG, fuel usually burns with a blue flame.

49. Question

Which of the following burns by producing a yellow, luminous flame? A. Natural gas

B. Coke

C. Wax

D. Charcoal

Answer

When a candle is lighted, the wax melts and converted into vapors. In candle, there is no provision for the proper mixing of wax vapors and air, so incomplete combustion occurs. And, some unburnt small carbon particles are produce which rise and get heated and glow to give out yellowish light. This makes the candle flame yellow and luminous.

50. Question

The molecular formula of an organic compound is $C_{48}H_{94.}$ This compound belongs to the homologous Series of: A. alkenes

B. aldehydes

C. alkynes

D. alkanes

Answer

The general formula of homologous series of alkynes is CnH2n-2. Here, n represents the number of carbon atoms present in one molecule of alkyne. Thus, C48H94 show the homologous series of alkynes.

51. Question

One of the following molecular formulae represent a ketone. This formula is: A. $C_5H_{12}O$

B. $C_6H_{12}O_2$

C. $C_6H_{14}O$

D. $C_6H_{12}O$

Answer

The general formula of homologous series of ketone is CnH2nO. Here, n is number of carbon atoms in one molecule of ketone.

52. Question

Which one of the following is not a fossil fuel? A. petrol

B. coke

C. charcoal

D. coal

Answer

Charcoal is not a fossil fuel.

53. Question

Butanone is a four-carbon compound having the functional group: A. -COOH

B. -CHO

C. -CO-

D. -OH

Answer

Butanone is a member of homologous series of ketones.

54. Question

The molecular formula of the third member of the homologous series of ketones is: A. C_4H_8O

B. C_3H_6O

C. $C_5H_{10}O$

D. $C_6H_{12}O$

Answer

The third member of homologous series of ketones is pentanone.

55. Question

The functional group present in propanal is: A. -OH

B. -COOH

C. -CO-

D. –CHO

Answer

Propanal

Questions Based on High Order Thinking Skills (HOTS)-Pg-243

56. Question

An organic compound having the molecular formula C_3H_6O can exist in the form of two isomers A and B having different functional groups. The isomer A is a liquid which is used as a solvent for nail polish. The isomer B is also a liquid. An aqueous solution of one of the lower homologues of B is used for preserving biological specimens in the laboratory

(a) What is compound A?

(b) Write the electron-dot structure of A.

(c) What is compound B?

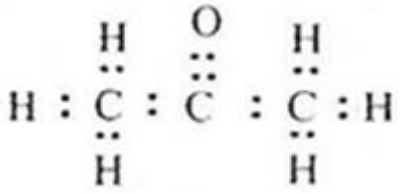
(d) Write the electron-dot structure of B.

(e) Name the lower homologue of compound B which is used in preserving biological specimens.

Answer

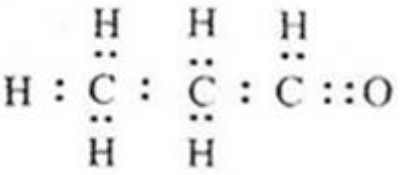
(a) A is propanone or Acetone.

(b) electron-dot structure of A:



(c) Compound B is propanal

(d) electron-dot structure of B:



(e) Methanal (or Formaldehyde) is used in preserving biological specimens.

57. Question

A hard material X which is mined from the earth is used as a household fuel and also for the generation of electricity at Thermal Power Stations. A soft material Y is also used as a fuel in the form of candles. A gaseous material Z which occurs along with petroleum is increasingly being used as a fuel in running vehicles in its compressed form.

(a) What are materials, X, Y and Z?

(b) When materials X, Y and Z are burned separately:

(i) Which material burns by producing a yellow, luminous flame?

(ii) Which material ultimately bums without producing a flame?

(iii) Which material can bum in a gas stove by producing a blue flame?

Answer

(a) X is coal; Y is wax; Z is natural gas

(b) (i) Y (wax) (ii) X (coal) (iii) Z (natural gas)

58. Question

Three organic compounds A, B and C have the following molecular formulae:

A) $C_4H_8O_2$

B) $C_4H_{10}O$

C) C_4H_8O

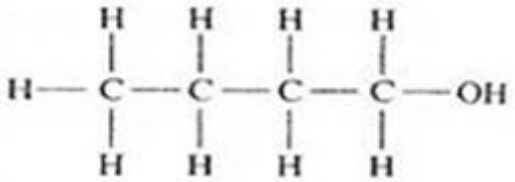
(a) Which compound contains an alcohol group? Write its name and structural formula.

(b) Which compound contains a carboxyl group? Write its name and structural formula.

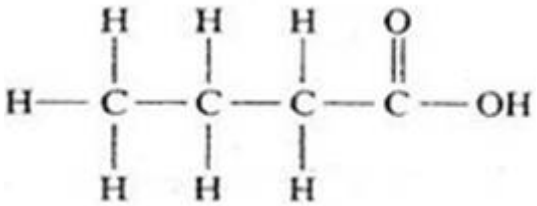
(c) Which molecular formula can represent an aldehyde as well as a ketone? Write the names and structural formulae of the aldehyde and ketone represented by this molecular formula.

Answer

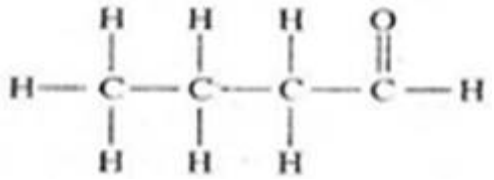
(a) B; Butanol, C_4H_9OH



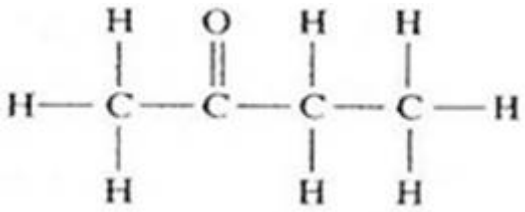
(b) A;Butanoic acid, C_3H_7COOH



(c) C; C_4H_8O Aldehyde: Butanal, C_3H_7CHO



Ketone: Butanone, $CH_3COCH_2CH_3$



59. Question

A colourless organic liquid X of molecular formula $C_2H_4O_2$ turns blue litmus to red. Another colourless organic liquid Y of molecular formula C_3H_6O has no action on any litmus but it is used as a nail polish remover. A yet another colourless organic liquid Z of molecular formula C_3H_6O has also no action on litmus but it is used in tincture of iodine.

(a) Name the liquid X. To which homologous series does it belong? Give the name of another member of this homologous series.

(b) Name the liquid Y. To which homologous series does it belong? Write the name of another member of this homologous series.

(c) Can you name an organic compound having the same molecular formula as liquid Y but which belongs to a different homologous series? What is this homologous series?

(d) Name the liquid Z. To which homologous series does it belong? Write the name of another member of this homologous series.

Answer

(a) Liquid X is ethanoic acid; it belongs to homologous series of carboxylic acids. Propanoic acid is another member of this homologous series.

(b) Liquid Y is Propanone; it belongs to homologous series of ketones. Butanone is another member of this homologous series.

(c) Propanal is an organic compound having the same molecular formula as liquid Y; it belongs to homologous series of aldehydes.

(d) Liquid Z is ethanol; it belongs to homologous series of alcohols. Propanol is another member of this homologous series.

60. Question

You are given an organic compound having the molecular formula C_3H_8• Give the name and formula of the compound formed:

(a) when one H atom of C_3H_8 is replaced by a Cl atom.

(b) when one H atom of C_3H_8 is replaced by OH group.

(c) when one H atom of C_3H_8 is replaced by a CHO group.

(d) when one H atom of C_3H_8 is replaced by a COOH group.

(e) when two H atoms joined to the middle carbon atom of C_3H_8 are replaced by one O atom.

Answer

(a) Chloropropane, CH_3-CH_2-CH_2-Cl

(b) Propanol, CH_3-CH_2-CH_2-OH

(c) Butanal, CH_3-CH_2-CH_2-CHO

(d) Butanoic acid, CH_3-CH_2-CH_2-COOH

(e) Propanone, CH_3-CO-CH_3

Very Short Answer Type Questions-Pg-262

1. Question

Name the gas evolved when ethanoic acid is added to sodium carbonate. How would you prove the presence of this gas?

Answer

Carbon dioxide (CO_2) gas evolved when ethanoic acid is added to sodium carbonate. This gas can be identified by passing through lime water which turns milky.

2. Question

Which of the following will give brisk effervescence with sodium hydrogen carbonate and why?

CH_3COOH, CH_3CH_2OH

Answer

When CH_3COOH reacts with sodium hydrogen carbonate, carbon dioxide (CO_2) gas is evolved with effervescence.

3. Question

Name the functional group present in an organic compound which gives brisk effervescence with $NaHCO_3$•

Answer

The functional group carboxylic acid group (-COOH) present in an organic compound (CH_3COOH) which gives brisk effervescence with $NaHCO_3$•

4. Question

Name the hydrocarbon formed when ethanol is heated with cone. H_2S0_4 at 170 ï¿½C? What is this reaction known as?

Answer

Ethene (CH_2=CH_2) is formed when ethanol is heated with cone. H_2S0_4 at 170 ï¿½C. This reaction is known as dehydration.

5. Question

Why does ethyne (acetylene) burn with a sooty flame?

Answer

Ethyne burns with a sooty flame because it has very high percentage of carbon. Oxygen in the air is unable to oxidise all the carbon of ethyne to carbon dioxide. Due to unburnt carbon particles, the flame becomes scooty.

6. Question

Name the product formed when hydrogen is added to ethene.

Answer

When hydrogen is added to ethene, ethane is formed.

7. Question

Explain why, ethene decolourises bromine water whereas ethane does not.

Answer

Ethene is an unsaturated hydrocarbon, hence it can decolourises the bromine water whereas ethane is a saturated hydrocarbon, hence it cannot do.

8. Question

Name two catalysts which can be used in the hydrogenation of unsaturated compounds.

Answer

Unsaturated hydrocarbons add hydrogen in the presence of catalysts such as palladium or nickel to give saturated hydrocarbons.

9. Question

State two disadvantages of incomplete combustion.

Answer

Disadvantages of incomplete combustion:

(i) Unburnt carbon is formed because of incomplete combustion which leads to the pollution of atmosphere and blackens cooking utensils.

(ii) It leads to the formation of carbon monoxide which is a highly poisonous gas.

10. Question

What happens when (give chemical equation): Sodium reacts with ethanol (ethyl alcohol)

Answer

Alcohols react with sodium leading to the evolution of hydrogen.

$2C_2H_5OH + 2Na \rightarrow 2C_2H_5O^-Na^+ + H_2$

11. Question

Describe one reaction of ethanol.

Answer

When ethanol reacts with sodium, hydrogen gas is evolved.

$$2Na + 2CH_3CH_2OH \rightarrow \underset{\text{(Sodium ethoxide)}}{2CH_3CH_2O^-Na^+} + H_2$$

This reaction is used as a test for ethanol.

When a small piece of sodium metal adds to the organic liquid (to be tested), taken in a dry test tube. If bubbles (or effervescence) of hydrogen gas are produced, it indicates that the given organic liquid is an alcohol.

12. Question

Name one liquid carbon compound which is being used as an additive in petrol in some countries.

Answer

Some countries now use ethanol as an additive in petrol.

13. Question

What are the raw materials required for making soap in a laboratory (or at home)?

Answer

Following raw materials are required for making soap in a laboratory:

(i) Vegetable oil (like castor oil, cottonseed oil or soyabean oil)

(ii) Sodium hydroxide (caustic soda)

(iii) Sodium chloride (common salt)

14. Question

Would you be able to check whether water is hard by using a detergent? Why?

Answer

Detergent gives lather with hard and soft water both, while a soap gives lather with soft water only. Thus, it is not possible to check the hardness of water by using a detergent.

15. Question

Describe a test for carboxylic acids.

Answer

Since carboxylic acid is acidic in nature, it will turn blue litmus into red.

16. Question

Why is the conversion of ethanol into ethanoic acid an oxidation reaction?

Answer

The conversion of ethanol into ethanoic acid is an oxidation reaction because oxygen is added to it during this conversion.

$$CH_3CH_2OH + 2[O] \xrightarrow[\text{or acidified } K_2Cr_2O_7]{\text{Alkaline } KMnO_4;\text{Heat}} CH_3COOH + H_2O$$

17. Question

Explain why, alkanes are excellent fuels.

Answer

Alkanes are excellent fuels because when alkanes burn in air releasing a lot of heat energy.

8. Question

Name one chemical compound which can be used to distinguish between ethanol and ethanoic acid.

Answer

Sodiumhydrogen-carbonate chemical compound can be used to distinguish between ethanol and ethanoic acid

19. Question

Complete the following equations:

(a) CH_3CH_2OH -----PICTURE

(b) $CH_3CH_2OH + C_2H_5OH \xrightarrow{Conc.H_2SO_4}$

Answer

(a)

$$(a)\quad CH_3CH_2OH \xrightarrow[170^0\,C]{Conc\,H_2SO_4} CH_2 = CH_2 + H_2O$$

$$(b)\quad CH_3COOH + C_2H_5OH \xrightarrow{Conc.H_2SO_4} CH_3COOC_2H_5 + H_2O$$

20. Question

Complete and balance the following equations:

(a) $CH_4 + O_2 \longrightarrow$

(b) $CH_4 + Cl_2 \xrightarrow{\text{Sunlight}}$

Answer

(a) Combusion:

$CH_4 + O_2 \rightarrow CO_2 + H_2O$ + heat and light

(b) Substitution Reaction

$CH_4 + Cl_2 \rightarrow CH_3Cl + HCl$ (in the presence of sunlight)

21. Question

Fill in the following blanks with suitable words:

(a) The process of burning of a hydrocarbon in the presence of air to give CO_2, H_20, heat and light is known as .....

(b) The sodium salt of a long chain fatty acid is called .....

(c) ..... is better than soap for washing clothes when the water is hard.

(d) The organic acid present in vinegar is.....

Answer

(a) Combustion (b) Soap (c) Detergent (d) Ethanoic acid

Short Answer Type Questions-Pg-263

22. Question

Which of the following hydrocarbons will give substitution reactions and why?

CH_4, C_3H_6, C_3H_8, C_4H_6, C_5H_{12}, C_5H_{10}

Answer

Saturated hydrocarbons will give substitution reactions. Being saturated hydrocarbons, CH_4, C_3H_8, and C_5H_{12} will give substitution reactions.

23. Question

Which of the following will give addition reactions and why?

C_4H_{10}, C_2H_6, C_2H_4, CH_4, C_3H_8, C_3H_4

Answer

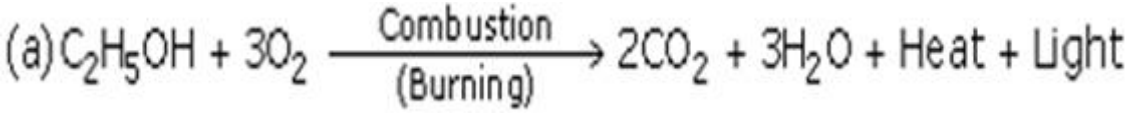
Unsaturated hydrocarbons will give addition reactions. Being unsaturated hydrocarbons, C_2H_4 and C_3H_4 will give addition reactions.

24 A. Question

Write the chemical equation of the reaction which takes place during the burning of ethanol in air.

Answer

Combustion: In the combustion process, mainly two products are formed i.e., CO_2 and H_2O and energy is released in form of heat and light.



24 B. Question

Why is ethanol used as a fuel?

Answer

Ethanol is used as a fuel as it burns with a clear flame producing lot of heat.

24 C. Question

State two uses of ethanol (other than as a fuel).

Answer

Uses of ethanol:

(i) It is used in alcoholic drinks like whisky, beer, etc.

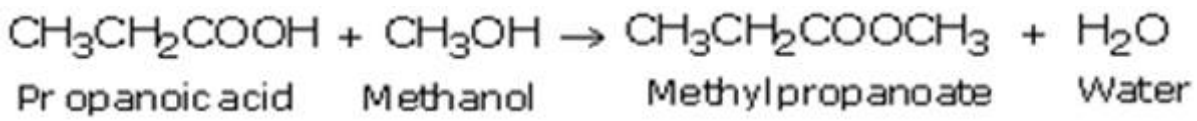
(ii) It is used as a solvent. Many organic compounds which are insoluble in water, are soluble in ethanol.

25 A. Question

What happens when propanoic acid is warmed with methanol in the presence of a few drops of concentrated sulphuric acid? Write equation of the reaction involved.

Answer

When propanoic acid reacts with methanol in the presence of concentrated sulphuric acid (a catalyst), ester ($CH_3CH_2COOCH_3$) is produced.



25 B. Question

What change will you observe if you test soap solution with a litmus paper (red and blue)? Give reason for your observation.

Answer

Since soap is basic in nature, it will turn red litmus paper blue. However, blue litmus paper will remain blue when tested with soap solution.

25 C. Question

What is meant by denatured alcohol? What is the need to denature alcohol?

Answer

Denatured alcohol is the ethanol which is made unfit for drinking by adding poisonous substances like methanol, copper sulphate, etc.

This is done to prevent the misuse of alcohol produced for industrial use.

26 A. Question

How would you test for an alcohol?

Answer

Sodium metal test: Add a small piece of sodium metal to the organic liquid (to be tested), taken in a dry test tube. If bubbles (or effervescence) of hydrogen gas are produced, it indicates that the given organic liquid is an alcohol.

26 B. Question

Give the harmful effects of drinking alcohol.

Answer

Harmful effects of drinking alcohol:

(i) Consumption of ethanol is not good for human health. It slows down the metabolic processes.

(ii) It depresses the central nervous system. This results in lack of coordination, mental confusion and drowsiness.

26 C. Question

Explain why, methanol is much more dangerous to drink than ethanol.

Answer

Unlike ethanol, intake of methanol in very small quantities can cause death. It is oxidised to methanal in the liver which reacts rapidly with protoplasm and coagulates it. Methanol also affects the optic nerve, causing blindness.

27. Question

How would you convert:

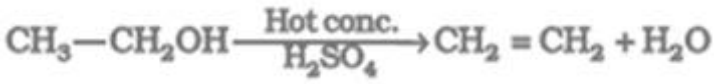
(a) ethanol into ethene?

(b) propanol into propanoic acid?

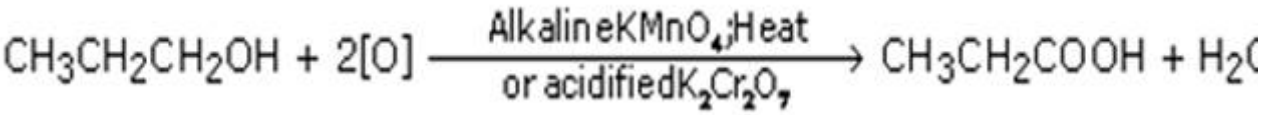
Name the process in each case and write the equations of the reactions involved.

Answer

(a) Dehydration:



(b) Oxidation:



28. Question

Give reasons for the following observations:

(a) Air holes of a gas burner have to be adjusted when the vessels being heated get blackened by the flame.

(b) Use of synthetic detergents causes pollution of water.

Answer

(a) When the bottoms of cooking vessels getting blackened by the flame, it means that the air holes of a gas burner are blocked and fuel is getting wasted. So, the air holes of the gas burner should be adjusted.

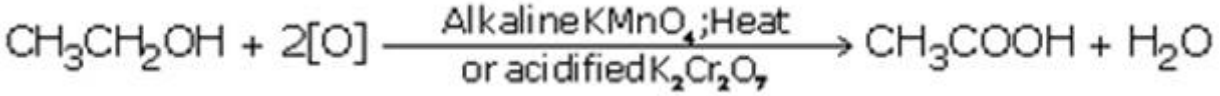
(b) Some synthetic detergents cannot be decomposed by micro-organisms as they are non-biodegradable. Hence, they cause water pollution.

29 A. Question

What would be observed on adding a 5% alkaline potassium permanganate solution drop by drop to some warm ethanol in a test-tube? Write the name of the compound formed during the chemical reaction. Also write chemical equation of the reaction which takes place.

Answer

When 5% alkaline potassium permanganate solution is added drop by drop in a test-tube containing some warm ethanol, the purple color of potassium permanganate starts disappearing. Ethanoic acid is formed in this chemical reaction.



29 B. Question

How would you distinguish experimentally between an alcohol and a carboxylic acid on the basis of a chemical property?

Answer

Take the samples of alcohol and carboxylic acid in different test tubes and add some sodium hydrogen carbonated in both the tubes.

Carboxylic acid reacts with sodium hydrogen carbonate to give brisk effervescence of carbon dioxide gas but alcohol does not react with sodium hydrogen carbonate.

$$CH_3COOH + NaHCO_3 \rightarrow CH_3COONa + H_2O + CO_2$$

$$C_2H_5OH + NaHCO_3 \rightarrow \text{No evolution of } CO_2$$

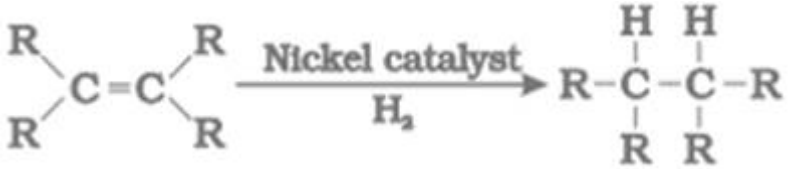
30. Question

Name the functional group of organic compounds that can be hydrogenated. With the help of a suitable example, explain the process of hydrogenation, mentioning the conditions of the reaction and any one change in physical property with the formation of the product. Name any one natural source of organic compounds that are hydrogenated.

Answer

Ethene (CH_2=CH_2) can be hydrogenated.

The addition of hydrogen to an unsaturated hydrocarbon in the presence of catalysts such as palladium or nickel to give a saturated hydrocarbon is called hydrogenation.



Example: Ethene (CH_2=CH_2) reacts with hydrogen in the presence of nickel catalyst to produce ethane (CH_3-CH_3).

$$CH_2 = CH_2 + H_2 \xrightarrow[\text{Heat}]{\text{NiCatalyst}} CH_3 - CH_3$$

This reaction is commonly used in hydrogenation of vegetable oil into vegetable ghee (solid fat)

31 A. Question

Name the gas evolved when ethanol reacts with sodium.

Answer

When ethanol reacts with sodium, hydrogen gas is evolved.

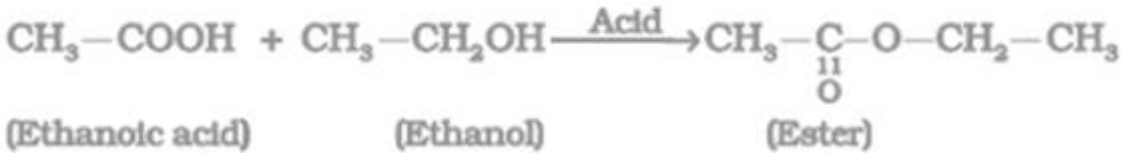
$$2Na + 2CH_3CH_2OH \rightarrow \underset{\text{(Sodium ethoxide)}}{2CH_3CH_2O^-Na^+} + H_2$$

31 B. Question

What type of compound is formed when a carboxylic acid reacts with an alcohol in the presence of cone.H_2SO_4?

Answer

When carboxylic acid reacts with alcohol in the presence of concentrated sulphuric acid (a catalyst), ester ($CH_3CH_2COOCH_3$) is produced.



31 C. Question

What will you observe when dilute ethanoic acid and dilute hydrochloric acid are put on universal indicator paper, one by one? What does it show?

Answer

When dilute ethanoic acid is put on universal indicator, the indicator paper turns to orange. It means that the pH of ethanoic acid is about 4 which indicates that ethanoic acid is a weak acid. On the other hand, dilute hydrochloric acid turns universal indicator paper to red, showing that its pH is about 1. This shows us that hydrochloric acid is a strong acid.

32 A. Question

What type of compound is CH_3COOH?

Answer

CH_3COOH is a carboxylic acid compound.

32 B. Question

What substance should be oxidised to prepare CH_3COOH?

Answer

Ethanol (C_2H_5OH) should be oxidised to prepare CH_3COOH.

32 C. Question

What is the physical state of CH_3COOH?

Answer

The physical state of CH_3COOH is liquid state.

32 D. Question

State one advantage of soaps over detergents.

Answer

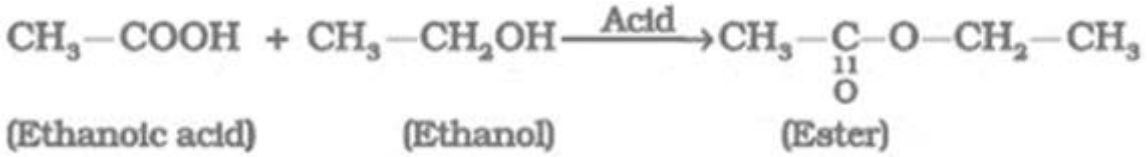
Soaps are biodegradable whereas detergents are non-biodegradable.

33 A. Question

What happens when ethanol reacts with ethanoic acid in the presence of a little of concentrated sulphuric acid? Write equation of the reaction involved.

Answer

When ethanol reacts with ethanoic acid in the presence of concentrated sulphuric acid (a catalyst), a sweet smelling ester ($CH_3CH_2COOCH_3$) is produced.

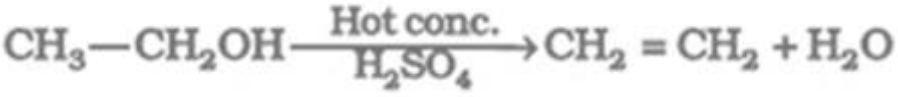


33 B. Question

What happens when ethanol is heated with concentrated sulphuric acid at 170 ï¿½C? Write the equation of the reaction which takes place.

Answer

Ethene ($CH_2=CH_2$) is formed when ethanol is heated with cone. H_2S0_4 at 170 ï¿½C. This reaction is known as dehydration.

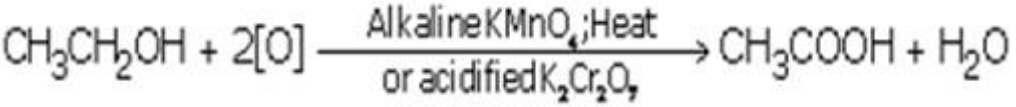


34 A. Question

What happens when ethanol is oxidised with alkaline potassium permanganate (or acidified potassium dichromate) ? Write the equation of the reaction involved.

Answer

when ethanol is oxidised with alkaline potassium permanganate (or acidified potassium dichromate, ethanoic acid is formed.



34 B. Question

Choose those compounds from the following which can tum blue litmus solution red: HCHO, CH_3COOH, CH_3OH, C_2H_50H, HCOOH, CH_3CHO

Give reasons for your choice.

Answer

CH_3COOH and HCOOH can turn blue litmus solution red as these are carboxylic acids.

35 A. Question

Explain the process of preparation of soap in laboratory.

Answer

Following steps are used in the preparation of soap in the laboratory:

1) Take about 20 ml of vegetable oil in a beaker.

2) Then, add 30 ml of 20% sodium hydroxide solution to it.

3) This mixture is heated slowly till it boils.

4) Then add 5 to 10 grams of sodium chloride (common salt).

5) Stir the mixture well and allow it to cool. On cooling the solution, solid soap separates out. 6. When the soap sets, it can be cut into pieces called 'soap bars'.

This process of soap preparation is known as saponification.

35 B. Question

Why is common salt (sodium chloride) added during the preparation of soap?

Answer

Common salt is added to solidify and precipitate out all the soap from the aqueous solution.

35 C. Question

Why is soap not suitable for washing clothes when the water is hard?

Answer

Soap does not work properly when hard water is used. Hard water contains salt of calcium and magnesium. When soap is added with hard water, a large amount of soap in water reacts with the calcium and magnesium ions of hard water to form an insoluble precipitate called scum. This makes the cleaning of clothes difficult.

36 A. Question

What happens when methane (natural gas) bums in air? Write the chemical equation of the reaction involved.

Answer

When methane (natural gas) bums in air, carbon dioxide and water vapour are formed.

$CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$ + Heat + Light

36 B. Question

What happens when ethanoic acid reacts with sodium carbonate? Write chemical equation of the reaction involved.

Answer

When ethanoic acid reacts with sodium carbonate, sodium ethanoate and carbon dioxide are formed.

$$2CH_3COOH + Na_2CO_3 \rightarrow 2CH_3COONa + CO_2 + H_2O$$

36 C. Question

Give a test that can be used to differentiate chemically between butter and cooking oil.

Answer

Take butter and cooking oil in two separate test tubes and add bromine water in both the tubes. Cooking oil decolourises the bromine water which means it is an unsaturated compound whereas butter does not decolourise the bromine water showing it is a saturated compound.

37 A. Question

Describe, giving equation, a chemical reaction which is characteristic of saturated hydrocarbons (or alkanes).

Answer

Substitution reaction is a characteristic of saturated hydrocarbons.

Methane reacts with chlorine in the presence of sunlight to form chloromethane and hydrogen chloride.

37 B. Question

What is an oxidising agent? Name two oxidising agents which can oxidise ethanol to ethanoic acid.

Answer

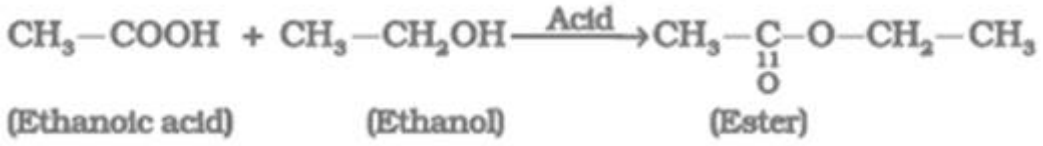
An oxidising agent is one which oxidises other substances by providing oxygen or removing hydrogen. Alkaline potassium permanganate and acidified potassium dichromate can be used as oxidising agents.

37 C. Question

Describe one reaction of a carboxylic acid.

Answer

Esterification reaction: When ethanoic acid reacts with ethanol in the presence of concentrated sulphuric acid (a catalyst), a sweet smelling ester ($CH_3CH_2COOCH_3$) is produced.



38 A. Question

Write names and formulae of hydrocarbons containing a single and a double bond (one example for each). Give one characteristic chemical property of each.

Answer

Hydrocarbon having single bond is methane (CH_4). It is a saturated hydrocarbon hence, it undergoes substitution reaction with chlorine.

Hydrocarbon having double bond is ethene ($CH_2=CH_2$). It is a unsaturated hydrocarbon hence, it undergoes addition reaction in the presence of a catalyst like nickel or palladium.

38 B. Question

What is a detergent? Name one detergent.

Answer

Detergents are generally ammonium or sulphonate salts of long chain carboxylic acids. Detergents are usually used to make shampoos and products for cleaning clothes.

Ex: Sodium n-dodecyl benzene sulphonate.

38 C. Question

Why have detergents replaced soap as a washing agent ?

Answer

Detergents do not form insoluble precipitates with calcium and magnesium ions in hard water hence, they can be used for washing even with hard water. Thus, Detergents are better cleansing agents than soaps.

39 A. Question

(a) How does ethanoic acid react with sodium hydrogencarbonate? Give equation of the reaction which takes place.

Answer

When ethanoic acid reacts with sodium carbonate, sodium ethanoate and carbon dioxide gas are formed.

$2CH_3COOH + Na_2CO_3 \rightarrow 2CH_3COONa + CO_2 + H_2O$

39 B. Question

Why are carbon and its compounds used as fuels for most applications?

Answer

Carbon and its compounds give a lot of heat and light when burnt in air.

39 C. Question

Which of the two is better for washing clothes when the water is hard: soap or detergent? Give reason for your answer.

Answer

Detergent is better for washing clothes when the water is hard because detergents do not form insoluble calcium and magnesium salts with hard water, and hence can be used for washing even with hard water.

40 A. Question

What is meant by a substitution reaction? Give an example (with equation) of the substitution reaction of an alkane.

Answer

Substitution reaction is a characteristic of saturated hydrocarbons. The reaction in which one (or more) hydrogen atoms of a hydrocarbon are replaced by some other atoms (like chlorine), is called a substitution reaction.

Example: Methane (CH_4) reacts with chlorine in the presence of sunlight to form chloromethane and hydrogen chloride.

40 B. Question

How is soap made? Write a word equation involved in soap making.

Answer

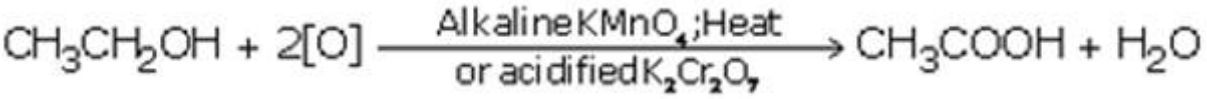
Soaps are made from animal fat or vegetable oils by heating it with sodium hydroxide.

41 A. Question

How is ethanoic acid obtained from ethanol? Write down the chemical equation of the reaction involved.

Answer

when ethanol is oxidised with alkaline potassium permanganate (or acidified potassium dichromate, ethanoic acid is formed.



41 B. Question

How would you distinguish between ethanol and ethanoic acid by chemical test?

Answer

Litmus test is used to distinguish between carboxylic acid and ethanol. When some blue litmus solution is added to the organic compound (to be tested), the colour of litmus solution turns red. It means the organic compound is acidic in nature, hence, it is a carboxylic acid. Ethanol has no effect on any litmus solution.

Litmus test: Some blue litmus solution is added to the organic compound (to be tested). If the blue litmus solution turns red, it shows that the organic compound is acidic in nature and hence it is a carboxylic acid (ethanoic acid). Ethanol has no effect on any litmus solution.

41 C. Question

Explain the formation of scum when hard water is treated with soap.

Answer

Soap does not work properly when hard water is used. Hard water contains salt of calcium and magnesium. When soap is added with hard water, a large amount of soap in water reacts with the calcium and magnesium ions of hard water to form an insoluble precipitate called scum. This makes the cleaning of clothes difficult.

42 A. Question

What happens when methane reacts with chlorine? Give equation of the reaction which takes place.

Answer

Methane reacts with chlorine in the presence of sunlight to form chloromethane and hydrogen chloride.

$$CH_4 + Cl_2 \xrightarrow{\text{Sunlight}} CH_3Cl + HCl$$

42 B. Question

What is hydrogenation? What is its industrial application?

Answer

The addition of hydrogen to an unsaturated hydrocarbon to obtain a saturated hydrocarbon is called hydrogenation.

This reaction is commonly used in hydrogenation of vegetable oil into vegetable ghee (solid fat)

42 C. Question

Give any two differences between soaps and detergents.

Answer

Differences between soaps and detergents:

Soaps	Detergents
They are bio-degradable.	They are non-biodegradable.
They are effective in soft water.	They are effective in both hard and soft wate

43 A. Question

What happens when ethanoic acid reacts with sodium hydroxide? Write equation of the reaction involved.

Answer

When ethanoic acid reacts with sodium hydroxide, sodium ethanoate and Water are formed.

$$CH_3COOH + NaOH \rightarrow CH_3COONa + H_2O$$

43 B. Question

What happens when vegetable oils are hydrogenated? Name the catalyst used.

Answer

Hydrogenation (addition of hydrogen) of vegetable oil in the presence of nickel catalyst gives vegetable ghee (solid fat).

43 C. Question

What is the advantage of detergents over soaps for washing clothes? Also state One disadvantage.

Answer

Advantage: Detergents can be used even with hard water and have strong cleansing action whereas soaps cannot work effectively in hard water.

Disadvantage: Detergents are non-biodegradable, hence cause water pollution.

44 A. Question

An organic compound X of molecular formula $C_2H_4O_2$ gives brisk effervescence with sodium hydrogencarbonate. Give the name and formula of X.

Answer

Ethanoic acid, CH_3COOH

44 B. Question

A mixture of ethyne (acetylene) and oxygen is burnt for welding. Can you tell why a mixture of ethyne and air is not used?

Answer

A mixture of ethyne and air is not used for welding because when ethyne is burnt in air, it gives a sooty flame due to incomplete combustion which is not enough to melt metals for welding.

44 C. Question

Name a chemical reaction which is characteristic of unsaturated hydrocarbons (like alkenes and alkynes).

Answer

Addition reaction is a characteristic of unsaturated hydrocarbons (like alkenes and alkynes).

45 A. Question

What is meant by an addition reaction? Give an example (with equation) of an addition reaction of an alkene.

Answer

The reaction in which a substance adds completely on a another substance without the removal of small molecules are called addition reactions. Addition reaction is a characteristic of

unsaturated hydrocarbons (like alkenes and alkynes).

Example: Ethene reacts with hydrogen when heated in the presence of nickel catalyst to form ethane.

45 B. Question

What is added to groundnut oil when it is to be converted to vanaspati ghee?

Answer

When groundnut oil is to be converted to Vanaspati ghee, hydrogen is added.

45 C. Question

Which of the two is better for our health: butter or vegetable oil? Why?

Answer

Vegetable oil is better for our health because it contains unsaturated fatty acids which are good for our health.

Long Answer Type Questions-Pg-265

46 A. Question

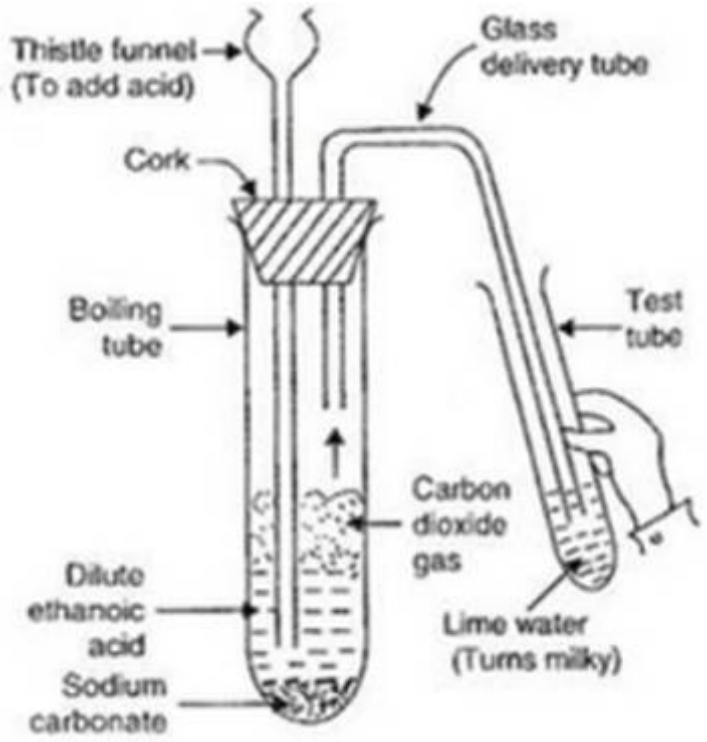
When ethanoic acid reacts with sodium hydrogencarbonate, then a salt X is formed and a gas Y is evolved. Name the salt X and gas Y. Describe an activity with the help of a labelled diagram of the apparatus used to prove that the evolved gas is the one which you have named. Also write the chemical equation of the reaction involved.

Answer

Salt X is sodium ethanoate, CH_3COONa; Gas Y is carbon dioxide (CO_2)

Activity:

- Take a boiling test tubes and put about 0.5 g of sodium carbonate in it.
- Also, take another tube and add some lime water in it.
- Then add 2 ml of dilute ethanoic acid in the boiling tube A. We will observe that brisk effervescence of carbon dioxide is produce.
- Pass the gas produced through lime water. Lime water turns milky.
- So, this experiment proves that when ethanoic acid reacts with sodium carbonate, then carbon dioxide gas is produced.



$$2CH_3COOH + Na_2CO_3 \rightarrow 2CH_3COONa + CO_2 + H_2O$$

46 B. Question

Give any two uses of ethanoic acid.

Answer

(i) 5-8 % solution of acetic acid in water is called vinegar and is used widely as a food preservative in pickles and sauces.

(ii) It is used in the manufacture of acetone and esters used in perfumes.

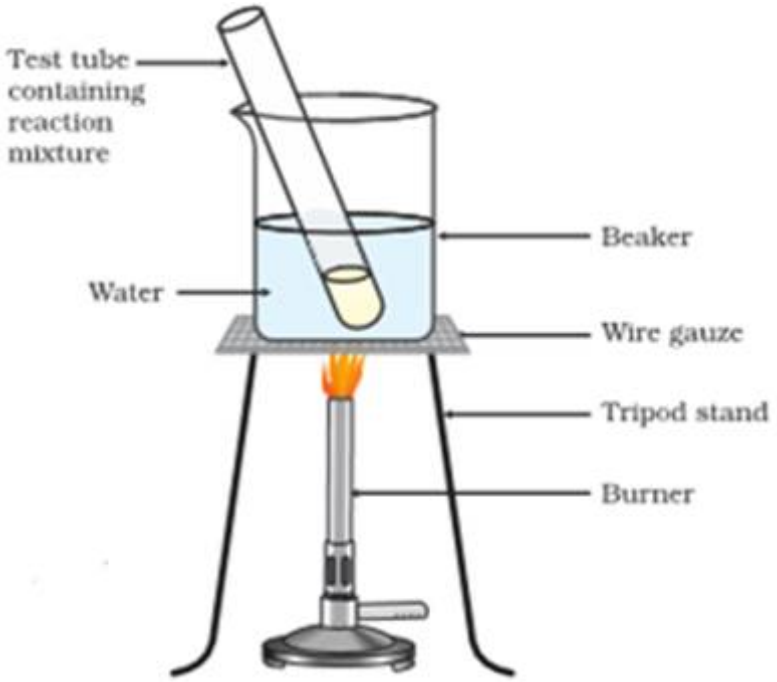
47 A. Question

Esters are sweet-smelling substances and are used in making perfumes. Describe an activity for the preparation of an ester with the help of a well labelled diagram. Write an equation for the chemical reaction involved in the formation of the ester. Also, write the names of all the substances involved in the process of esterification.

Answer

Activity:

- Take 1 mL ethanol (absolute alcohol) and 1 mL glacial acetic acid along with a few drops of concentrated sulphuric acid in a test tube.
- Warm in a water-bath for at least five minutes.
- Pour into a beaker containing 20-50 mL of water and smell the resulting mixture.
- A sweet smell is obtained indicating the formation of ester.



$$CH_3-COOH + CH_3-CH_2OH \xrightarrow{Acid} CH_3-\underset{\underset{O}{\|}}{C}-O-CH_2-CH_3$$

(Ethanoic acid) (Ethanol) (Ester)

47 B. Question

State any two uses of esters.

Answer

Uses of esters:

(i) Esters are used in making perfumes and as flavouring agents.

(ii) Esters are used as solvents for oils, fats, gums, paints and varnishes, etc.

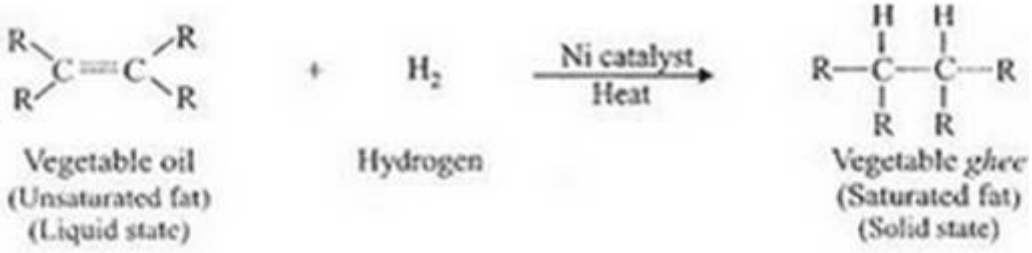
48 A. Question

Name the reaction which is usually used in the conversion of vegetable oils to fats. Explain the reaction involved in detail. Write a chemical equation to illustrate your answer.

Answer

Hydrogenation is usually used in the conversion of vegetable oils to fats.

Hydrogenation (addition of hydrogen) of vegetable oil (which are unsaturated compounds) in the presence of nickel catalyst gives ghee (saturated compounds). This process is called hydrogenation of vegetables oil and can be represented as follows.

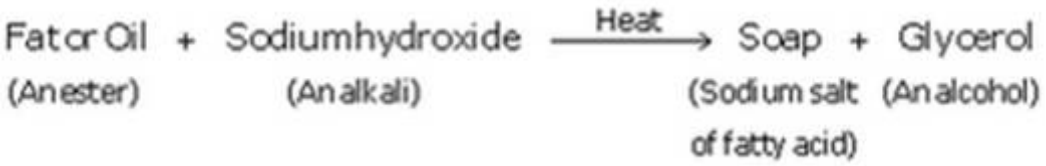


48 B. Question

What is saponification? Write the chemical equation of the reaction involved in this process. Name all the substances which take part in this process and also those which are formed.

Answer

Soaps are made from animal fat or vegetable oils by heating it with sodium hydroxide.



This process of preparation of soap by the fats and oils hydrolysis with alkali is called saponification.

48 C. Question

Why does micelle formation take place when soap is added to water? Will a micelle be formed in other solvents like ethanol also?

Answer

A soap is a sodium or potassium salt of long chain fatty acids. It has one polar end and one non-polar end. Polar end is hydrophilic in nature whereas non-polar end is hydrophobic. When soap is added to water, it forms a colloidal suspension in water in which the soap molecules cluster together to form spherical aggregates called micelles. In a soap micelle, soap molecules are arranged radially with hydrocarbon ends directed towards the centre and ionic ends directed outwards.

No, micelle will not be formed in other solvents such as ethanol.

49 A. Question

What is a soap? Name one soap.

Answer

A soap is a sodium or potassium salt of long chain fatty acids.

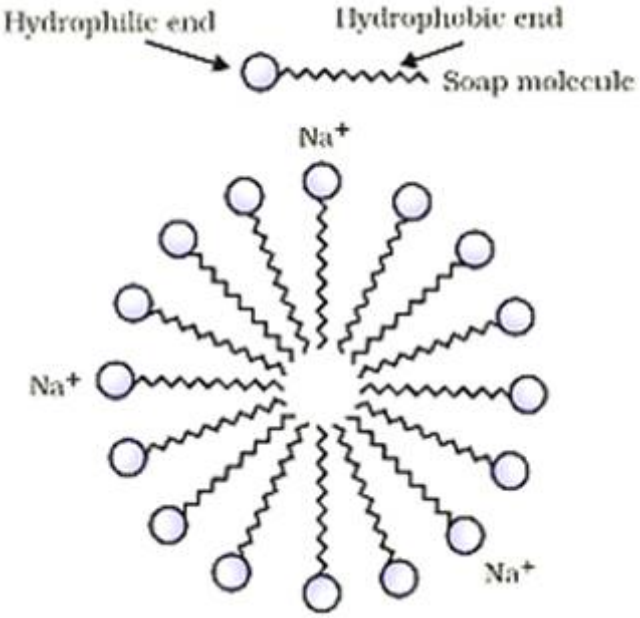
Example: Sodium stearate, $C_{17}H_{35}COO\text{-}Na+$

49 B. Question

Describe the structure of a soap molecule with the help of a diagram.

Answer

A soap molecule is made up of two parts: a long hydrocarbon part and a short ionic part containing the -COO-Na+ group. The long hydrocarbon part is hydrophobic and therefore, soluble in oil but insoluble in water. The short ionic part is hydrophilic in nature, so soluble in water but insoluble in oil.

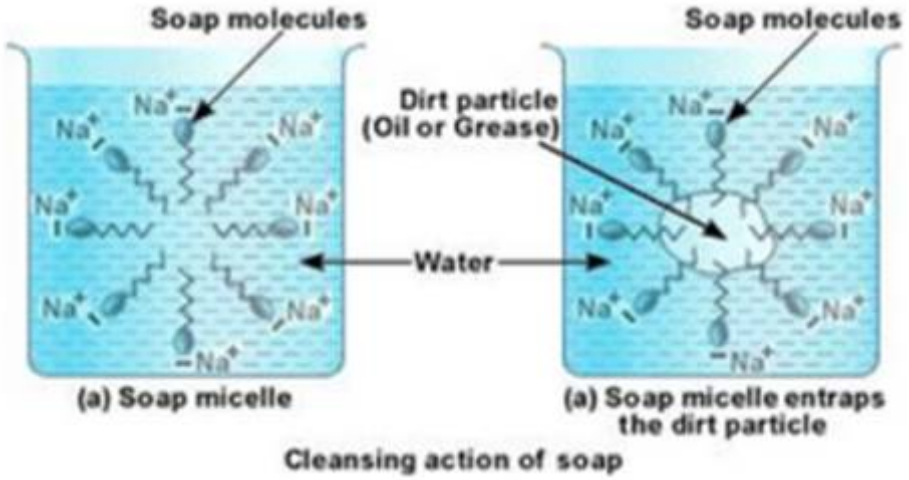


49 C. Question

Explain the cleansing action of soap. Draw diagrams to illustrate your answer.

Answer

Soaps are molecules in which the two ends have differing properties, one is hydrophilic, that is, it dissolves in water, while the other end is hydrophobic, that is, it dissolves in hydrocarbons. When soap is at the surface of water, the hydrophobic 'tail' of soap will not be soluble in water and the soap will align along the surface of water with the ionic end in water and the hydrocarbon 'tail' protruding out of water.



Inside water, these molecules have a unique orientation that keeps the hydrocarbon portion out of the water. This is achieved by forming clusters of molecules in which the hydrophobic tails are in the interior of the cluster and the ionic ends are on the surface of the cluster. This formation is called a micelle. Soap in the form of a micelle is able to clean, since the oily dirt will be collected in the centre of the micelle. The ionic ends in the micelles remain attached to water. When the dirty clothes are agitated in soap solution, the oily dirt particles entrapped by soap micelles get dispersed in water and the clothes get cleaned.

Multiple Choice Questions (MCQs)-Pg-265

50. Question

While cooking, if the bottom of the cooking utensil 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.

Answer

While cooking, if the bottom of the cooking utensil is getting blackened on the outside, it means that the fuel is not burning completely.

51. Question

When ethanol is heated with alkaline potassium permanganate solution, it gets converted into ethanoic acid. In this reaction, alkaline potassium permanganate acts as : A. reducing agent

B. oxidising agent

C. catalyst

D. dehydrating agent

Answer

An oxidising agent is one which oxidises other substances by providing oxygen or removing hydrogen. Alkaline potassium permanganate and acidified potassium dichromate can be used as oxidising agents.

52. Question

When ethanol is heated with concentrated sulphuric acid at 170 ï¿½C, it gets converted into ethene. In this reaction, concentrated sulphuric acid acts as : A. oxidising agent

B. catalyst

C. dehydrating agent

D. reducing agent

Answer

Ethene (CH2=CH2) is formed when ethanol is heated with cone. H2S04 at 170 ï¿½C. This reaction is known as dehydration.

53. Question

When a vegetable oil is treated with hydrogen in the presence of nickel (or palladium) catalyst, it forms a fat. This is an example of: A. anodizing reaction

B. substitution reaction

C. displacement reaction

D. addition reaction

Answer

The addition of hydrogen to an unsaturated hydrocarbon to obtain a saturated hydrocarbon is called hydrogenation. This reaction is commonly used in hydrogenation of vegetable oil into vegetable ghee (solid fat)

54. Question

The soap molecule has a: A. hydrophilic head and a hydrophobic tail

B. hydrophobic head and a hydrophilic tail

C. hydrophobic head and a hydrophobic tail

D. hydrophilic head and a hydrophilic tail

Answer

The soap molecule has a hydrophilic head and a hydrophobic tail.

55. Question

Chlorine reacts with saturated hydrocarbons at room temperature in the: A. absence of sunlight

B. presence of sunlight

C. absence of moisture

D. presence of H_2SO_4

Answer

Methane (CH4) reacts with chlorine in the presence of sunlight to form chloromethane and hydrogen chloride.

56. Question

In a soap micelle, the soap molecules are arranged radially with: A. ionic ends directed towards the centre and hydrocarbon ends directed outwards

B. hydrocarbon ends directed towards the centre and ionic ends directed outwards

C. both ionic ends and hydrocarbon ends directed towards the centre

D. both hydrocarbon ends and ionic ends directed outwards

Answer

In a soap micelle, the soap molecules are arranged radially with hydrocarbon ends directed towards the centre and ionic ends directed outwards.

57. Question

When ethanol reacts with sodium metal, it forms two products. These products are: A. sodium ethanaoate and oxygen

B. sodium ethanaoate and hydrogen

C. sodium ethoxide and oxygen

D. sodium ethoxide and hydrogen

Answer

When ethanol reacts with sodium, hydrogen gas is evolved.

58. Question

Vinegar is a solution of about: A. 5 to 8 per cent ethanoic acid in alcohol

B. 5 to 8 per cent ethanoic acid in water

C. 50 to 80 per cent ethanoic acid in water

D. 50 to 80 per cent ethanoic acid in alcohol

Answer

Vinegar is a solution of about 5 to 8 per cent ethanoic acid in water

59. Question

One of the following substances is not added to make denatured alcohol. This is: A. methyl alcohol

B. copper sulphate

C. chloroform

D. pyridine

Answer

Methyl alcohol, copper sulphate and pyridine are added to make denatured alcohol.

60. Question

One of the following organic compounds cannot decolourise the red-brown colour of bromine water. This compound is:

Options||A. $C_{14}H_{28}$

B. C_7H_{12}

C. C_6H_{14}

D.C_9H_{16}

Answer

Unsaturated hydrocarbons (cooking oil) decolourise the red-brown colour of bromine water whereas saturated hydrocarbons cannot decolourise.

61. Question

The substance which can produce brisk effervescence with baking soda solution is : A. ethanol

B. vegetable oil

C. vinegar

D. soap solution

Answer

: Vinegar is a solution of about 5 to 8 per cent ethanoic acid in water. It can can produce brisk effervescence with baking soda solution

62. Question

The chemical which is not required for the preparation of soap in the laboratory is: A. vegetable oil

B. baking soda

C. caustic soda

D. common salt

Answer

Following raw materials are required for making soap in a laboratory: (i) Vegetable oil (like castor oil, cottonseed oil or soyabean oil) (ii) Sodium hydroxide (caustic soda) (iii) Sodium chloride (common salt)

63. Question

Which of the following can damage optic nerve leading to blindness, if taken internally? A. CH_3COOH

B. C_2H_50H

C. $NaHCO_3$

D. CH_3OH

Answer

Methanol affects the optic nerve, causing blindness.

64. Question

The usual disease caused by the excessive drinking of alcohol over a long period of time is: A. diabetes

B. cataract

C. cirrhosis

D. arthritis

Answer

The usual disease caused by the excessive drinking of alcohol over a long period of time is cirrhosis.

65. Question

Which of the following molecular formula corresponds to ethyl butanoate ester? A. $C_5H_{10}O_2$

B. $C_6H_{12}O_2$

C. $C_7H1_40_2$

D. $C_8H_{16}O_2$

Answer

The molecular formula of ethyl butanoate ester is C6H12O2.

Questions Based on High Order Thinking Skills (HOTS)-Pg-266

66. Question

A neutral organic compound X of molecular formula C_2H_6O on oxidation with acidified potassium dichromate gives an acidic compound Y. Compound X reacts with Y on warming in the presence of cone. H_2SO_4 to give a sweet smelling substance Z. What are X, Y and Z?

Answer

X= ethanol; Y= ethanoic acid; and, Z = ethyl ethanoate

67. Question

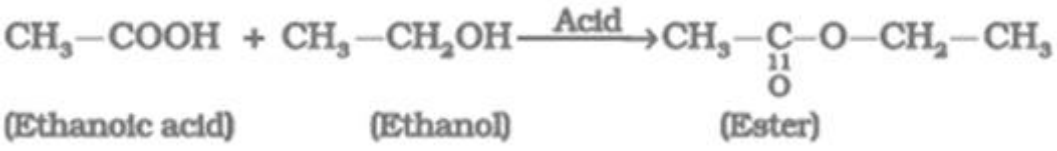
Consider the following organic compounds:

HCHO, C_2H_5OH, C_2H_6, CH_3COOH, C_2H_5Cl

Choose two compounds which can react in the presence of cone. H_2SO_4 to form an ester. Give the name and formula of the ester formed.

Answer

Ethanol (C_2H_5OH) and Ethanoic acid (CH_3COOH).



Ester: Ethyl ethanoate, $CH_3COOC_2H_5$

68. Question

A neutral organic compound is warmed with some ethanoic acid and a little of cone. H_2SO_4. Vapours having sweet smell (fruity smell) are evolved. What type of functional group is present in this organic compound?

Answer

Alcohol group (-OH) is present in the organic compound.

69. Question

The structural formula of an ester is:

Write the formula of the acid and the alcohol from which it is formed.

Answer

Carboxylic acid: CH_3COOH; Alcohol: CH_3CH_2OH

70. Question

Consider the following organic compounds:

CH_3OH, C_2HsOH, CH_3COCH_3, CH_3COOH, C_2H_5COOH, $C_4H_9COOC_2H_5$, CH_4, C_2H_6, CH_3CHO, HCHO

Out of these compounds:

(a) Which compound is most likely to be sweet-smelling?

(b) Which compound on treatment with cone. H_2SO_4 at 170 ï¿½C forms an alkene?

(c) Which compound on repeated chlorination forms chloroform?

(d) Which compound is added to alcohol to denature it?

(e) Which compound is a constituent of vinegar?

(f) Which compound is used to sterilise wounds and syringes?

Answer

(a) Ester: $C_4H_9COOC_2H_5$;

(b) Alcohol (C_2HsOH)

(c) Methane (CH_4);

(d) Methanol (CH_3OH);

(e) Acetic acid (CH_3COOH);

(f) Ethanol (C_2H_5OH)

71. Question

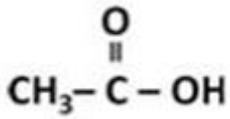
An organic acid X is a liquid, which often freezes during winter time in cold countries, having the molecular formula $C_2H_4O_2$. On warming it with methanol in the presence of a few drops of concentrated sulphuric acid, a compound Y with a sweet smell is formed.

(a) Identify X and Y. Also write their formulae showing the functional group present in them.

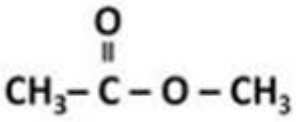
(b) Write a chemical equation for the reaction involved.

Answer

(a) X is ethanoic acid.



Y is methyl ethanoate.



(b) $CH_3COOH + CH_3OH \xrightarrow{conc.H_2SO_4} CH_3COOCH_3 + H_2O$

72. Question

An organic compound A having the molecular formula C_3H_8O is a liquid at room temperature. The organic liquid A reacts with sodium metal to evolve a gas which bums causing a little explosion. When the organic liquid A is heated with concentrated sulphuric acid at 170 ï¿½C, it forms a compound B which decolourises bromine water. The compound B adds on one molecule of hydrogen in the presence of Ni as catalyst to form compound C which gives substitution reactions with chlorine.

(a) What is compound A?

(b) What is compound B?

(c) What type of reaction occurs when A is converted into B?

(d) What is compound C?

(e) What type of reaction takes place when B is converted into C?

Answer

(a) Compound A is propanol (CH_3-CH_2-CH_2-OH)

(b) Compound B is propene (CH_3-CH=CH_2)

(c) Dehydration reaction

(d) Compound C is propane (CH_3-CH_2-CH_3)

(d) Addition reaction

73. Question

An organic compound A (molecular formula $C_2H_4O_2$) reacts with Na metal to form a compound B and evolves a gas which burns with a pop sound. Compound A on treatment with an alcohol C in the presence of a little of concentrated sulphuric acid forms a sweet-smelling compound D (molecular formula $C_3H_6O_2$). Compound D on treatment with NaOH solution gives back B and C. Identify A, B, C and D.

Answer

A is ethanoic acid (CH_3COOH) ; B is sodium ethanoate (CH_3COONa); C is methanol (CH_3OH) and D is methyl ethanoate (CH_3COOCH_3).

74. Question

Which of the following hydrocarbons can decolourise bromine water and which cannot? Why?

C_6H_{12}, C_6H_{14}, C_6H_{10}

Answer

C_6H_{12} and C_6H_{10} can decolourise bromine water as they are unsaturated hydrocarbons whereas C_6H_{14} cannot decolourise bromine water as it is a saturated hydrocarbon.

75. Question

A four carbon atoms containing neutral organic compound X reacts with sodium metal to evolve a gas which burns with a 'pop' sound. Another four carbon atoms containing carbon compound (Y) reacts with sodium hydrogencarbonate to evolve a gas which turns lime water milky. When compounds X and Y are heated together in the presence of a little of concentrated sulphuric acid, then a new compound Z is formed.

(a) What is compound X? Also write its formula.

(b) What is compound Y? Also write its formula,.

(c) What is compound Z? Also write its formula.

(d) What type of smell is given by compound Z?

(e) What is the general name of compounds like Z?

(f) What is the general name of the reaction which takes place between X and Y to form Z?

Answer

(a) X is butanol. C_4H_9OH.

(b) Compound Y is butanoic acid; C_3H_7COOH.

(c) Compound Z is butyl butanoate, $C_3H_7COOC_4H_9$

(d) Sweet smell

(e) The general name of compound Z is ester.

(f) Esterification