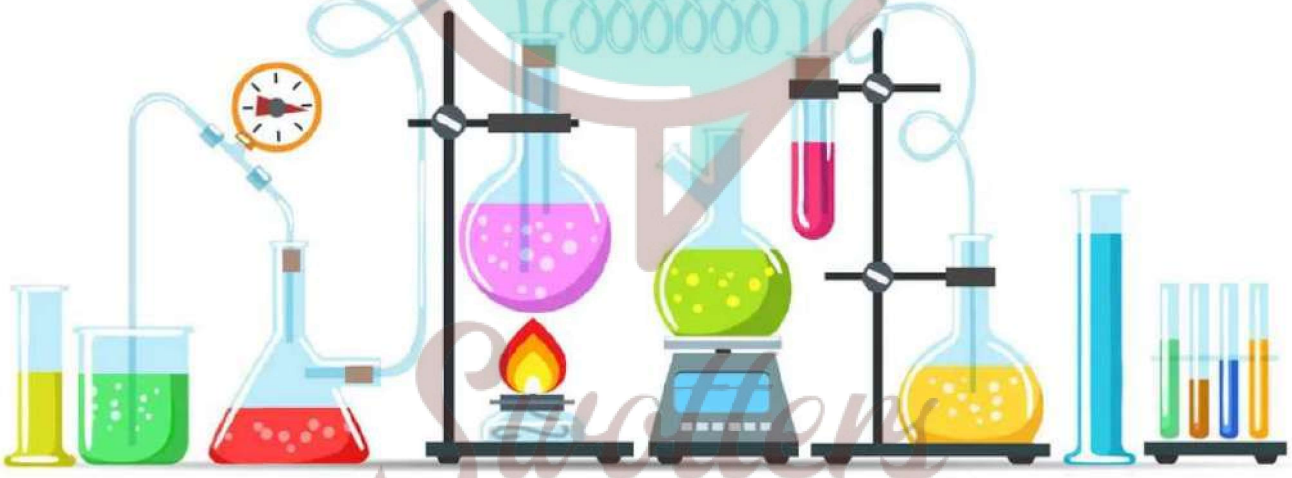
SCIENCE

(Chemistry)



Important Questions

➢ Multiple Choice Questions:

1. Which of the following statements are correct for carbon compounds?

(i) Most carbon compounds are good conductors of electricity.

(ii) Most carbon compounds are poor conductors of electricity.

(iii) Force of attraction between molecules of carbon compounds is not very strong.

(iv) Force of attraction between molecules of carbon compounds is very strong.

(a) (ii) and (iv)

(b) (ii) and (iii)

(c) (i) and (iv)

(d) (i) and (iii)

2. C_3H_8 belongs to the homologous series of

(a) Alkynes

(b) Alkenes

(c) Alkanes

(d) Cyclo alkanes

3.

The IUPAC name of $CH_3 - \underset{\displaystyle CH_3}{\overset{\displaystyle CH_3}{\overset{|}{\underset{|}{C}}}} - CH_2 - CH_3$ is

(a) 2-ethyl-2-methyl propane

(b) 2, 2-demethyl butane

(c) 1,1,1-trimethyl propane

(d) 2, 2-methyl butane

4. Which of the following is the formula of Butanoic acid?

(a) $CH_3CH_2CH_2CH_2COOH$

(b) $COOH-CH_2-CH_2-CH_2-CH_3$

(c) $CH_3 - \underset{\displaystyle COOH}{\underset{|}{CH}} - CH_2 - CH_3$

(d) $CH_2 - CH_2 - CH_2 - COOH$

5. The number of isomers of pentane is

(a) 2

(b) 3

(c) 4

(d) 5

6. Which of the following will undergo addition reactions?

(a) CH_4

(b) C_3H_8

(C) C_2H_6

(d) C_2H_4

7. When ethanoic acid is treated with NaHCO^ the gas evolved is

(a) H_2

(b) CO_2

(c) CH_4

(d) CO

8. Ethanol on complete oxidation gives

(a) acetic acid/ ethanoic acid

(b) CO_2 and water

(c) ethanal

(d) acetone/ ethanone

9. Which of the following will give a pleasant smell of ester when heated with ethanol and a small quantity of sulphuric acid?

(a) CH_3COOH

(b) CH_3CH_2OH

(c) CH_3OH

(d) CH_3CHO

10. Name the functional group present in CH_3COCH_3.

(a) Alcohol

(b) Carboxylic acid

(c) Ketone

(d) Aldehyde

➢ Very Short Question:

1. What are the essential constituents of all organic compounds?

2. What is the valency of carbon in its compounds?

3. Why are organic compounds present in such a large number?

4. Which is common in all the members of a family?

5. A family of organic compounds has the functional group 'al'. What is its name?

6. Out of ketonic and aldehydic groups, which is the terminal functional group?

7. Why is candle flame generally yellow?

8. The formula of a hydrocarbon is CnH2n. Name the family to which it belongs and also predict its nature.

9. An unknown compound has the smell of vinegar. Identify it.

10. What do we get when ethanoic acid reacts with ethanol in the presence of concentrated sulphuric acid?

➢ Short Questions:

1. Write the structures of

(i) Ethanoic acid

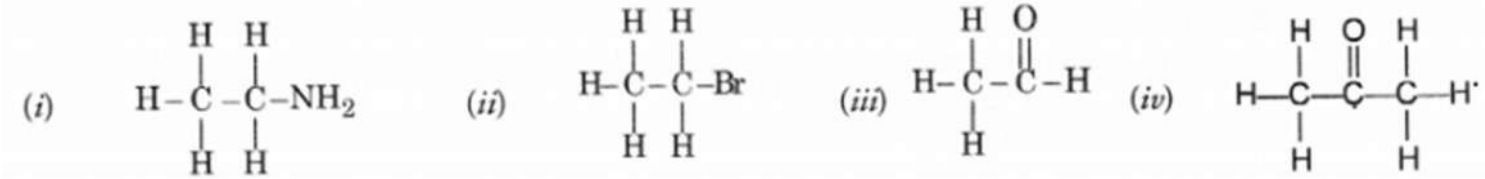
(ii) Butanone

(iii) Hexanal

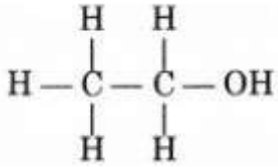
(iv) But-2-ene.

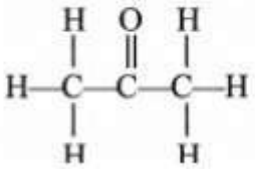
2. How will you name the following compounds?

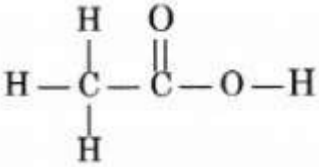
3. Identify the name of the functional groups in the following compounds.



4. Write the IUPAC names of the following compounds.

(A) 

(B) 

(C) 

5. Give the electron dot structure and structural formula of first member of alkene and alkyne families.

6. Draw the structural formulae of the possible isomers for the compound with molecular formula C_3H_6O?

7. How will you convert ethene into ethanol? Give the chemical reaction involved.

8. What is an homologous series? Which two of the following organic compounds belong to the same homologous series?

C_2H_6, C_2H_6O, $C_2H_6O_2$,

➢ Long Questions:

1. An organic compound 'A' is an essential constituent of wine and beer. Oxidation of 'A' yields an organic acid 'B' which is present in vinegar. Name the compounds 'A' and 'B' and write their structural formulae. What happens when 'A' and 'B' react in the presence of an acid catalyst? Write the chemical equation for the reaction.

2. Give a chemical test to distinguish between:

(i) Ethane and ethene

(ii) Ethanol and ethanoic acid

(iii) Soaps and detergents.

3.

(a) What are homologous series of compounds? List any two characteristics of homologous series.

(b) What would be observed by adding a 5% solution of alkaline potassium permanganate drop by drop to warm ethanol taken in a test tube?

(c) Write the name of the compound formed during the chemical reaction. How would you distinguish experimentally between an alcohol and a carboxylic acid on the basis of a chemical property?

➢ Assertion Reason Questions:

1. For question two statements are given- one labelled Assertion (A) and the other labelled Reaso (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below:

   a. Both A and R are true, and R is correct explanation of the assertion.

b. Both A and R are true, but R is not the correct explanation of the assertion.

c. A is true, but R is false.

d. A is false, but R is true.

Assertion: Diamond and graphite do not have the same crystal structure.

Reason: Diamond is crystalline while graphite is amorphous.

2. For question two statements are given- one labelled Assertion (A) and the other labelled Reaso (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below:

a. Both A and R are true, and R is correct explanation of the assertion.

b. Both A and R are true, but R is not the correct explanation of the assertion.

c. A is true, but R is false.

d. A is false, but R is true.

Assertion: Olefins have the general formula C_nH_{2n+1}.

Reason: There is at least one double bond between two carbon atoms in their molecules.

➢ Case study Question:

1. Read the following and answer any four questions from (i) to (v).

A hydrocarbon (P) has the molecular formula $C_{10}H_{22}$ hydrocarbon (Q) has two carbon atoms less th (P) and belong to the same homologous series. A hydrocarbon (R) has two carbon atoms more tha (P) and belong to the same homologous series.

i. What is the molecular formula of (Q)?

a. $C_{12}H_{26}$

b. C_8H_{16}

c. C_8H_{18}

d. C_8H_{14}

ii. To which homologous series do the compound (P), (Q) and (R) belong?

a. C_nH_{2n}

b. C_2H_{2n-2}

c. C_nH_{2n+2}

d. C_nH_{2n+1}

iii. What is the molecular formula of (R)?

a. $C_{12}H_{26}$

b. $C_{12}H_{24}$

c. $C_{12}H_{22}$

d. $C_{12}H_{28}$

iv. Identify the correct statement about compounds (P), (Q) and (R).

a. They have same melting and boiling points.

b. They have same chemical properties.

c. They have different general formula.

d. They differ by -CH unit.

v. Compounds (P), (Q) and (R) are:

a. Alkanes.

b. Alkenes.

c. Alkynes.

d. None of these.

2. Read the following and answer any four questions from (i) to (v).

The table given below shows six organic compounds A, B, C, D, E and F having different molecular formula:

Organic compound	Molecular formula
A	C_7H_{16}
B	C_8H_{16}
C	C_4H_6
D	C_6H_{10}
E	C_5H_{10}
F	C_9H_{20}

i. Which of the following compounds belong to same homologous series?

a. E and F

b. B and C

c. A and B

d. C and D

ii. Which of the following is the member of the same homologous series as E?

a. D

b. A

c. F

d. B

iii. Identify the correct statements.

a. A and Fare saturated hydrocarbons while all others are unsaturated hydrocarbons.

b. C and D belong to a homologous series having general formula C_nH_{2n}.

c. B and E are alkynes.

d. All the compounds have same physical and chemical properties.

iv. Compound B is:

a. An alkane.

b. An alkene.

c. An alkyne.

d. None of these.

v. Compound (F) has a general formula:

a. C_nH_{2n-2}

b. C_nH_{2n}

c. C_nH_{2n+4}

d. C_nH_{2n+2}

Answer Key-

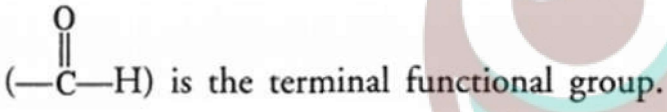
➢ Multiple Choice Answers:

1. (b) (ii) and (iii)
2. (c) Alkanes
3. (b) 2, 2-demethyl butane
4. (d)
5. (b) 3
6. (d) C_2H_4
7. (b) CO_2

8. (b) CO_2 and water
9. (a) CH_3COOH
10. (c) Ketone

➢ Very Short Answers:

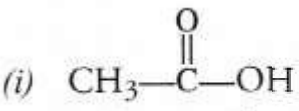
1. Answer: Carbon and hydrogen are the essential constituents of all organic compounds. However, carbon tetrachloride (CCl_4) is an exception.
2. Answer: Carbon is tetravalent in its compounds.
3. Answer: This is due to the self-linking property of carbon known as catenation.
4. Answer: They have the common functional group.
5. Answer: The family is of aldehydes also called alkanals.
6. Answer: Aldehydic group

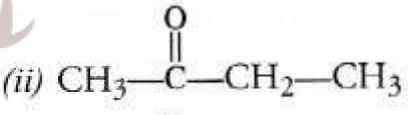


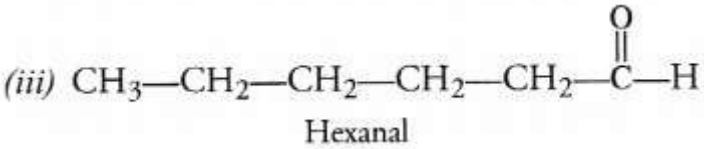
7. Answer: Candle flame is generally yellow due to the presence of unburnt carbon particles. When light falls on these particles, they scatter yellow colour. This shows that the combustion of hydrocarbons present in wax or candle is not complete.
8. Answer: The hydrocarbon belongs to alkene family. It is unsaturated in nature.
9. Answer: The compound is ethanoic acid also called acetic acid.
10. Answer: Ethyl ethanoate ($CH_3COOC_2H_5$) is formed by esterification reaction. It has fruity smell.

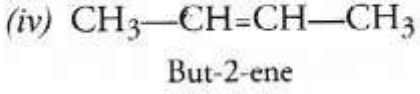
➢ Short Answer:

1. Answer:









2. Answer:
   (a) Ethanal
   (b) Ethanol
   (c) Methanal

(d) Chloroethane.

3. Answer:

(i) $-NH_2$ (amino) (ii) —Br (bromo)

(iii)  (al) (iv)  (one)

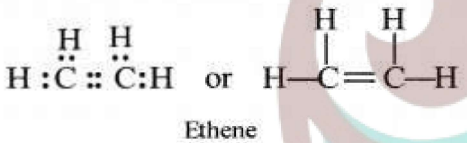
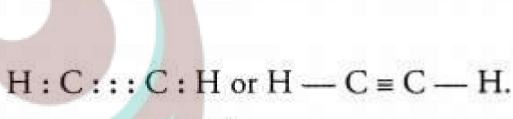
4. Answer:

(A) Ethanol

(B) Propanone

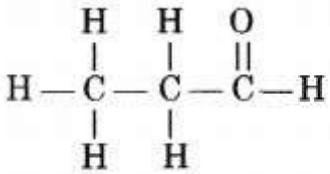
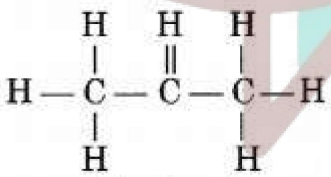
(C) Ethanoic acid.

5. Answer:

(i)  Ethene (ii)  Ethyne

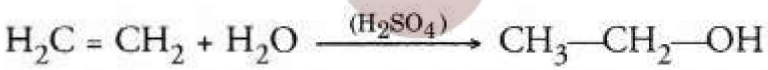
6. Answer:

The given organic compounds represents two structural isomers which are actually functional isomers in nature.

 Propanal  Propanone

7. Answer:

Ethene is converted into ethanol by passing its vapours through water in the presence of sulphuric acid. This reaction is called hydration of ethene.



8. Answer:

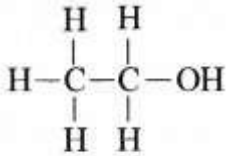
Homologous series represent different families of organic compounds into which these are divided
Two characteristics of homologous series are listed.
The compounds CH_4O and C_2H_6O belong to the same homologous series known as alkanols.

➢ Long Answer:

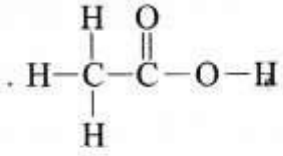
1. Answer:

The available information suggests that the compound 'A' is ethanol and the compound 'B'

formed by the oxidation of 'A' is ethanoic acid. Their structural formulae are:

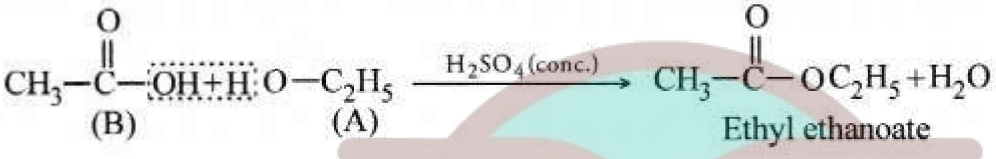


Ethanol (A)



Ethanoic acid (B)

When 'A' and 'B' react in the presence of an acid like cone. H2SO4, the compound is ethyl ethanoate (ester) with a pleasant smell.



(B) (A) Ethyl ethanoate

2. Answer:

(i) Ethene decolorizes the yellow colour of bromine water while ethane does not.

(ii) Ethanoic acid gives a brisk effervescence with sodium hydrogen carbonate while ethanol does not.

(iii) Soaps form curdy white precipitate or scum with hard water while detergents do not form any precipitate.

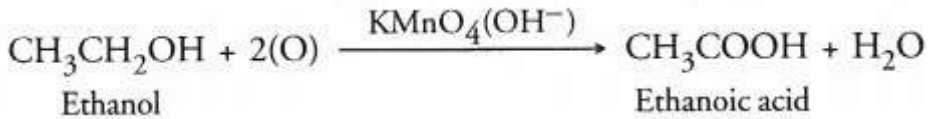
3. Answer:

(a) Homologous series represent different families of organic compounds into which these are divided. Two characteristics of homologous series are listed.

- All the members in a particular homologous series of family have the same characteristic functional group. For example, in organic acids, the functional group is carboxyl group (—COOH).
- Any two consecutive members in a particular family have the same common difference of CH_2 in their molecular formulae. For example, the first three members of the family of alkanes are: CH_4 (methane), C_2H_6 (ethane) and propane (C_3H_8).

(b) On adding a 5% solution of alkaline potassium permanganate to ethanol, it will be oxidized to ethanoic acid.

The pink colour of the solution will get discharged upon warming.



Ethanol Ethanoic acid

(c) A carboxylic acid gives a brisk effervescence when an aqueous solution of sodium hydrogen carbonate ($NaHCO_3$) is added to it. This is due to the evolution of CO_2 gas. However, alcohol will not give any reaction.

$$ROOH + NaHCO_3 \longrightarrow RCOONa + H_2O + CO_2$$

Carboxylic acid — Sod. salt

➢ Assertion Reason Answer:

1. (c) A is true, but R is false.

Explanation:

In diamond, C-atoms are sp^3 hybridized while in graphite, they are sp^2 hybridized. Diamond and graphite both are crystalline forms of carbon.

2. (d) A is false, but R is true.

Explanation:

Olefins are unsaturated hydrocarbons. There is at least one double bond between two carbon atoms in their molecules and they have the general formula C_nH_{2n}.

➢ Case Study Answer:

1. i (c) C_8H_{18}

Explanation:

Molecular formula of (Q) is C_8H_{18} as it has two carbon atoms less than (P).

ii. (c) C_nH_{2n+2}

Explanation:

Compounds (P), (Q) and (R) are alkanes having general formula C_nH_{2n+2}.

iii. (a) $C_{12}H_{26}$

Explanation:

Molecular formula of (R) is $C_{12}H_{26}$ as it has two carbon atoms more than (P).

iv. (b) They have same chemical properties.

Explanation:

Compound (P), (Q) and (R) belong to same homologous series So they have different physica properties but similar chemical properties. They have same general formula C_nH_{2n+2}. They differ by 2 carbon atoms and 4 hydrogen atoms.

v. (a) Alkanes.

2. i (d) C and D

Explanation:

A and Fare alkanes; B and E are alkenes; C and Dare alkynes.

ii. (d) B

Explanation:

B is an alkene having general formula C_nH_{2n} the homologous series to which E belongs.

iii. (a) A and Fare saturated hydrocarbons while all others are unsaturated hydrocarbons.

Explanation:

C and D belong to a homologous series having general formula C_nH_{2n-2} B and E are alkenes. A the compounds have different physical and chemical properties.

iv. (b) An alkene.

Explanation:

(B) is alkene.

v. (d) C_nH_{2n+2}

Explanation:

(F) is an alkane.