

CHEMISTRY

BOOKS - ZEN CHEMISTRY (KANNADA ENGLISH)

CARBON AND ITS COMPOUNDS

Question Section In Text Questions

1. What would be the electron-dot structure of carbon dioxide which has the formula of CO_2 ?



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2. What would be the electron-dot structure of a molecule of sulphur which is made up of eight atoms of sulphur?

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3. Calculate the difference in the formulae and molecular masses for

(a) CH_3OH and C_2H_5OH

(b) C_2H_5OH and C_3H_7OH and

(c) C_3H_7OH and C_4H_9OH

- Is there any similarity in these three ?
- Arrange these alcohols in the order of increasing carbon atoms to get a family . Can we call this family a homologous series ?



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4. How many structural isomers can you draw for pentane ?



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5. What are the two properties of carbon which leads which lead to the huge number of carbon compounds we see around us?



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6. What is the formula and the electron-dot structure of cyclopentane?

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7. Draw the structures for the following compounds .

(i) Ethanoic (ii) Bromopentane

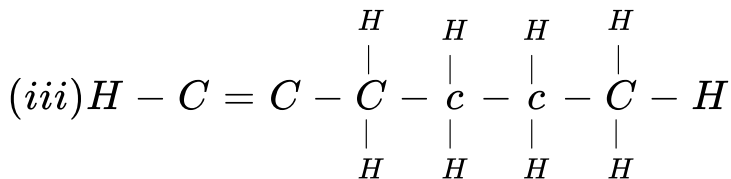
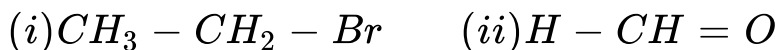
(iii) Butanone (iv) Hexanal

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8. Are structure isomers possible for bromopentane?

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9. How would you name the following compounds ?



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

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

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12. How do you distinguish experimentally between an alcohol and a carboxylic acid ?

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13. What are oxidizing agents ?

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14. Would you be able to check if water is hard using a detergent ?

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15. People use a variety of methods to wash clothes . Usually after adding the soap, they beat the clothes on a stone, or beat them with a paddle , scrub with a brush , or the mixture is agitated in a washing machine . Why is agitation necessary to get clean clothes?

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Question Section Textual Exercise

1. Ethane with the molecular formula C_2H_6 has

A. 6 covalent bonds

B. 7 covalent bonds

C. 8 covalent bonds

D. 9 covalent bonds

Answer:



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2. Butanone is a four-carbon compound with the functional group

A. Carboxylic acid

B. aldehyde

C. ketone

D. alcohol

Answer:



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

- A. food is not cooked completely
- B. the fuel is not burning completely
- C. fuel is wet
- D. fuel is burning completely

Answer:



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4. Explain the nature of covalent bond using the bond formation in CH_3Cl



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5. Draw the electron-dot structure for

(i) Ethanoic acid (ii) H_2S (iii) propanone (iv) F_2



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6. What is a homologous series? Explain with an example .



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7. How can ethanol and ethanoic acid be differentiated on the basis of their physical and chemical properties?

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8. Why does micelle formation take place when soap is added to water? Is a micelle formed in other solvents such as ethanol also?

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



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



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11. What change do you observe if you test soap with litmus paper?



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12. What is hydrogenation ? What is its industrial application ?



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13. Which of the following hydrocarbons undergo addition reaction ?

C_2H_6 , C_3H_8 , C_3H_6 , C_2H_2 and CH_4



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14. Give a test to differentiate chemically between butter and vegetable oil .



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15. Explain the mechanism of cleaning action of soap.



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Zee Additional Questions Section Multiple Choice Questions

1. The atomic numbers of four elements A,B,C and D are 6,10,12 and 17 respectively. Which two elements combine to form a covalent compound ?

A. A and D

B. A and C

C. B and D

D. C and D

Answer: A

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2. A covalent molecule having a triple bond between its atoms is :

- A. oxygen
- B. hydrogen
- C. nitrogen
- D. sulphur

Answer: C

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3. Which of the following has double bonds ?

- A. Ethane and oxygen
- B. nitrogen and ethane
- C. oxygen and methane
- D. ethene and carbon dioxide

Answer: D



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4. The first organic compound synthesized by Wohler was:

- A. urea

B. glucose

C. uric acid

D. vinegar

Answer: A



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5. The pair of elements which shows catenation is

A. silicon and sodium

B. carbon and sulphur

C. carbon and chlorine

D. silicon and sodium

Answer: B



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6. The allotrope of carbon which is a good electrical conductor:

A. diamond

B. coal

C. fullerene

D. graphite

Answer: D



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7. Buckminster fullerene has carbon atoms .

A. 55

B. 65

C. 60

D. 70

Answer: C



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8. Isomerism is possible if a hydrocarbon has _____ or more carbon atoms.

A. 3

B. 4

C. 2

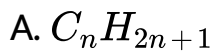
D. 1

Answer: B



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9. The general formula of saturated hydrocarbons is

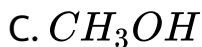
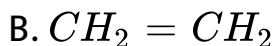
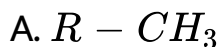




Answer: B

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10. Which of the following compounds is not a hydrocarbon ?

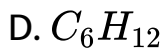
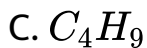
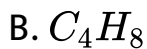
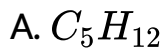


Answer: C



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11. The next homologue of C_5H_{10} is

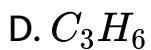
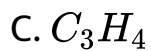
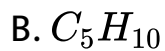
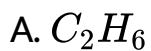


Answer: D



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12. An alkyne among the following is



Answer: C



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13. The possible isomers for pentane are

A. 3

B. 4

C. 2

D. 6

Answer: A

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14. Butanal is organic compound with the functional group

A. alcohol

B. ketone

C. aldehyde

D. ester

Answer: C



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15. The hydrocarbon 2-methylpropane is an isomer of

A. n-butane

B. isobutane

C. n-propane

D. pentane

Answer: B



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16. How many hydrogen atoms are present in a hydrocarbon with 50 carbon atoms and one triple bond in it ?

A. 50

B. 100

C. 102

D. 98

Answer: D



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17. The number of carbon atoms present in the sixth member of alkenes is

A. six

B. five

C. seven

D. four

Answer: C



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

- A. 5 covalent bonds
- B. 12 covalent bonds
- C. 16 covalent bonds
- D. 17 covalent bonds

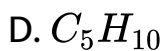
Answer: D



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19. The hydrocarbon that burns with a clean flame is

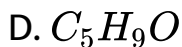
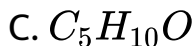
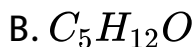
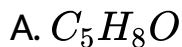
- A. C_4H_{10}
- B. C_3H_6
- C. C_4H_8



Answer: A

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20. Which of the compounds has an aldehyde group ?



Answer: C

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21. In which of the following compounds is -OH the functional group ?

A. Butanone

B. Butanol

C. butanoic acid

D. butanal

Answer: B



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22. Propanone is an organic compound with functional group as

A. $-CHO$

B. $-CO$

C. $-OH$

D. $-COOH$

Answer: B



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23. Vinegar is a solution of

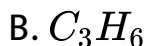
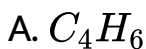
- A. 50% - acetic acid in alcohol
- B. 5% - acetic acid in alcohol
- C. 5% - 8% acetic acid in water
- D. 50% - 60% acetic acid in water

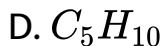
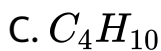
Answer: C



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24. Which of the following doesn't undergo a substitution reaction ?





Answer: C

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

A. Helium

B. neon

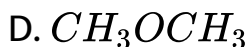
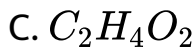
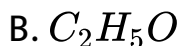
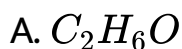
C. argon

D. Krypton

Answer: B

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26. The compound which gives effervescence with baking soda solution is



Answer: B



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27. Which of the following mixed with ethanol to denature it ?

A. oxygen

B. methane

C. acetone

D. methanol

Answer: D



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28. An example for detergent is

A. sodium lauryl sulphate

B. sodium palmate

C. Potassium stearate

D. sodium linoleate

Answer: A



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29. Commercially available ethanol is known as

A. adulterated spirit

B. rectified spirit

C. absolute alcohol

D. denatured alcohol

Answer: B



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30. The damage of the optic nerve, leading to blindness, is caused when.....is consumed.

A. ethanol

B. methanal

C. methanol

D. ethanoic acid

Answer: C



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31. The disease caused when ethanol is consumed for a longer period of time.

A. diabetes

B. cirrhosis

C. cataract

D. arthritis

Answer: A



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32. The presence of which ion makes water hard?

A. sodium

B. calcium

C. potassium

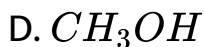
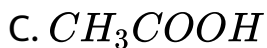
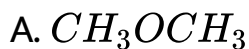
D. sulphate

Answer: B



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33. Which among the following has a sweet smell ?



Answer: C



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34. Conversion of vegetable oil into ghee is an example for

A. oxidation reaction

B. substitution reaction

C. reduction reaction

D. displacement reaction

Answer: C



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35. An example for saturated hydrocarbon is

A. C_2H_6

B. C_3H_4

C. C_2H_2

D. C_2H_4

Answer: A



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36. The molecular formula of three carbon compounds which are in homologous series are C_2H_6 , C_3H_8 , C_4H_{10} .

The suitable general formula for these compounds is



Answer: D



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37. The functional groups present in propanol and propanal respectively are

- A. $-OH$ and $-CHO$
- B. $-OH$ and $-COOH$
- C. $-CHO$ and $-COOH$
- D. $-CHO$ and $-CO$

Answer: A



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Zee Additional Questions Section Very Short Answer Vsa Type Questions

1. Draw the electron-dot structure of a methane molecule,

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2. Why does carbon atom exhibit the property of catenation and form a large number of compounds with other elements ?

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3. Which element exhibits the property of catenation ?
Why ?

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4. Name an element other than carbon, which exhibits catenation up to 7-8 atoms. Are these compounds stable ?

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5. Name the first member of alkynes and write its molecular formula.

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6. What do you mean by functional groups ? Given examples.

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7. Write the formula of the following groups :

(a) aldehyde (b) ketone

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8. Write the names of the next homologue of CH_3CH_2OH and $HCOOH$.

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9. The molecular formula of A is $C_{10}H_{18}$ and B is $C_{18}H_{36}$.

Name the homologous series to which they belong .

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10. Why is it not possible to have isomers of methane, ethane, propane?

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11. Write the molecular formula of benzene and state the number of double bonds in its structure.

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12. Draw the electron-dot structure of CH_3Cl .

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13. Write the name and the structure of an aldehyde with four carbon atoms in its molecule

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14. Give the name and structure of the simplest ketone .

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15. Give the IUPAC name of $C_2H_5COCH_3$.

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16. What would be the structure of ethanoic acid which had the formula CH_3COOH

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17. The formula of citric acid is shown below:



State the name of the functional group in citric acid .

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18. Identify the functional group in pentanone

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19. Alkanes generally burn with a clean flame . Why?

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20. Name the gases that are burnt as a mixture for welding..

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21. What is esterification?

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22. Intake of small amount of methanol can be fatal.

Comment .

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23. What type of bond is present in F_2 molecule ?

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24. Select saturated hydrocarbon from the following .

C_3H_6 , C_5H_{10} , C_4H_{10} , C_2H_4 , C_6H_{14}

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25. State the valency of each carbon atoms in

(1) an alkane (2) alkyne .

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26. Write the name and formula of second member of the carbon compounds having functional group - OH.

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27. Write the molecular formula of alcohol which can be derived from butane.

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28. Write the name and structure of an alcohol with three Carbon atoms in its molecule.

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29. What is meant by covalent bond ?

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30. State the part of the soap molecule that attaches itself to dirt when soap is dissolved in water

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31. Name the ions whose presence makes the water hard.

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32. Draw the electrons dot structure of an alkane having molecular formula C_6H_{14} .

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33. Carbon tetrachloride is not a good conductor of electricity give reason to justify your answer . .

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34. What happens when a small piece of sodium is dropped into ethanol ?

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35. Write the name the following functional group

$-OH$

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36. Name the process of converting vegetable oil to vegetable ghee.

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37. Write the formula of functional group

(a) alcohol (b) aldehyde .

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38. Name the functional group present in

(a) CH_3CHO (b) C_2H_5COOH

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39. Write the molecular formula and structure formula of an alkene having five carbon atoms.

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Zee Additional Questions Section Short Answer Sa Type Questions

1. Carbon is a versatile element. Justify.

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2. Carbon (group 14), an element in the periodic table , forms compound with many elements . Write the example of a compound formed with

(a) chlorine (group 17) (b) oxygen (group 16)

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3. In the electron-dot structure, the valence-shell electrons are represented by crosses or dots.

(a) The atomic number of chlorine is 17. Write its electronic configuration .

(b) Draw the electron-dot structure of a chlorine molecule.

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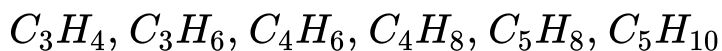
4. The general formula of two specific groups of saturated and unsaturated hydrocarbons is C_nH_{2n} . Write the structure of the number of each group when $n = 3$.

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5. Write the molecular, electron-dot , and structural formula of ethyne.

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6. Classify the following into two homologous series and name them.



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7. C_3H_6 , C_4H_8 and C_5H_{10} belong to the same homologous series .

a] Why is the melting point of CH higher than C,H,?

b] Arrange these hydrocarbons in order of their increasing boiling point

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8. An aldehyde and a ketone can be represented by the same molecular formula, say C_3H_6O . Write their structures and name them. State the relation between the two in the language of science.

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9. Unsaturated hydrocarbons contain multiple bonds between the two carbon atoms and show addition

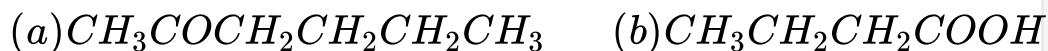
reactions. Give the test to distinguish ethane from ethene.

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10. How do you differentiate between saturated and unsaturated hydrocarbons with the help of combustion reactions?

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11. Name the functional groups present in the following compounds:





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12. How can you convert methane into chloroform by a substitution reaction? Explain with the help of a chemical equation.



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13. What happens when

a) ethanol is burnt in air and

b) ethanol is oxidized? Write the corresponding equations.



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14. What do you observe when you drop a piece of sodium into ethanol? Name the gas evolved. How do you test this gas? Write the chemical equation for the reaction.

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15. How is glacial acetic acid different from acetic acid given in a lab? Write its one characteristic which gave it its name.

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16. What is saponification?

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17. List out any two problems that arise due to use of detergents instead of soaps.

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18. Why are detergents better cleansing agents than soaps? Explain.

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19. Explain substitution reaction in hydrocarbons with an example.

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20. Differentiate between addition reaction and substitution reaction.

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21. What is structural isomerism? Draw isomers of pentane.

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22. Draw the structure of the following compounds and identify the functional group present in them.

(i) Butanoic acid (ii) Bromopropane (iii) Butyne



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23. Write the molecular formula and electron dot structure of

a] Ethane

b] Ethyne



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24. List two differences between saturated and unsaturated hydrocarbons.



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25. State any three physical properties of carbon compounds.

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26. State the reason why carbon forms a covalent compound and not C^{4+} and C^{-4} . Also give reasons why covalent compounds are bad conductors of electricity and have low melting and low boiling points.

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27. Give the structural difference between saturated and unsaturated hydrocarbons with an example each.



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28. Differentiate between saturated and unsaturated hydrocarbons giving one example each .



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29. Write the number of covalent bonds in the molecule of ethane, propane, and butane.



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30. The general formula of three compounds A,B and C is C_nH_{2n} , B has the highest boiling point , and C has the

lowest boiling point .

(a) Mention the type of compounds A,B and C .

(b) Which of them has the minimum number of carbon atoms?

(c) Name the homologous series to which they belong.

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31. Name the functional group present in each of the following compounds:

(a) $HCOOH$

(b) C_2H_5CHO

(c) CH_3COCH_3

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32. Write the molecular formula of two consecutive members of the homologous series of aldehydes. State which parts of these. Compounds determine their physical and chemical properties.

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33. State the meaning of a functional group in a carbon compound. Write the functional group present in ethanol and ethanoic acid and also draw their structures.

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34. Define a homologous series of carbon compounds, List any two characteristics of a homologous series.

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35. Draw the possible isomers of the compound with molecular formula C_3H_6O and also give their dot structures.

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36. Draw the structure of benzene and cyclohexane. Which one is a saturated hydrocarbon ?

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37. What are structural isomers ? Draw two structural isomers of butane.

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38. What are structural isomers? Name the first member of alkanes that show structural isomerism.

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39. Which category of compounds is formed when one hydrogen atom of an alkane molecule is replaced by a hydroxyl group ? Name the functional groups in the

following compounds:

(a) $RCOOH$ (b) $RCOOR$

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40. (a) Which of the following burn with a yellow flame:

C_2H_5OH , C_2H_4 , or C_2H_6 ?

(b) Write a balanced chemical equation to show the burning of ethanol in oxygen .

(c) Name an oxidizing agents which can convert ethanol into ethanoic acid.

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41. An organic compound A on heating with concentrated sulphuric acid forms a compound B which on addition of the mole of hydrogen in presence of Ni forms a compound C. One mole of compound C on combustion forms two moles of CO_2 and 3 moles of H_2O . Identify the compounds A, B and C.



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42. A cyclic compound 'X' has the molecular formula CH . It is an unsaturated compound and burns with a sooty flame. Identify 'X' and write its structural formula. Is 'X' more reactive than its saturated homologue and if so, why?



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43. Two carbon compounds A and B have the molecular formula CH_2 and C_2H_4 , respectively. Which one of the two is most likely to show addition reaction? Justify your answer. Explain with the help of a chemical equation how an addition reaction is useful in the vegetable-ghee industry.



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44. Ethyl ethanoate smells like pears and is used for flavouring sweets.

a] Write the chemical formula of ethyl ethanoate.

b] Write the chemical reaction between ethanol and

ethanoic acid in the presence of sulphuric acid.

c] Suggest the function of sulphuric acid in the reaction.

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45. How do you bring about the following conversions:

a] Ethanol to ethene.

b] Ethanol to ethanoic acid.

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46. How can ethanol be converted into ethanoic acid?

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47. Why do detergents remain effective for washing clothes whereas with soaps foam is formed with difficulty?

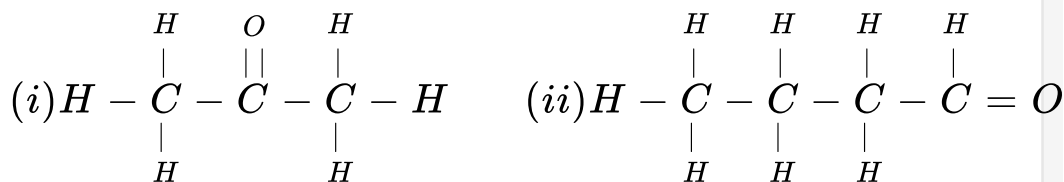
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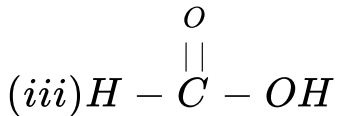
48. What is covalent bond? What type of bond exists in the following?

i] CCl_4 *ii]* $CaCl_2$ *iii]* CH_4 *iv]* NH_3 .

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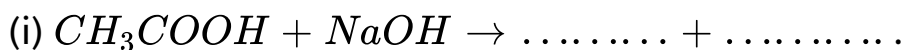
49. Name the following compound :





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50. Complete the following reaction and the main product formed in each case:



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51. Name the compound formed where ethanol is heated in excess of concentrated sulphuric acid at 443 K. Also write the chemical equation of the reaction stating the

role of concentrated sulphuric acid in it. What would happen if hydrogen is added to the product of this reaction in the presence of a catalyst such as potassium or nickel?

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52. i) Name the property of ethanol which makes it useful in medicines,

ii) Name the organic compound which is used in pickles. Mention its composition.

iii) Mention any two uses of alcohol in medicine.

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53. Write the structural formula and IUPAC name of the following

i) A carboxylic acid with 4 carbon atoms

ii) An alkyne with three carbon atoms

iii) An alcohol having one carbon atom



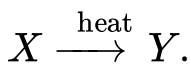
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54. X' is a compound used in cough syrups and in many tonics. It is soluble in H_2O

i) Name the compound X. Write its chemical formula.

ii) Which gas is evolved when compound X reacts with Sodium? How will you test the chemical equation involved in the reaction of X with sodium.

iii) Complete the following equation for X and identify Y.



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55. Some esters are added to food items for special smells. An ester can be made from ethanol and ethanoic acid

i] Name the ester obtained in the reaction that takes place in the presence of concentrated sulphuric acid.

Write the chemical equation.

ii] Name the process.



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56. Explain the addition and substitution reaction with the help of examples. C_2H_6 undergoes substitution reaction but not addition reaction. Why?

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Zee Additional Questions Section Long Answer La Type Questions

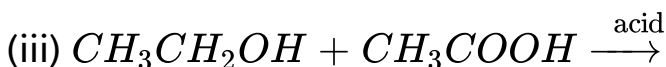
1. An organic compound A of molecular formula C_2H_4 on reduction gives another compound B of molecular formula C_2H_6 . B on chlorination in the presence of sunlight gives C of molecular formula C_2H_4Cl .

a) Name the compounds A, B, and C.

b] Write the equation for the conversion of A to B and name the type of the reaction.

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2. a] Complete the following reactions:



b] Define an oxidizing agent. Explain its role in the oxidation of alcohol into acids.

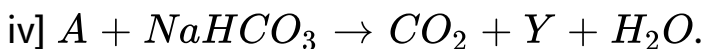
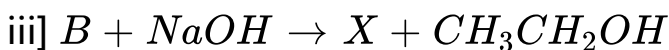
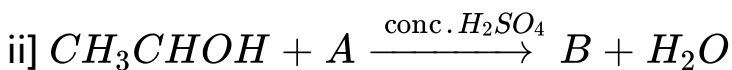
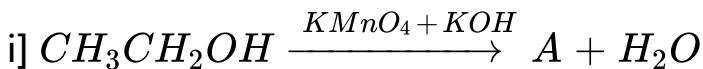
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3. A gas is evolved when sodium carbonate reacts with propanoic acid. Write the balanced chemical equation between the two given reactants. Show the acidic nature of propanoic acid by any two methods.

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4. a] Write the chemical name of absolute alcohol.

b] Identify A, B, X, and Y in the reaction sequence:



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5. Give reasons:

- a) Pure ethanoic acid is known as glacial acetic acid.
- b) Ethanol is used as an antifreeze in car batteries.
- c) Ethanol mixed with methanol is known as denatured alcohol.
- d) Oxyacetylene flame is used for welding.
- e) Gasoline is used as a fuel in western countries.

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6. A compound X is formed by the reaction of a carboxylic acid $C_2H_4O_2$ and an alcohol in the presence of a few drops of sulphuric acid. The alcohol on oxidation with

alkaline potassium permanganate followed by acidification gives the same carboxylic acid as used in this reaction. Give the names and structures of the

a) carboxylic acid

b alcohol and

c) the compound X. Also write the reaction.



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7. A compound C [molecular formula $C_2H_4O_2$] reacts with Na. metal to form a compound R and evolves a gas which burns with pop sound. Compound C on treatment with alcohol A in the presence of an acid forms a sweet-smelling compound S [molecular formula $C_3H_6O_2$]. On addition of NaOH to C, it also gives R and water. S on

treatment with NaOH solution gives back Rand A.

Identify C, R, A, and S and write the reactions involved.

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8. State the reason why carbon forms a covalent compound and not C^{4+} and C^{-4} . Also give reasons why covalent compounds are bad conductors of electricity and have low melting and low boiling points.

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9. Define structural isomer and draw the isomeric structures of butane. Compare the structure of benzene and cyclohexane, by drawing them.



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10. Describe the addition reaction of carbon compounds with its application. State the functions of catalyst in this reaction. How this reaction is different from a substitution reaction? Explain with example.



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11. i] Give a chemical test to distinguish between saturated and unsaturated hydrocarbon.

ii] Name the product formed when ethane burns in air.

Write the balanced chemical equation for the reaction showing the types of energies liberated.

iii] Why is the reaction between methane and chlorine in the presence of sunlight considered a substitution reaction?

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Activity

1. take some carbon compounds (naphthalene , camphor , alcohol) one by one on a spatula and burn them

* observe the nature of the flame and note whether smoke is produced

* place a metal plate above the flame . Is there a deposition on the plate in case of any of the compounds ?

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2. Light a Bunsen burner and adjust the air hole at the base to get different types of flames / presence of smoke

when do you get yellow sooty flame ?

when do you get a blue flame ?



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