

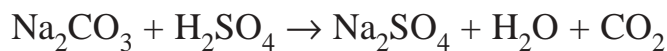
7. CARBON COMPOUNDS

SHORT ANSWER QUESTIONS

(2 MARKS)

1. How is CO_2 prepared in the Laboratory from carbonates?

A. CO_2 is prepared in the laboratory by the action of acids on carbonates or bicarbonates.



2. Mention three uses of carbon dioxide

A. Carbon dioxide is used in

- The preparation of Soda water, cool drinks, (aerated water) etc.,
- The manufacture of washing soda, and Na_2CO_3 .
- Fire extinguishment.

3. Write physical properties of carbondioxide?

A. **Physical properties:**

- It is a colourless gas with faint pungent odour and slight acidic taste.
- It is heavier than air
- It is soluble in water
- carbon dioxide is not poisonous, but it does not support life. Its harmful effects to the life are due to suffocation.

4. What is catenation?

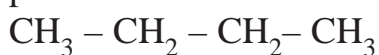
A. Catenation: catenation is the phenomenon in which atoms of same element join together to form long chains.

carbon exhibits maximum catenation because of strong carbon – carbon bonds and tetravalence. Due to catenation, carbon atoms can form various types of straight chains, branched chains and ring structures, thus, giving rise to a large number of compounds.

5. What is Isomerism?

A. **Isomerism** : compounds having same molecular formulae but different structure are called isomers and like phenomena is called Isomerism.

Carbon compounds exhibits isomerism i.e., for a particular molecular formula two (or) more compounds may exist. For example for the molecular formula C_4H_{10} the following isomers are possible.



n – butane



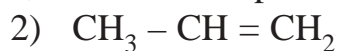
Iso butane

6. Write the formation of multiple bonds by carbon atoms?

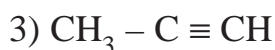
A. **Formation of Multiple bonds:** Carbon atoms are capable of forming multiple bonds with other carbon atoms. This further gives rise to a large variety of compounds. The following examples show carbon compounds with single, double and triple bonds,



n – propane



propene



propyne

7. What is carbonization of coal?

A. When coal is heated to $500 - 1000^\circ\text{C}$ without contact to air, it gets converted into a variety of solid, liquid and gaseous carbon compounds. This process is known as coal distillation (or) pyrolysis (or) carbonization of coal.

8. What are the substances produced in coal distillation?

A. Distillation of coke gives, coal-tar, light oil and coal-gas.

9. What are the products from coal-tar?

A. Coal – tar gives 1) phenols 2) pyridines 3) naphthalenes 4) tar

10. Write the physical properties of alkanes?

A. **Physical Properties of Alkanes:**

1) Alkanes containing up to five carbon atoms are gases. Those which contain between 6 and 10 carbon atoms are liquids and above 10 carbon atoms are solids.

2) They are insoluble in water.

3) They are highly combustible, so they are used as fuels.

11. Write the uses of alkanes?

A. **Uses:**

1) Alkanes are used as fuels

2) Higher alkanes are used as solvents

3) Alkanes are the starting materials for the synthesis of various organic compounds

4) Alkanes are used in the production of methanol, ethanol, hydrogen etc.,

12. Write the physical properties of alkenes?

A. **Physical Properties :**

1) Alkenes upto 3 carbon atoms are gases; those between 4 and 13 carbon atoms are liquids and above 13 are solids.

2) Alkenes are highly inflammable.

3) They are soluble in water

4) On combustion they produce CO_2 and H_2O

13. Write the uses of alkenes?

A. **Uses:**

1) Alkenes are used in the production of polymers

2) They are used in the production of alcohols.

3) Ethylene mixed with air is used as anaesthetic

14. Write the physical properties of alkynes?

A. Physical Properties:

- 1) Alkynes up to 3 carbon atoms are gases. Those with 4 to 11 carbon atoms are liquids and above 11 are solids.
- 2) Alkynes are colourless and odourless
- 3) They are insoluble in water
- 4) On combustion they produce large amount of heat. Hence they are used as fuels.

15. What is polymerization?

A. **Polymerization:** The reaction in which same kind of many molecules join together to form a giant molecule is called polymerization. and the giant molecule is called polymer.

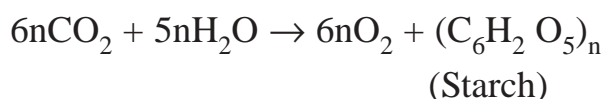
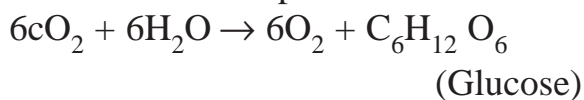
16. What do you understand by a functional group?

A. **Functional Group:** A group of atoms in carbon compounds showing characteristic properties is called functional group.

Each functional group has its own characteristic properties irrespective of other part of the molecule. when these functional groups are present in organic compounds they show typical properties.

17. Write about photosynthesis?

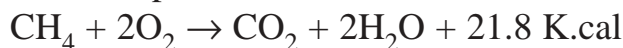
A. **Photosynthesis :** It is a phenomenon in which green pigment of the plant prepares the starchy food materials by combining CO_2 and water in the presence of sunlight. Oxygen is evolved in the course of this process.



18. Write about combustion reaction of methane?

A. **Combustion:** Complete burning of a substance is called combustion. Alkanes on combustion produce CO_2 and water and liberate heat. So they are used as fuels.

For Example :



SECTION-II

VERY SHORT ANSWER QUESTIONS

(1 MARK)

1. What is allotropy?

A. **Allotropy :** The occurrence of same element in two or more different forms is known as allotropy.

2. Write two elements which exhibit allotropy?

A. sulphur and phosphorus

3. It is not possible to synthesize diamond in laboratory - why?

A. It requires high pressure.

4. What is effect of acid on diamond?

A. Diamond is unaffected by acids

5. What is the c–c bond length in diamond?

A. The c–c bond length in diamond is 1.54°A

6. Name the three important allotropes of carbon?

A. 1) Diamond 2) Graphite 3) c–60 (Buckminsterfullerene)

7. How carbon rings are there in C₆₀

A. C₆₀ contains 60 carbon atoms arranged in 32 rings

8. Who discovered C₆₀ (Buckminsterfullerene)

A. H.W. Kroto and R.E. Smalley.

9. How many of oxides are formed by carbon?

A. Carbon forms two types of oxides. They are

1) carbon monoxide

2) carbon dioxide

10. What is dry ice?

A. The solid carbon dioxide is called dry ice.

11. Write the unique properties of carbon?

A. The unique properties of carbon are catenation, isomerism and formation of multiple bonds.

12. Mention the natural sources of carbon compounds?

A. The principle natural resources for carbon compounds are plants and carbonaceous materials like wood, natural gas, coal, petroleum etc.

13. What are the Hydrocarbons? Give some examples?

A. Carbon gives rise to a class of compounds containing exclusively carbon and hydrogen. These compounds are called hydrocarbons.

Eg: 1. Methane (CH₄) 2. Ethane (C₂H₆) 3. Propane (C₃H₈)

14. Which the names of different kinds of coal?

A. Anthracite, Bituminous, Lignite,

15. Write the main divisions of Hydro carbons?

A. Hydro carbons may broadly be divided into two classes.

1. saturated hydrocarbons 2. unsaturated hydrocarbons

16. What is meant by saturated hydro carbons?

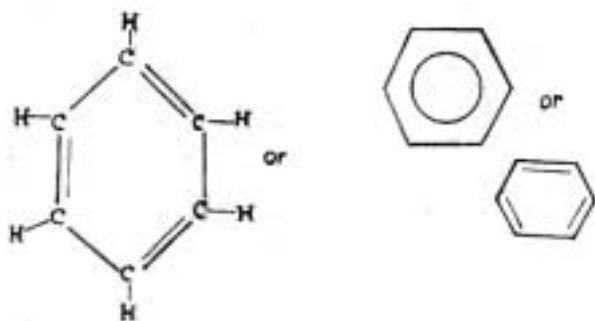
A. If all the valencies of carbon are satisfied the resultant hydrocarbons are referred to as "saturated hydrocarbons (or) alkanes" They have general formula. C_nH_{2n+2}

17. What is an alkyl group?

A. If one hydrogen is removed from alkane it is called alkyl group.

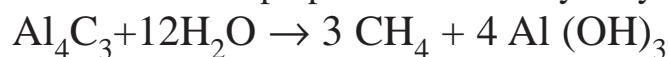
18. Write the structure of Benzene?

A.



19. Write How methane (CH₄) is prepare?

A. Methane can be prepared from the hydrolysis of aluminium carbide



20. What is unsaturated hydrocarbons?

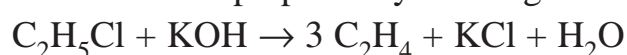
A. The hydrocarbons containing one or more double bonds or triple bonds between two carbon atoms are called unsaturated hydrocarbons.

21. Write the important classes of unsaturated hydrocarbons?

A. Alkenes and Alkynes are two important classes of unsaturated hydrocarbons.

22. Write how ethane (or) ethylene is prepare?

A. Ethene can be prepared by reacting chloroethene with alcoholic KOH (potassium hydroxide)



23. Write how ethyne is prepare?

A. Ethyne can be conveniently prepared by the hydrolysis of calcium carbide.



24. Write the uses of acetylene?

- A.
- 1) Acetylene is used in welding
 - 2) Acetylene is used for artificial ripening of fruits

25. What happens when a piece of sodium metal is added to alcohol?

A. When a piece of sodium metal is added to alcohol it reacts vigorously and liberate hydrogen gas.

26. Define combustion?

A. Combustion: complete burning of a substance is called combustion.

Section -III
Long Answer Questions (4 Marks each)

1. How do you perform Tollen's test for detecting the aldehyde group?

A. The aldehyde functional group in a compound is detected by Tollen's test. For this a 5 ml of silver Nitrate (AgNO_3) solution is taken in a test tube. Few drops of sodium hydroxide (NaOH) is added to this solution.

Ammonia solution is now added to the solution till the gray precipitate of Ag_2O formed is dissolved. To this solution, if the aldehyde group compound is added and slowly heated on a water bath a bright silver mirror forms on the inside walls of the test tube. This test is called Tollen's Test.

2. Compare the structures of diamond and graphite?

A. **Diamond**

Graphite

1. Diamond is a crystalline solid

2. It is the hardest substance

3. It is tetrahedral arrangement.

4. In diamond the C–C bond length is 1.54\AA

5. In this bond angle is $109^\circ 28'$

1. It is a grayish black soft crystalline solid.

2. It is soapy to touch.

3. Graphite contains carbon atom in hexagonal rings.

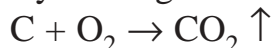
4. In graphite the C–C bond length is 1.42\AA

5. In this bond angle is 120°

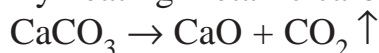
3. Write different methods of preparation of carbon dioxide?

A. Carbon dioxide can be prepared by the following methods.

1) By heating carbon in excess of oxygen



2) By heating metallic carbonates and bicarbonates.



3) By the action of acids on carbonates.



4) Carbon dioxide is obtained as a byproduct in the manufacture of alcohol by fermentation of sugar.

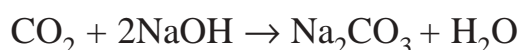
4. What are the chemical properties of CO_2

A. **Chemical Properties :**

1) Carbon dioxide dissolves in water to give carbonic acid, H_2CO_3 . Thus it is also known as anhydride of carbonic acid.

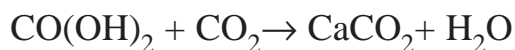


2) Due to its acidic nature it turns blue litmus into faint red and neutralizes to form carbonates and bicarbonates.





- 3) When CO_2 is passed through lime water a milky white precipitate is formed due to the formation of CaCO_3



- 4) It is neither combustible nor a supporter of combustion.

5. Write about Coal?

- A. Coal is formed inside the earth by the decomposition of plant and animal bodies in the absence of air.

The plant and animal bodies transform solar energy during their growth. After conversion of wood into coal this energy is still retained. Hence coal deposits are called "Store of Sun".

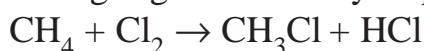
There are many kinds of coal. They differ from one another in respect of their carbon content. The oldest coal is called anthracite. It contains 95% carbon. The commonest variety is bituminous, contains 82% carbon. Another kind of coal is lignite. It contains only 70% carbon.

Coal is also a source of many carbon compounds. By distillation Coal gives coke, coal-tar, light oil and coal gas etc.

6. Write the substitution reactions of methane?

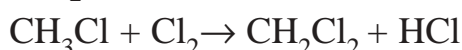
- A. Methane reacts with halogens such as chlorine and bromine in the presence of sunlight (or) on heating. These reactions are called substitution reactions because in these reactions hydrogen atoms of methane are replaced by halogen atoms.

Methane does not react with chlorine in the dark. However in the presence of sunlight (or) on heating it gives a variety of products.

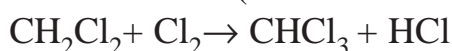


(Methyl chloride (or) chloromethane)

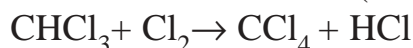
If Cl_2 is used in excess, all the hydrogen atoms are replaced by chlorine atoms one by one.



(Dichloro methane (or) Methylene dichloride)



(Trichloromethane (or) Chloroform)

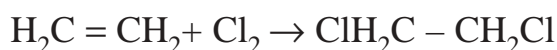
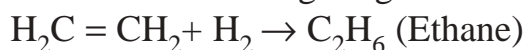


(Tetrachloro methane (or) Carbon tetrachloride)

7. Write the chemical properties of alkenes?

- A. **Chemical properties:**

- 1) Alkenes are unsaturated hydrocarbons. Due to presence of double bonds they undergo addition reactions giving rise to saturated compounds.



- 2) **Polymerization :** Alkenes polymerize to form long chain compounds known as polymers. For example, ethylene in liquid state undergoes polymerization to give polythene.



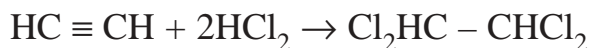
Ethylene

Polythene

Here 'n' is very large number.

8. Write the chemical properties of alkynes?

A. 1) Alkynes also combine with Hydrogen, halogens etc., to give rise to saturated compounds.



2) Combustion : Acetylene readily burn in oxygen to give rise CO_2 and water and large amount of heat. For this reason it is used in metal welding.



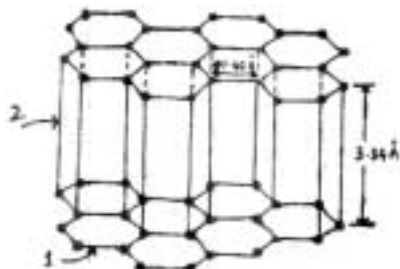
9. What are the different types of carbon compounds based on fundamental group?

S.No	Functional group	Name	Example
1.	$-\text{C}-\text{OH}$	Alcohol	CH_3OH
2.	$-\text{C}-\text{CHO}$	Aldehyde	CH_3CHO
3.	$\begin{array}{l} -\text{C} \\ \quad \diagdown \\ \quad \quad \text{C}=\text{O} \\ \quad \diagup \\ -\text{C} \end{array}$	Ketone	CH_3COCH_3
4.	$-\text{C}-\text{COOH}$	Acid	CH_3COOH
5.	$-\text{C}-\text{O}-\text{C}$	Ether	$\text{CH}_3-\text{O}-\text{CH}_3$
6.	$-\text{C}-\text{NH}_2$	Amine	CH_3NH_2
7.	$-\text{C}-\text{COOR}$	Ester	$\text{CH}_3\text{COOC}_2\text{H}_5$

Section -V

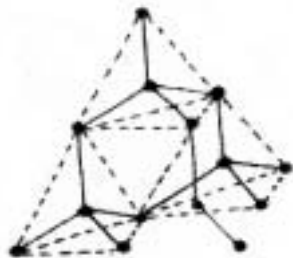
1. Draw the diagram of graphite?

A.



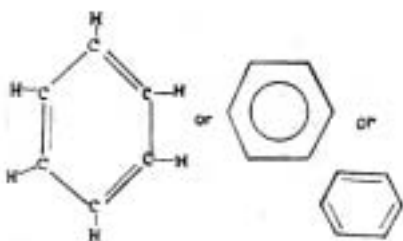
2. Draw the diagram of diamond?

A.



3. Draw the diagram of benzene?

A.



4. Draw the diagram of C_{60} (Buckminster fullerene)

A.



Part -B

1. Multiple choice questions (1/2 Mark each)

- 1. What percentage of carbon in the earth's crust** ()
a) 0.02 b) 0.002 c) 0.2 d) 0.3
- 2. The carbondioxide percentage in atmosphere is** ()
a) 0.003 b) 0.0003 c) 0.3 d) 0.03
- 3. The atomic number of carbon is** ()
a) 4 b) 6 c) 14 d) 12
- 4. Howmany number of outer most electrons in the carbon** ()
a) 4 b) 6 c) 2 d) 12
- 5. The density of diamond is** ()
a) 3.51Kg/cc b) 3.51 g/m³ c) 3.51g/cc d) 3.51 cc/g
- 6. The refractive index of diamond is** ()
a) 2.41 b) 24.1 c) .241 d) 3.41
- 7. Diamond is soluble in** ()
a) Benzene b) water c) petrol d) none
- 8. which Of the following is called as a lubricant?** ()
a) diamond b) graphite c) alcohol d) Benzene
- 9. The density of diamond is** ()
a) 0.225 g/cc b) 2.25 g/cc c) 22.5 g/cc d) 32.5 g/cc
- 10. which of the following have football structure?** ()
a) Diamond b) Graphite c) C_{60} d) none
- 11. of the following gases which is poisonous one ?** ()
a) carbon dioxide b) carbon monoxide c) oxygen d) Hydrogen
- 12. "Store of sun"** ()
a) food deposite b) Mineral deposite c) coal deposite d) petroleum

13. **What percentage of carbon in anthracite coal?** ()
 a) 80% b) 95% c) 90% d) 98%
14. **"Store of sun"** ()
 a) food deposite b) Mineral deposite c) coal deposite d) petroleum
15. **of the following which is the aromatic hydrocarbon** ()
 a) Acetelene b) Ethylene c) Benzene d) Propane
16. **The general formula of alkenes is** ()
 a) C_nH_{2n+1} b) C_nH_{2n} c) $C_{2n}H_n$ d) C_nH_{2n-1}
17. **Which is used in the production of polymers** ()
 a) Alkenes b) Alkanes c) Alkynes d) all the above
18. **Which of these are used as anaesthetic** ()
 a) Hexane b) Pentene c) Methane d) thylene
19. **General formula of alkynes** ()
 a) C_nH_{2n-1} b) C_nH_{2n+1} c) $C_{2n}H_{2n-2}$ d) C_nH_{2n+2}
20. **The chemical name of Tollen's reagent?** ()
 a) Hydrochloric Solution b) Ammonia Solution
 c) wate d) None of these
21. **The name of C_8H_{18} is** ()
 a) Hexane b) Octane c) Methane d) Propane
22. **Alkanes undergo** ()
 a) Addition ractions b) substitution reactions
 c) condensation reactions d) polymerisation reactions
23. **- COOR is called** ()
 a) acid group b) amine group
 c) ester group d) ketone group
24. **The oldest coal is** ()
 a) Lignite b) bituminous
 c) anthracite d) None
25. **Which of these are highly un reactive?** ()
 a) Alkanes b) Alkenes
 c) Alkynes d) all

26. Another name of chloroform is ()

- a) Methyl chloride b) Di chloro methane
c) Tri chloro methane d) Tetra chloro methane

27. Which is used for artificial ripening of fruits ()

- a) Acetylene b) Butyne
c) Propyne d) Hexyl

Answers

1) d; 2) d; 3) b; 4) a; 5) c 6) a; 7) d; 8) b; 9) b; 10) c 11) b; 12) c; 13) b; 14) a; 15) c
16) b; 17) a; 18) d; 19) c; 20) b; 21) b; 22) b; 23) c; 24) c; 25) a 26) c; 27) a;

II. Fill in the Blanks (1/2 Mark)

1. Diamond is a crystalline _____
2. _____ is used as glass- cutter
3. In diamond carbon atoms are in _____ arrangement
4. The bond angles in diamond and graphite are _____ and _____ respectively
5. Graphite contains carbon atoms in _____ hexagonal rings
6. The C – C bond length in hexagonal of graphite is _____
7. The two successive graphite layers are separated by _____
8. The buckminster fullerene contains _____ pentagon and _____ hexagon ring of carbon.
9. The average bond length in C_{60} (buckminster fullerenes) is _____
10. _____ gas mainly found in exhaust fumes of industry and automobiles
11. In the fermentation reactions _____ gas is liberated.
12. _____ is known as anhydride of carbonic acid
13. petroleum occurs in large between certain _____ layers.
14. Bituminous coal contains _____ carbon
15. Lignite coal contains _____ carbon

16. Coal is formed inside the earth by the _____ of plant and animal bodies in the absence of the earth
17. Coke and coal-gas are used as _____
18. L.P.G. gas contains large amount of _____
19. _____ are used in the production of alcohols
20. Alkynes contain at least one carbon – carbon _____ bond
21. Ethyne is commonly known as _____
22. Tollen's test is _____ group (functional group) specification
23. The distance between two layers of graphite is _____
24. $\text{Fe}_2\text{O}_3 + 3\text{CO} \xrightarrow{\Delta} \text{_____} + \text{_____}$
25. Alkenes undergo _____ reactions
26. The presence of alcoholic functional group by addition of _____ metal
27. $6\text{CO}_2 + 6\text{H}_2\text{O} \rightarrow 6\text{O}_2 + \text{_____}$
28. Carbon dioxide is highly _____
29. Complete burning of a substance is called _____
30. _____ is used in welding

Answers

- | | | | | |
|-----------------------|-----------------------|---|----------------------------------|--------------------------|
| 1. solid | 2. diamond | 3. tetrahedral | 4. $109^\circ 28'$, 120° | 5. Hexagonal |
| 6. 1.42 \AA | 7. 3.35 \AA | 8. 12, 20 | 9. 1.4 \AA | 10. carbon monoxide |
| 11. CO_2 | 12. CO_2 | 13. Sedimentary | 14. 82 % | 15. 70% |
| 16. decomposition | | 17. Fuels | 18. butane | 19. alkenes |
| 20. triple | 21. acetylene | 22. CHO (aldehydes) | 23. 3.35 \AA | 24. 2 Fe, 3CO_2 |
| 25. Addition | 26. sodium | 27. $\text{C}_6\text{H}_{12}\text{O}_6$ | 28. stable | 29. combustion |
| 30. Acetylene | | | | |

III. Matching

(1/2 Mark)

I.

Group A

- 1) – OH ()
- 2) – CHO ()
- 3) – COOH ()
- 4) – NH₂ ()
- 5) – COOR ()

Group B

- a) ester
- b) ketone
- c) alcohol
- d) aldehyde
- e) acid
- f) amine
- g) ether

II.

Group A

- 1) Hexane ()
- 2) Ethane ()
- 3) Pentyne ()
- 4) Hexane ()
- 5) Butane ()

Group B

- a) C₆H₁₀
- b) C₂H₆
- c) C₄H₁₀
- d) C₆H₁₄
- e) C₅H₈

III.

Group A

- 1) Propane ()
- 2) Butane ()
- 3) Pentane ()
- 4) Hexane ()
- 5) Ethylene ()

Group B

- a) C₂H₄
- b) C₆H₁₄
- c) C₅H₁₂
- d) C₄H₁₀
- e) C₃H₈

IV.

Group A

- 1) Aldehyde ()
- 2) Ketone ()
- 3) Acid ()
- 4) Ether ()
- 5) Amine ()

Group B

- a) C₃H₇NH₂
- b) CH₃OCH₃
- c) CH₃COOH
- d) CH₃COCH₃
- e) CH₃CH₀

V.

Group A

Group B

- | | | |
|-------------------|-----|-------------------|
| 1) Methyl alcohol | () | a) C_4H_{10} |
| 2) Glucose | () | b) C_6H_6 |
| 3) Butane | () | c) CH_3OH |
| 4) Benzene | () | d) C_2H_2 |
| 5) Acetylene | () | e) $C_6H_{12}O_6$ |

Answers

Matching

- I.
1 - c 2 - d 3 - e 4 - f 5 - a
- II.
1 - d 2 - b 3 - e 4 - a 5 - c
- III.
1 - e 2 - d 3 - c 4 - b 5 - a
- IV
1 - e 2 - d 3 - c 4 - b 5 - a
- V
1 - c 2 - e 3. a 4. b 5 - d

