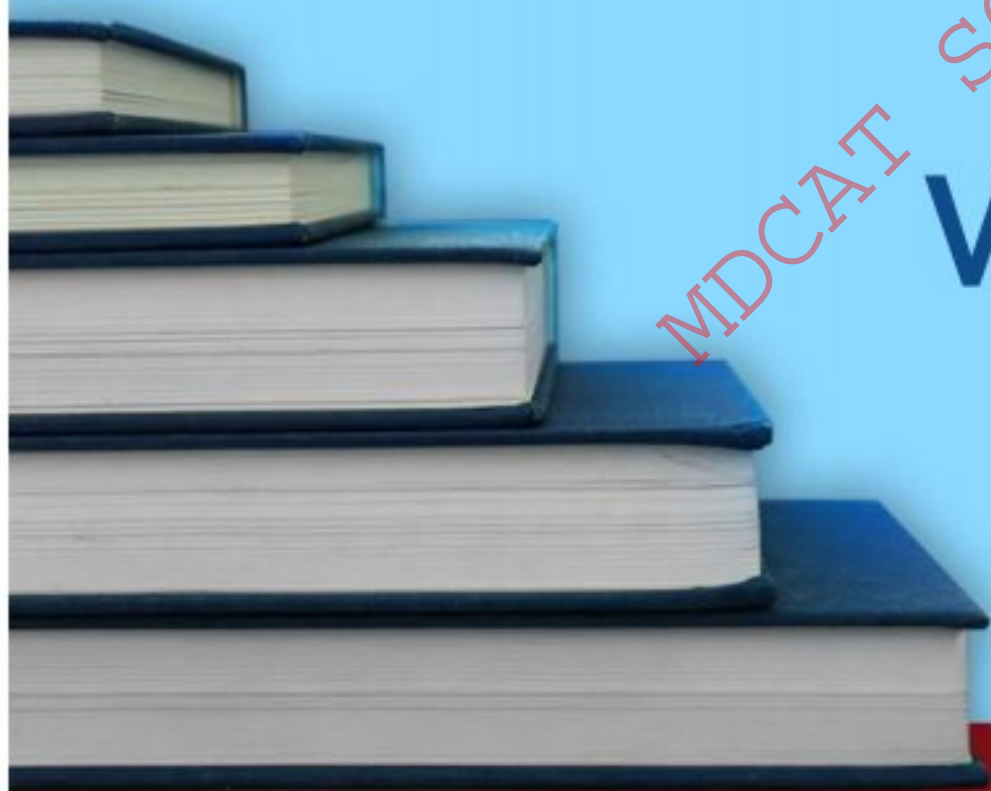


CHEMISTRY



MDCAT SOCIETY FOR FUTURE DOCTORS

WORKSHEET-1



STOP

A PROJECT BY PUNJAB GROUP

Worksheet-1

(C. Organic Chemistry)
Fundamental PrinciplesUSE THIS SPACE FOR
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- Q.1 Which of the following is an aromatic compound?**
A) Aniline
B) Cyclohexanol
C) Cyclobutane
D) Neopentane
- Q.2 Which of the following properties is not shown by organic compounds?**
A) They have low boiling points
B) They are more soluble in non-polar solvent
C) They show polymorphism and isomorphism
D) They are flammable
- Q.3 All of the following are polar organic compounds EXCEPT?**
A) C₁₀H₂₂
B) CH₃CHO
C) CHCl₃
D) CH₃CH₂OH
- Q.4 Which one of the following statements is not correctly matched?**

Options	Class of organic compound	Example
A)	Straight chain compound	1-Butene
B)	Alicyclic compound	Cyclohexene
C)	Aromatic compound	Toluene
D)	Heterocyclic compound	Phenol

- Q.5 Which of the following is not heterocyclic compound?**
A) Pyrrole
B) Resorcinol
C) Furan
D) Thiophene
- Q.6 The main reason for large number of organic compound is:**
A) Isomerism
B) Complexity of structure
C) Catenation
D) Homologous series
- Q.7 Which of the following is structure of isobutyl alkyl radical?**
A) CH₃CH₂CH₂CH₂-
B) CH₃CH₂CH(CH₃)
C) CH₃CH(CH₃)CH₂-
D) CH₃-C(CH₃)₂-

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- Q.8 Which of the following hydrocarbons is least reactive?**
 A) Alkyne C) Benzene
 B) Alkane D) Alkene
- Q.9 In geometric isomerism, the trans-isomers have all of the following properties EXCEPT:**
 A) They are non-polar molecules
 B) They have high boiling points
 C) They are symmetrical molecules
 D) They have high melting points
- Q.10 Which of the following organic compounds does not show geometric isomerism?**
 A) 2-Butene C) 2-Pentene
 B) 3-Hexene D) 1-Butene
- Q.11 Which of the following is/are basic conditions for geometric isomerism?**
 A) Having carbon carbon double bond (C = C)
 B) Different groups are attached with carbon containing double bond
 C) Double bond involves free rotation
 D) Both A and B
- Q.12 Which of the following is the most stable free radical?**
 A) $\begin{array}{c} \text{R} \\ | \\ \text{R}-\text{C}^{\bullet} \\ | \\ \text{R} \end{array}$ C) $\begin{array}{c} \text{R} \\ | \\ \text{R}-\text{C}^{\bullet}\text{H} \\ | \\ \text{R} \end{array}$
 B) $\text{R}-\text{C}^{\bullet}\text{H}_2$ D) $\text{C}^{\bullet}\text{H}_3$
- Q.13 Which of the following is the least stable carbocation?**
 A) Me_3C^+ C) Me_2CH^+
 B) CH_3^+ D) MeCH_2^+
- Q.14 Consider the following structure of alkane:**

$$\begin{array}{ccccccc} \text{H}_3\text{C} & -\text{CH}_2 & -\text{CH}_2 & -\text{CH}_2 & -\text{CH} & -\text{CH}_3 \\ & & & & | \\ & & & & \text{CH}_2 \\ & & & & | \\ & & & & \text{CH}_3 \end{array}$$
- The correct name of given structure of alkane according to IUPAC is:**
 A) 3-Methylheptane C) 3-Methylhexane
 B) 5-Methylheptane D) 2-Methylpentane

Q.15 When hydrogen is removed from alkane, the product obtained has the general formula:

- A) C_nH_{2n+2} C) C_nH_{2n+1}
 B) C_nH_{2n-2} D) C_nH_{2n-1}

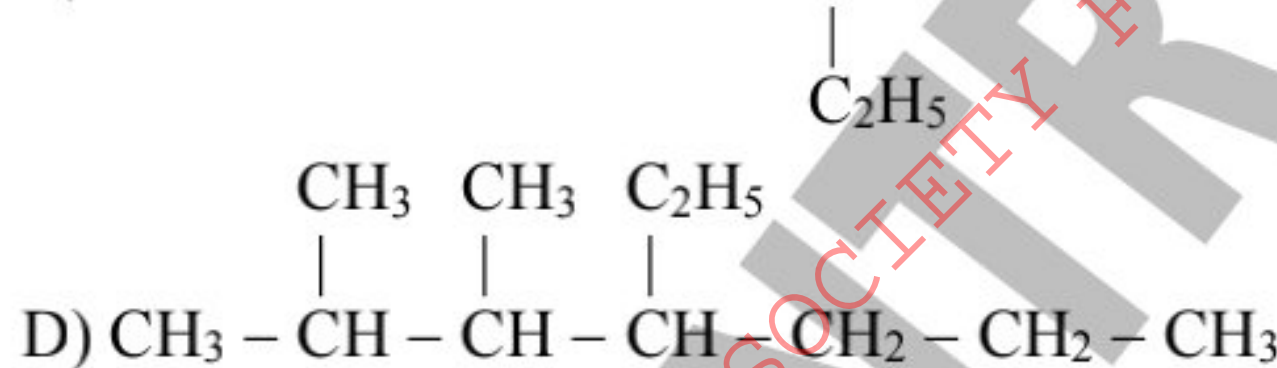
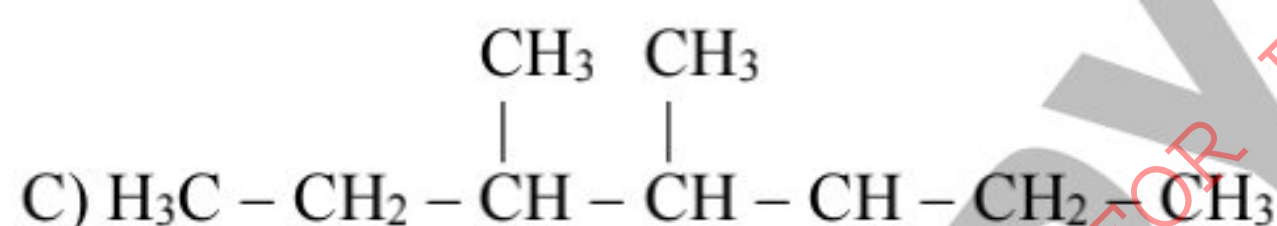
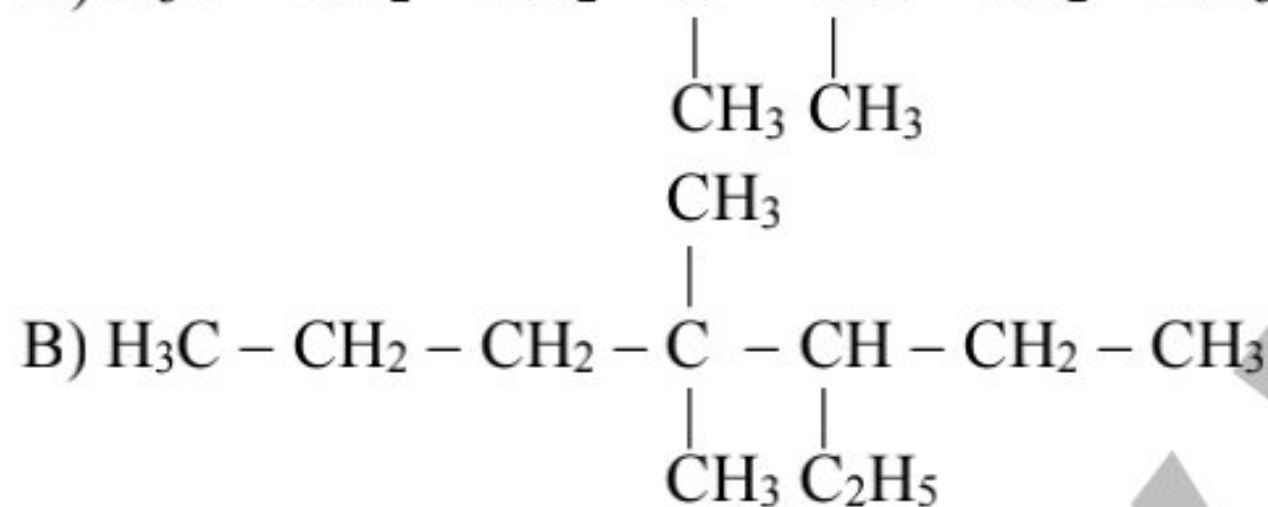
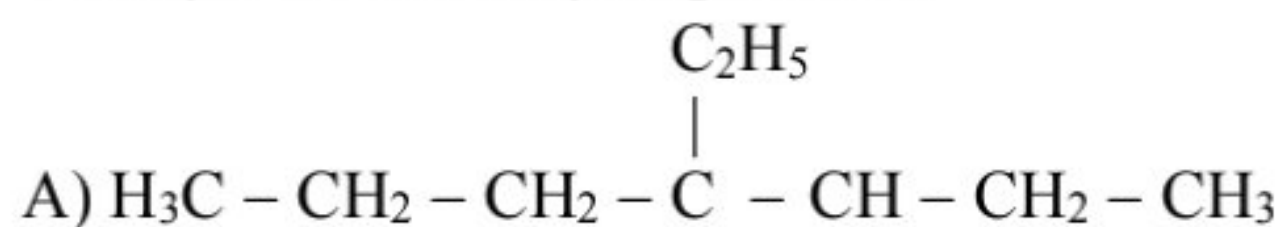
Q.16 Consider the following condensed formula of alkane:



Correct name of above formula according to IUPAC is:

- A) 2,3,4-Trimethylpentane C) 2,4,4-Trimethylpentane
 B) 2,6,6-Trimethylpentane D) 2,2,4-Trimethylpentane

Q.17 The structural formula of the following given compound 4-Ethyl-3,4-dimethylheptane is:



Q.18 Organic compounds that show weak attractive forces have:

- A) High boiling points C) Low melting points
 B) High melting points D) Low vapour pressure

Q.19 When organic compounds contain more than one functional group, it is known as:

- A) Derivatives C) Poly-functional
 B) Heterocyclic D) Isomers

Q.20 The correct name according to IUPAC of the following alkene is:



- A) 1,3-Pentadiene C) 2,3-Pentadiene
 B) 2,4-Pentadiene D) 1,4-Pentadiene

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- Q.21** An atom or a group of atoms or a double bond or triple bond whose presence imparts specific properties to organic compounds is called a functional group, because they are the chemically functional parts of molecules. Which of the following is functional group of carboxylic acid?
- A) -COOH C) -CONH₂
B) -OH D) -CHO
- Q.22** Which of the following is functional group of thioalcohol?
- A) Cyano group C) Mercapto group
B) Formyl group D) Amino group
- Q.23** The type of isomerism which arises due to shifting of proton from one atom to other in the same molecule is called:
- A) Tautomerism C) Geometric isomerism
B) Metamerism D) Chain isomerism
- Q.24** Which of the following class of organic compounds contains ring which has more than one kind of atoms?
- A) Aromatic C) Non-benzenoid
B) Heterocyclic D) Aliphatic
- Q.25** The type of structural isomerism which arises due to the unequal distribution of carbon atoms on either side of the functional group is called:
- A) Chain isomerism C) Tautomerism
B) Metamerism D) Position isomerism
- Q.26** Which of the following pair of organic compounds shows position isomerism?
- A) CH₃-CH₂-CHO and CH₃-CO-CH₃
B) CH₃-CH₂-CH₂-OH and CH₃-CH(OH)CH₃
C) C₂H₅-O-C₂H₅ and CH₃-O-C₃H₇
D) CH₃-COOH and HCOOCH₃
- Q.27** There are two types of isomerism i.e. structural isomerism and stereoisomerism. The two main types of stereoisomerism are: Diastereomerism (including 'cis-trans isomerism' and Optical Isomerism). Each non-superimposable mirror image structure is called a/an:
- A) Metamer C) Enantiomer
B) Elastomer D) Tautomer
- Q.28** The major portion of natural gas is:
- A) Methane C) Propane
B) Butane D) Ethane
- Q.29** In organic compounds carbon atoms form:
- A) Ionic bond C) Hydrogen bond
B) Covalent bond D) Metallic bond

Q.30 Which of the following is functional group of ester?

- A) $-\text{COOH}$ C) $-\text{C}=\text{O}$
 B) $-\text{CHO}$ D) $-\text{COOR}$

Q.31 Each functional group represents a different class of organic compounds. They are divided into following classes of organic compound on the basis of functional group:

- A) Hydrocarbons
 B) Derivatives of hydrocarbons
 C) Both A and B
 D) Neither A nor B

Q.32 All of the following compound can exist in the form of cis and trans isomers EXCEPT:

- A) 2-Butane C) 1-Bromo-2-chloropropene
 B) 2-Pentene D) 1-Pentene

Q.33 Which of the following is general formula of ether?

- A) $(\text{C}_n\text{H}_{2n+1})_2\text{O}$ C) $\text{C}_2\text{H}_{2n+1}\text{CHO}$
 B) $(\text{C}_n + \text{H}_{2n+1})_2\text{CO}$ D) $(\text{C}_n\text{H}_{2n+1}\text{COOC}_n\text{H}_{2n+1})$

Q.34 Pyridine belongs to which class of organic compounds:

- A) Heterocyclic C) Alicyclic
 B) Hydrocarbon D) Homocyclic

Q.35 Ethanol and dimethyl ether are best considered:

- A) Structural isomers C) Enantiomers
 B) Stereoisomers D) Diastereomers

Q.36 Alkenes show geometrical isomers due to:

- A) Asymmetry
 B) Rotation around a single bond
 C) Resonance
 D) Restricted rotation around a double bond

Q.37 An optically active compound:

- A) Must contain at least four carbon
 B) When in solution rotate the plane of polarized light
 C) Must always contain asymmetric carbon atom
 D) In solution always give a negative reading in polarimeter

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Q.38 Which of the statements is false regarding chiral compounds?

- A) Rotate the plane of polarized light
- B) Have cis and trans isomers
- C) Exist as enantiomers
- D) Can be detected with a polarimeter

STEP ENTRY TEST 2021
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ANSWER KEY (Worksheet-1)

1	A	11	D	21	A	31	C
2	C	12	A	22	C	32	D
3	A	13	B	23	A	33	A
4	D	14	A	24	B	34	A
5	B	15	C	25	B	35	A
6	C	16	D	26	B	36	D
7	C	17	A	27	C	37	C
8	B	18	C	28	A	38	A
9	B	19	C	29	B		
10	D	20	A	30	D		

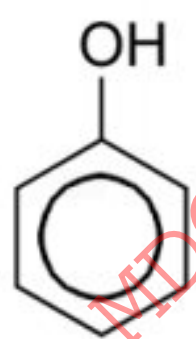
ANSWERS EXPLAINED

Q.1 (A) Aniline is an aromatic compound. While B and C are alicyclic, while D is branched aliphatic organic compound.

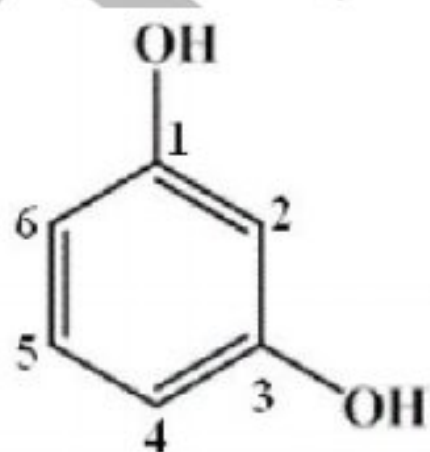
Q.2 (C) Organic compounds do not show the property of polymorphism and isomorphism. They show the property of isomerism.

Q.3 (A) $C_{10}H_{22}$ is a non-polar organic compound. In fact, it is an example of an alkane. Its name is decane.

Q.4 (D) Phenol is not a heterocyclic compound. It is an aromatic compound and its structural formula is:

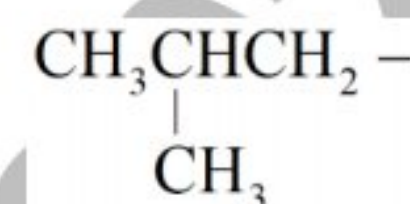


Q.5 (B) Resorcinol is not a heterocyclic compound. It is an organic compound with the formula $C_6H_4(OH)_2$. It is one of three isomeric benzenediols, the 1,3-isomer (or meta-isomer). It is a white, water-soluble solid.



Q.6 (C) The main reason for such a large number of compounds is its unique property of linking with other carbon atoms to form long chains or rings. This self-linking property of carbon is called catenation.

Q.7 (C) The structure of isobutyl alkyl radical.



Q.8 (B) Alkanes are the simplest and least reactive hydrocarbon species containing only carbons and hydrogens.

Q.9 (B) Since trans-isomers of geometric isomerism are symmetrical molecules. They have a low boiling point and high melting point.

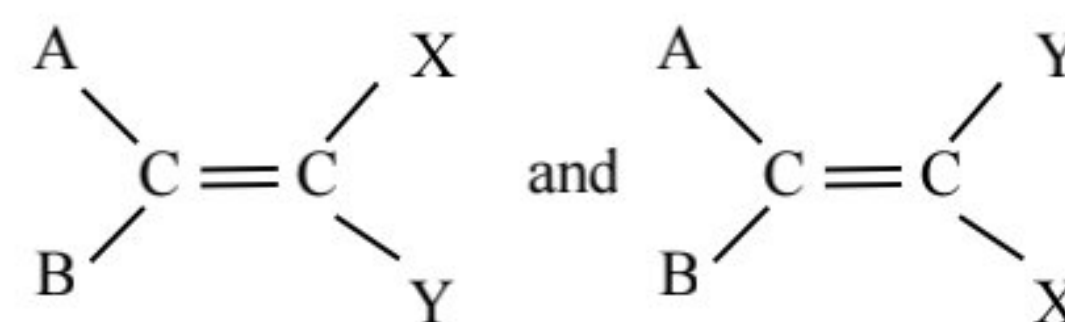
Q.10 (D) 1-Butene does not fulfill the conditions of geometric isomerism. Though it has a carbon-carbon double bond ($C=C$) but different groups are not attached to the carbon containing the double bond, as shown in the structure $CH_2=CH-CH_2-CH_3$.

Q.11 (D) Basic conditions for geometric isomerism are such as:

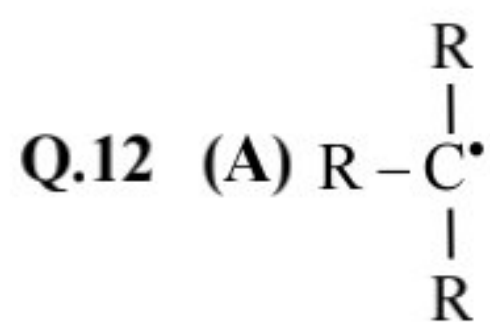
- Having Carbon-Carbon double bond
- Different groups are attached to the carbon containing the double bond

Memorize: The presence of a double bond is not the only condition for geometrical isomerism. Each double-bonded carbon atom must have two different groups attached to it.

e.g.

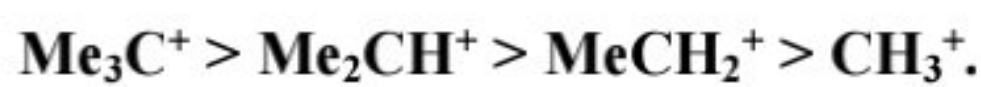


are geometrical isomers only if $A \neq B$ and $X \neq Y$. A can be the same as X and Y, and B can be the same as X or Y.

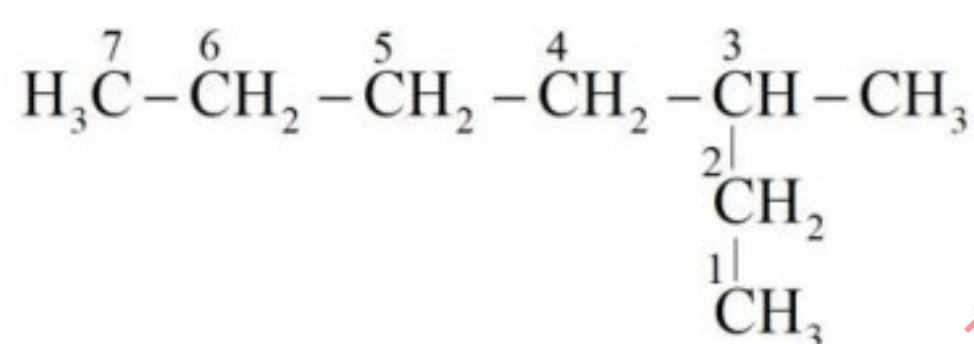


is the most stable free radical while others B, C, and D are not.

Q.13 (B) CH_3^+ (methyl carbocation) is the least stable because of less number of alkyl groups (i.e. electron donating) are attached with it. Order of stability of carbocations is



Q.14 (A) The correct name of alkane according to IUPAC is 3-Methylheptane.

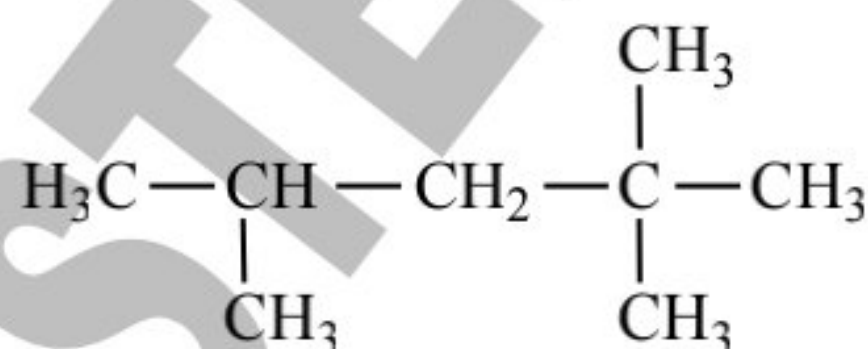


Q.15 (C) Alkanes can be described by the general formula $\text{C}_n\text{H}_{2n+2}$. An alkyl group is formed by removing one hydrogen from the alkane chain and is described by the formula $\text{C}_n\text{H}_{2n+1}$.

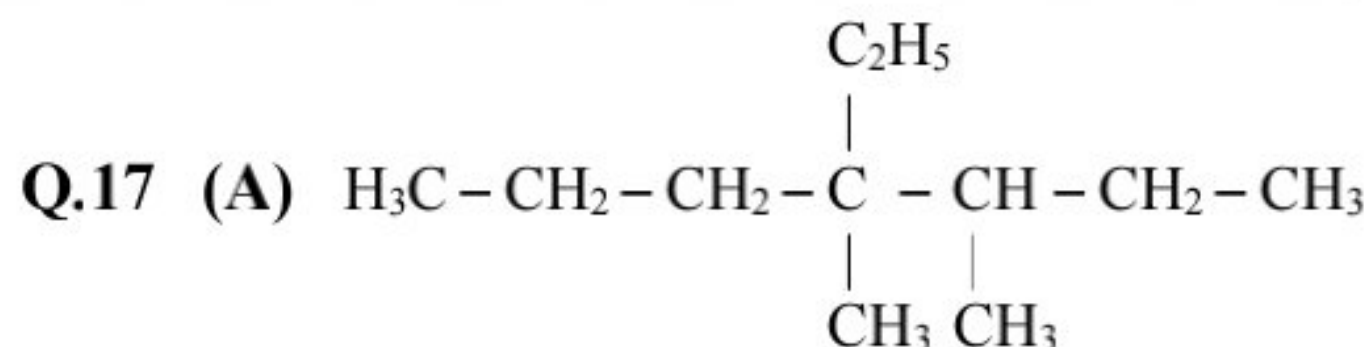
Q.16 (D) 2,2,4-Trimethylpentane is the correct name according to IUPAC of given condensed formula



- Its structural formula is:



(Isooctane)



is the structural formula of 4-Ethyl-3,4-dimethylheptane.

Q.18 (C) Organic compounds that show weak attractive forces have low melting points.

Q.19 (C) When organic compounds contain more than one functional group, it is known as poly-functional.

Q.20 (A) 1,3-Pentadiene is the correct name according to IUPAC of given structural formula



Q.21 (A) $-\text{COOH}$ is a functional group of carboxylic acid.

Q.22 (C) Mercapto ($\text{SH}-$) is a functional group of thioalcohol.

Q.23 (A) The type of isomerism which arises due to shifting of proton from one atom to other in the same molecule is called tautomerism.

Q.24 (B) The compounds in which the ring consists of atoms of more than one kind are called heterocyclic compound or heterocycles. In heterocyclic compounds generally one or more atoms of elements such as N, O or S which are known as hetero atoms. e.g. Pyridine, Furan, Pyrrole and Thiophene are heterocyclic compounds.

Q.25 (B) The type of structural isomerism which arises due to the unequal distribution of carbon atoms on either side of the functional group is called metamerism.

Q.26 (B) $\text{CH}_3-\text{CH}_2-\text{CH}_2-\text{OH}$ (1-propanol) and $\text{CH}_3-\text{CH}(\text{OH})\text{CH}_3$ (2-propanol) show position isomerism.

Q.27 (C) Optical isomers are two compounds which contain the same number and kinds of atoms, and bonds (i.e., the connectivity between atoms is the same), and different spatial arrangements of the atoms, but which have non-superimposable mirror images. Each non-superimposable mirror image structure is called an enantiomer. All α -amino acids show optical isomerism except glycine.

Q.28 (A) The major portion of natural gas is methane.

Q.29 (B) Organic compounds are mostly covalent in nature and forms covalent bonds.

Q.30 (D) Functional group of ester is $-\text{COOR}$.

Q.31 (C) Organic compounds are divided in two major classes on the basis of functional group.

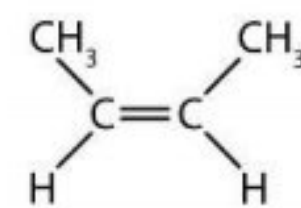
1. Hydrocarbons

2. Derivatives of hydrocarbons

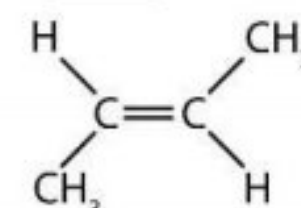
Q.32 (D) 1-Pentene does not exist in the form of cis and trans isomers because it does not fulfill the condition of geometric isomerism.

Other (1-Butene, 2-Pentene and 1-Bromo-2-chloropropene) show cis and trans isomers as shown below:

2-Butene:

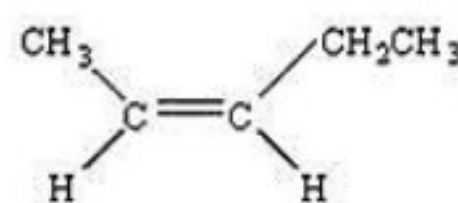


cis-2-butene

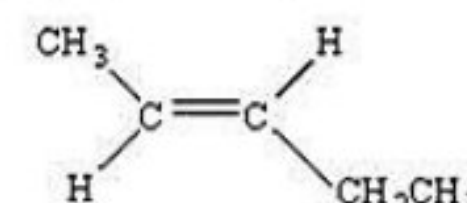


trans-2-butene

2-Pentene:

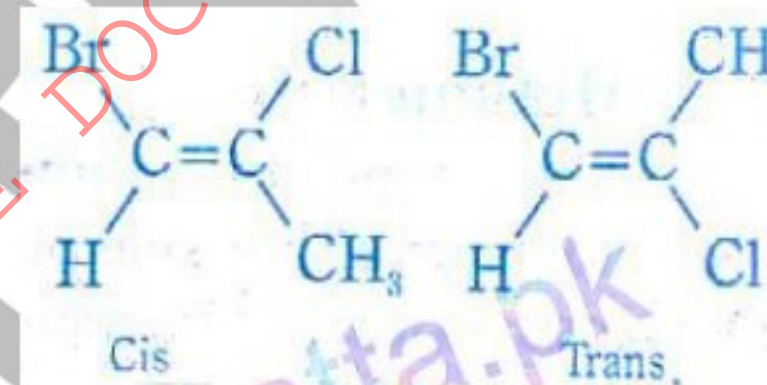


cis-2-pentene



trans-2-pentene

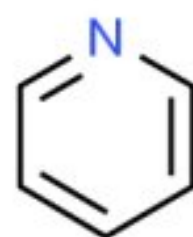
1-Bromo-2-chloropropene



Q.33 (A)

Opt.	Class of Compounds	Functional Group	Name of Functional Group	General Formula
A)	Ether	$-\text{O}-$	Oxygen	$(\text{C}_n\text{H}_{2n+1})_2\text{O}$
B)	Ketone	$-\text{CO}-$	Keto group	$(\text{C}_n + \text{H}_{2n+1})_2\text{CO}$
C)	Aldehyde	$-\text{CHO}$	Formyl	$\text{C}_2\text{H}_{2n+1}\text{CHO}$
D)	Ester	$-\text{COOR}$	Ester	$(\text{C}_n\text{H}_{2n+1}\text{COOC}_n\text{H}_{2n+1})$

Q.34 (A) Pyridine belongs to heterocyclic class of organic compounds.

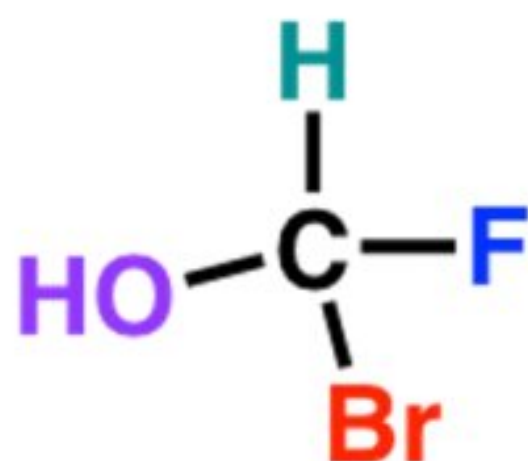


Pyridine

Q.35 (A) Ethanol and dimethyl ether are best considered structural isomers.

Q.36 (D) Alkanes show geometrical isomers due to restricted rotation around a double bond.

Q.37 (C) An asymmetric carbon atom (chiral carbon) is a carbon atom that is attached to four different types of atoms or groups of atoms. Molecules that cannot be superimposed on their own mirror image are said to be **chiral** like mirror image.



For example asymmetric carbon atom it can rotate plane polarized light either to the left (laevorotatory) or to the right dextrorotatory.

Q.38 (A) Chiral compound can rotate the plane polarized light.

