CBSE TEST PAPER 01

CLASS XI CHEMISTRY (Organic Chemistry Some Basic Principle and Techniques)

General Instruction:

- All questions are compulsory.
- Marks are given alongwith their questions.

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1. Write the expanded form of the following condensed formulas into their complete structural formulas.

(a) $CH_3CH_2COCH_2CH_3$.

(b) $CH_3CH=CH(CH_2)_3CH_3$. [2]

2. How does hybridization affect the electronegativity? [1]

3. Why is sp hybrid orbital more electronegative than sp^2 or sp^3 hybridized orbitals? [2]

4. What type of hybridization of each carbon atom in the following compounds?

(a) CH_3Cl (b) $(CH_3)_2CO$ (c) CH_3CN (d) $CH_3CH = CHCN$. [4]

5. What is the shape of the following molecules:

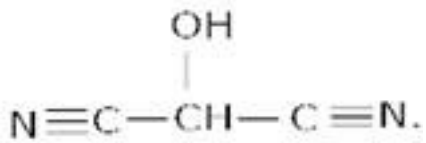
(a) $H_2C=O$ (b) CH_3F (c) $HC\equiv N$. [3]

6. How many σ and π bonds are present in each of the following molecules?

(a) $HC\equiv CC\equiv CCH_3$ (b) $CH_2=C=CHCH_3$. [2]

7. Why are electrons easily available to the attacking reagents in π – bonds? [1]

8. Write the bond line formula for



[1]

CBSE TEST PAPER 01

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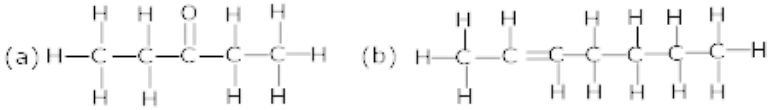
[ANSWERS]

Ans 1. the expanded form of given compound is represented below:



Ans 2. The greater the s – character of the hybrid orbital's, the grater is the electro negativity.

Hybridization	**% of s-charaer**
sp^3	25%
sp^2	33.33%
sp	50%

Therefore, carbon having sp hybridisation is more electronegative than other two.

Ans 3. The greater the s – character of the hybrid orbital's, the greater is the electro negativity, because s- orbital having spherical structure. Thus, a carbon atom having an sp hybrid orbital with 50% s – character is more electro negative than that possessing sp^2 or sp^3 hybridized orbital's.

Hybridization	**% of s-charaer**
sp^3	25%
sp^2	33.33%
sp	50%

Ans 4.

Compound	**Hybridzsataion**	**Reason**
CH_3Cl	sp^3	carbon is linked to 4 atoms
		methyl groups linked to another carbon atom, sp^2 is due to

$(CH_3)_2CO$	sp^3-sp^2	carbonyl carbon
CH_3CN	sp^3, sp	methyl groups linked to another carbon atom, cyanide having $C \equiv N$ bond
CH_3CH = CHCN	sp^3, sp^2, sp^2,sp	methyl carbon, double bonded carbons,$C \equiv N$ resp.

(a) sp^3 (b) sp^3-sp^2 (c) sp^3, sp (d) sp^3, sp^2, sp^2,sp.

Ans 5. (a) $H_2C=O$ is sp^2 hybridized carbon due to carbonyl group having geometry trigonal planar.

(b)CH_3F is sp^3 hybridized carbon having tetrahedral geometry .

(c) HC≡N is sp hybridized carbon having linear geometry.

Ans 6.

Nature of bond	**Number of sigma and pi bond**
single bond	one sigma bond
double bond	one sigma+ one pi bond
triple bond	one sigma +two pi bonds

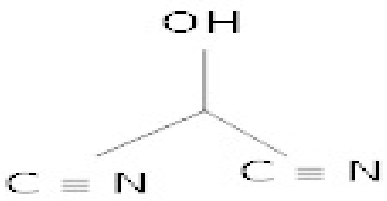
(a) σ C = C : 4 (b) σ C = C : 3

σ C – H : 6 σ C – H : 6

π C = C : 3 π C = C : 2

Ans 7. In multiple bond systems, the electron charge cloud of the π – bond is located above and below the plane of bonding atoms. This results in the electrons being easily available to the attacking reagents.

Ans 8.The bond line formula for the given compound is :



CBSE TEST PAPER 02

CLASS XI CHEMISTRY (Organic Chemistry Some Basic Principle and Techniques)

General Instruction:

- All questions are compulsory.
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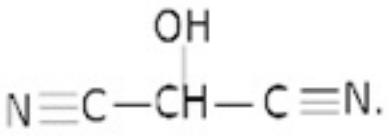
1. How are organic compounds classified? [1]
2. What is a functional group? [2]
3. Define homologous series? [1]
4. Give two examples of aliphatic compounds. [2]
5. Write an example of non – benzenoid compound. [1]
6. Write an example of alicyclic compound. [2]
7. Name the chain isomers of C_5H_{12} which has a tertiary hydrogen atom. [1]
8. For each of the following compounds write a condensed formula and also their bondline formula. [2]

(a) $HOCH_2\ CH_2\ CH_2CH\ (CH_3)\ CH\ (CH_3)\ CH_3$

(b)



CBSE TEST PAPER 02

CLASS XI CHEMISTRY (Organic Chemistry Some Basic Principle and Techniques)

[ANSWERS]

Ans 1. on the basis of nature organic compounds can be classified into follwing categories.

(i) Acyclic or open chain compounds (ii) Alicyclic or closed chain or ring compounds. (iii) Aromatic compounds.

Ans 2. It may be defined as an atom or group of atoms within the molecule which is responsible for the characteristic chemical properties of the organic compounds.

$$\underset{(alkane\ )}{R-H} + \underset{(functional\ group)}{G} \rightarrow \underset{(organic\ compund\ with\ specfic\ fnctional\ group)}{R-G} + H$$

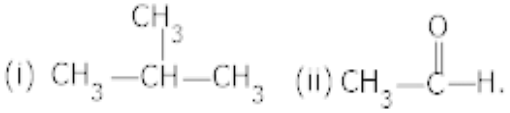
where G may be : hydroxyl group (- OH, alcohol), aldehyde group (- CHO), carboxylic acid group (-COOH) etc.

Ans 3. A series of similarly constituted compounds in which the members present have same functional group, same chemical properties and show a gradation in physical properties and any two successive members in a particular series differ in their molecular formula by $-CH_2$ group or by ***14*** mass units.

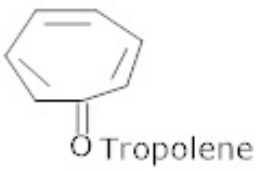
e.g. the general formula of alcohol family is C_nH_{2n}-OH (n= 1,2,3,4...) a few members of family are methyl alcohol (CH_3OH) , ethyl alcohol (C_2H_5OH) and propyl alcohol (C_3H_7OH).

Ans 4.organic compounds in which all carbon atoms are linked to one another to form open chains are called as aliphatic compounds. these may be saturated or unsaturated.

for example. 2-methyl propane and ethanal.

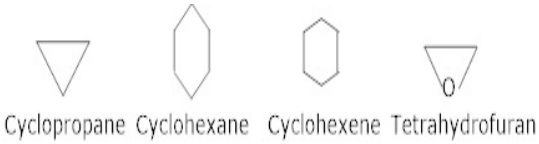


Ans 5. non-benzoid compounds are cycle compounds having no benzene ring but extra stable compounds. e.g. tropolene, shown below.



Tropolene

Ans 6.Alicyclic compounds: carbocylic compounds which resembles aliphatic compounds in their properties are called as alicyclic compounds. for example: cyclopropane, cyclohexane , cyclohexene and THF etc.



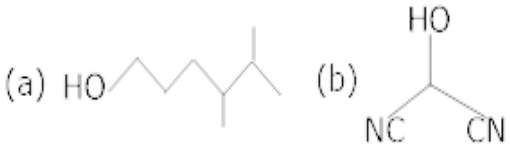
Ans 7. out of possible chain isomers of compond with formula C_5H_{12} give isomer having tertiary carbon is 2 – methyl butane, $(CH_3)_2C^*H-CH_2-CH_3$.

Ans 8. Condensed formula of given compounds are represented below:

(a) $HO(CH_2)_5CHCH_3CH\ (CH_3)_2$

(b) $HOCH(CN)_2$.

Bond line formula of given compounds are given below.



CBSE TEST PAPER 03

CLASS XI CHEMISTRY (Organic Chemistry Some Basic Principle and Techniques)

General Instruction:

- All questions are compulsory.
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1. Write the structural formula of
(a) p – Nitro aniline (b) 2,3 – Dibromo-1-phenylpentane. [2]
2. Derive the structure of 3 – Nitrocyclohexene. [2]
3. Give the IUPAC of the following – [2]

(a)  (b) $Cl_2CH\ CH_2OH$

4. What is the cause of geometrical isomerism in alkenes? [1]
5. Draw the two geometrical isomers of, but–2–en–1,4-dioic acid. Which of the will have higher dipole movement? [2]
6. Name the chain isomers of C_5H_{12} which has a tertiary hydrogen atom. [1]
7. How many structural isomers and geometrical isomers are possible for a cyclohexane derivative having the molecular formula C_9H_{16}? [2]
8. Alkynes does not exhibit geometrical isomers. Give reason. [2]
9. Which of the following shows geometrical isomerism?

(a) CHCl = CHCl (b) $CH_2 = CCl_2$ (c) $CCl_2 = CHCl$. [2]

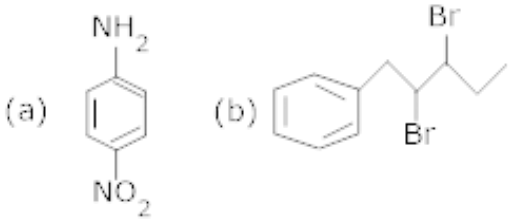
10. How many isomers are possible for monosubstituted and disubstituted benzene? [2]

CBSE TEST PAPER 03

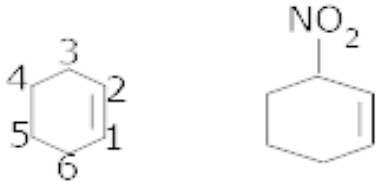
CLASS XI CHEMISTRY (Organic Chemistry Some Basic Principle and Techniques)

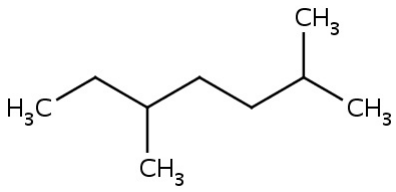
[ANSWERS]

Ans 1.The structural formula of (a) p – Nitro aniline (b) 2,3 – Dibromo-1-phenylpentane are given below:

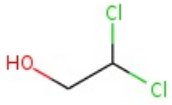


Ans 2. Six membered ring containing a carbon – carbon double bond is implied by cyclohexene, which is numbered. The prefix 3 – nitro means that a nitro group is parent on C – 3. Thus complete structured formula of the compound is derived. Double bond is suffixed functional group whereas NO_2 is prefixed functional group; therefore double bond gets preference over – NO_2 group, the structural formula of 3 – Nitrocyclohexene is given below.



Ans 3. (a) The IUPAC name of 

is 2,5 – dimethyl heptane

(b) The IUPAC name of 

2,2– dichloro ethan-1-ol.

Ans 4. **Cause of Geometrical isomerism** :Geometrical isomerism arises due restricted rotation of π – bond in alkenes. these are of two types a) cis-isomer b) trans-isomer.

Exaplanation: In alkenes, we have C=C double bond, here one bond is σ and other is π. Sigma (σ) bond is formed by overlapping of half filled orbitals along the internuclear axis, but π-bond is formed by sidewise overlap of p-orbitals.

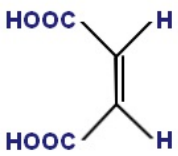
The rotation about a π bond is restricted because to break it we have to break the π-bond.

To break π-bond we need energy. The energy cannot be obtained by collision among molecules. So rotation is not free.

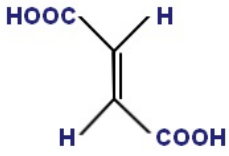
It means, if similar groups are present on same side of C=C double bond, they will remain on same side, known as cis isomers

And, if similar groups are present on opposite side then they will remain on opposite side, known as trans isomers.

Ans 5.Two geometrical isomers of but–2–en–1,4-dioic acid are maleic acid and fumeric acid, shown below:



cis-butenedioic
(maleic acid)



trans-butenedioic acid
(fumaric acid)

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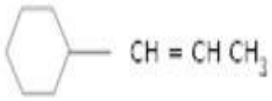
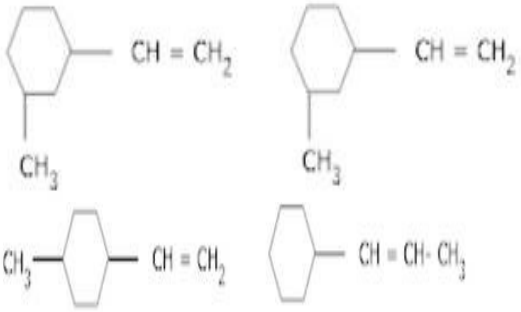
Since Maleic acid is cis isomer (same -COOH group of same side) of but–2–en–1,4-dioic acid, therefore it will have finite dipole moment.

on the other hand, In fumeric acid, same acidic groups are on opposite side, therfore, they will cancel the effect of dipole moment of each, hence have Zero dipole moment.

Ans 6. Out of all possible chain isomers of C_5H_{12} , 2–Methyl butane $(CH_3)_2CH–CH_2–CH_3$ will will have 3° - Carbon (carbon linked to 3 other carbon atoms and one H)

Ans 7. Five structural isomers of cyclohexene and two geometrical isomers(cis and trans) of alkene C_9H_{16} are possible given below:



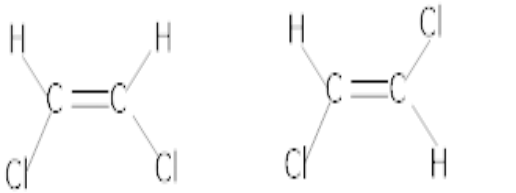


Ans 8. alkynes do not show geometrical isomerism because alkynes contains $C \equiv C$ bond. since carbon shows tetracovalency, therefore only one atom or group of atoms will combine with Carbon atom, having linear geometry. therefore Cis and trans arrangements are not possible. therefore alkynes do not show geometrical isomerism.

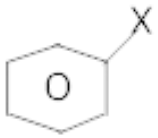
Ans 9. There are two necessary conditions for a compound to possess geometrical isomerism:

1. It must contain a carbon-carbon double bond in a molecule.
2. Two unlike atoms or groups must be linked to each doubly bonded carbon atom.

here each compound contain double bond but the unlike atoms are linked to each double bonded is in case (a) CH Cl = CH Cl only. therefore it will show geometrical isomerism.



Ans 10. In benzene, all carbon atoms are equivalent, so incoming group can be substituted at any Carbon atom of benzene.



on the other hand, when second incoming group undergoes subsitution, there are three possibilities . Three disubstituted benzenes are ortho (1,2- or 1,6 postion) , meta (1,3 or 1,5) and para(1,4-) given below: