Chapter 11. Organic Chemistry - Some Basic Principles and Techniquies

Question-1

What is the hybridization of carbon atoms in $HC \equiv C\text{-}CH = CH_2$?

Solution:

$HC \equiv \overset{1}{C}\text{-}\overset{2}{CH} = CH_2$ Carbon 1 is sp and 2 is sp^2 hybridised carbon atoms.

Hint: For hybridization, π bond is not taken into account. Carbon 2 is connected to three sigma bonds. Hence its hybridisation is sp^2 which gives three bonds.

C^1 is connected to two sigma bonds. Hence its hybridisation is sp.

Question-2

What is the change in the hybridisation of carbon atom, in the following dehydration reaction ?

$$CH_3CONH_2 \xrightarrow{P_2O_5} CH_3CN$$

Solution:

$$\underset{sp^2}{CH_3-\overset{\overset{O}{\|}}{C}-NH_2} \xrightarrow{P_2O_5} \underset{sp}{CH_3C \equiv N} + H_2O$$

Carbon in CH_3CONH_2 is connected with three sigma bonds. Hence, its hybridization is sp^2. But in $CH_3C \equiv N$ carbon atom is connected with two sigma bonds.

Question-3

Which of the following is not a 'Lewis acid' $AlCl_3$, $BeCl_2$, BF_3 & $SnCl_4$?

Solution:

$SnCl_4$ contains octet arrangement (8 electrons) around Sn atom. Hence Sn has no tendency to accept pair of electrons. Therefore $SnCl_4$ is not a Lewis acids.

$AlCl_3$, BF_3 have six electrons around Al and B. In $BeCl_2$, Be has only four electrons. $AlCl_3$, BF_3 and $BeCl_2$ can act as Lewis acid.

Question-4

Which of the following is not an electrophile? OH^-, SO_3 ,NO_2^+, Cl^+.

Solution:

OH^- is not an electrophile. SO_3,NO_2^+, Cl^+ are electrophiles, which attack electron rich carbanions. OH^- is a nucleophile which can attack positively charged carbon atom(carbo cation)

Question-5

Which of the following is not a nucleophile? OH^-, NH_3, BF_3 & HSO_3^-

Solution:

BF_3 , is an electron deficient, molecule. Hence it cannot act as an nucleophile.

Question-6

$C_4H_{10}O$ show metamerism, functional isomerism and position isomerism. Explain.

Solution:

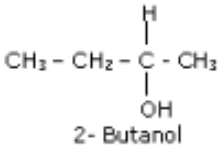
Functional isomerism

$C_4H_{10}O$ $C_2H_5OC_2H_5$ Diethyl ether

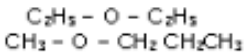
$CH_3CH_2CH_2CH_2OH$

Position isomerism :

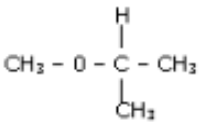
Position OH group in alcohol may be different; $CH_3CH_2CH_2\,CH_2OH$ (I) Butanol



2- Butanol



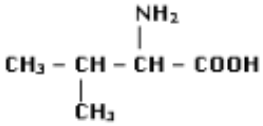
Metamerism:



isopropyl methyl ether.

Question-7

Write IUPAC names for the following compounds.

1) 

2) $CH_3 - CH = CH - C \equiv CH$

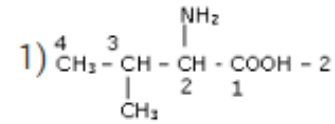
3) $CH_2 = CH - CH_2 - C \equiv CH$

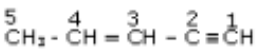
4) $CH_2 = CH - CH = CH_2$

5)

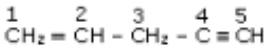
$$\begin{array}{l} CH_2 - CN \\ | \\ CH_2 - CN \end{array}$$

Solution:

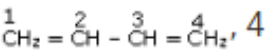
1)  2- amino – 3- methylbutanoic acid

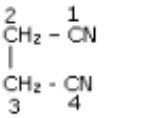
2)  pent – 3 – en – 1 – yne

End carbon atom with double or triple bond, will be given lowest number.

3)  pent – 1 –en – 4yne

If double bonds and triple bonds are in equal position, carbon atoms with double bond will be given the lowest number.

4)  , 4 butadiene.

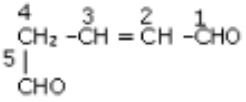
5)  1,4 – Butanedinitrile

Question-8

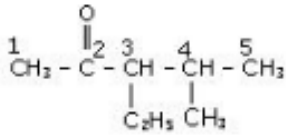
c) 2 – methoxy – 2 – butene.

Solution:

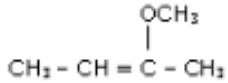
a) pent - 2 - ene - 1,5 - dial



b) 3 - Ethyl - 4 methyl - 2 - pentanone



c) 2 - Methoxy - 2 -butene

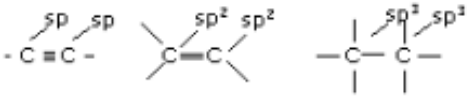


Question-9

Why C ≡ C bond has shorter bond length than C = C and C-C bond?

Solution:

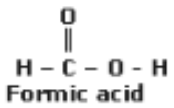
More penetrating character 2 orbital towards its nuclear.

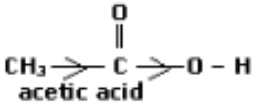


In sp hybrid orbitals ratio of s & p character = 1 : 1
In sp^2 hybrid orbitals ratio of s & p character 1 : 2
In sp^3 hybrid orbitals ratio of s & p character 1 : 3
s-orbital is a localised orbital and the size of the orbital is very small. Hence bond due to s-orbital will be the shorter one. p-orbital is more diffused and hence bond due to p-orbital will be longer than that due to s-orbital. More the s-character more shorter will be the bond length. Triple bond has more s-character. Hence it will have shortest bond length.

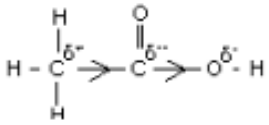
Question-10

Formic acid is a stronger acid than acetic acid. Explain.





Solution:



CH_3 group in acetic acid is a group with +I effect. It is an electron donating group in which a pair of electrons in C – C bond between CH_3 and COOH groups are pushed towards carbon of –COOH group. Similarly pair of electrons of C – O bond of –CO group and –OH are pushed towards oxygen of OH group.
Since oxygen carries δ^- release of hydrogen as H^+ becomes difficult. Hence, acetic acid is a weaker acid than formic acid.

Question-11

How is a mixture of benzoic acid and benzophenone separated?

Solution:

Benzoic acid is soluble in hot water and benzophenone is not soluble in hot water. The mixture is separated by dissolving it in hot water and filtering the hot solution. Benzoic acid crystallizes on cooling the filterate while benzophenone remains as an insoluble residue.

Question-12

By what method is glycerol formed during saponification of oil separated?

Solution:

Glycerol has higher boiling point 563 K with some decomposition. Hence it is separated from spont lye in soap industry by distillation under reduced pressure. Under reduced pressure (12 mm) glycerol distills over at a lower temperature (453K).

Question-13

What is meant by theoretical plate?

Solution:

A fractionating coloumn provides many surfaces for heat exchanges between the ascending vapours and the descending, condensed liquid. These surfaces may consist of fixed plates or glass beads. Each successive condensation and vaporization is called a theoretical plate. Fractionating columns with hundreds of plates are present in commercial fractionating coloumn.

Question-14

How is a mixture of aniline and water, essential oil or turpentine oil from plants, separated? Give the reason:

Solution:

Aniline, essential oil, and turpentine oil are steam volatile and are immiscible with water. When steam is passed through the mixture and distilled, a mixture of steam and the volatile organic compounds is condensed and collected. Using separating funnel, Aniline, or essential oil or turpentine oil is separated from water.

In steam distillation the mixture boils when the sum of vapour pressures due to the Aniline and that due to water becomes equal to the atmospheric pressure. Hence aniline will boil at a low temperature than its boiling point. Since the other liquid is water, mixture will boil at to but below 373 K as aniline gives some vapour pressure.

Question-15

What is meant Rf value? What is the use of it?

Solution:

$$Rf : \frac{\text{Distance moved by the substance from base line}}{\text{Distance moved by the solvent from base line}}$$

It is the qualitative index for substances. From Rf value it is possible to identify the substances.

Question-16

Why is paper chromatography a partition chromatography?

Solution:

In paper chromatography compounds of a mixture are partitioned between stationary phase and mobile phases. Water trapped in the chromatography is the stationary phase and solvents acts as mobile phases. Substances are partitioned according to its solubility between water and the solvents.

Question-17

Define the term 'elution' as applied to column chromatography.

Solution:

The process by which adsorbed substances are desorbed from the stationary phase, by allowing an appropriate solvent or a mixture of solvents to flow down the column slowly. Depending upon the degree to which the compound is adsorbed, partial or complete separation takes place.

Question-18

Which are called stationary phase and mobile phase in chromatography?

Solution:

The solid or liquid on which the mixture to be separated applied called stationary phase. In column chromatory, silica gel, alumina, activated charcoal act as stationary phase. Water trapped in the chromatography paper and silica gel or alumina in thin layer chromatography are other examples. A pure solvent, a mixture of solvents, or a gas which moves slowly over the stationary phase is called mobile phase.

Question-19

List any four modern techniques for structural elucidation.

Solution:

Infrared (IR), ultra violet – visible, (uv-vis) nuclear magnetic resonance(NMR) spectroscopy, and mass spectrometry, XRD(X-ray diffraction technique) are the important modern techniques used for structural elucidation.

Question-20

How steam distillation differs from fractional distillation?

Solution:

Fractional distillation is applicable to separate liquids with closer boiling points. (Ex. Petroleum fractionation). Steam distillation is used to separate substances which are volatile in steam and insoluble in water. These substances may also have higher boiling points (>373 K at 760 mm) and decomposes at or below its boiling point (Ex: turpentine oil / essential oil / aniline).

CBSE Class 11 Chemistry

Important Questions

Chapter 12

Organic Chemistry Some Basic Principles and Techniques

1 Marks Questions

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

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

Ans.(a) σ C = C : 4 (b) σ C = C : 3

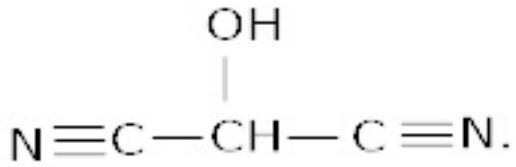
σ C – H : 6 σ C – H : 6

π C = C : 3 π C = C : 2

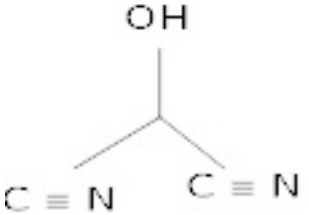
2.Why are electrons easily available to the attacking reagents in π – bonds?

Ans. 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.

3.Write the bond line formula for



Ans.



4.How are organic compounds classified?

Ans.(i) Acyclic or open chain compounds

(ii) Alicyclic or closed chain or ring compounds.

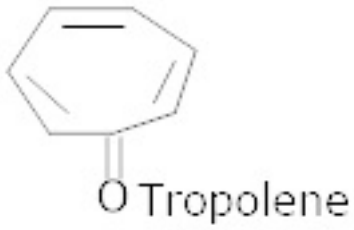
(iii) Aromatic compounds.

5.Define homologous series?

Ans.A group or a series of organic compounds each containing a characteristic functional group forms a homologous series and the members of the series are called homologous.

6.Write an example of non – benzenoid compound.

Ans.



Tropolene

7.What is the cause of geometrical isomerism in alkenes?

Ans. Alkene have a π – bond and the restricted rotation around the π – bond gives rise to geometrical isomerism.

8.Name the chain isomers of C_5H_{12} which has a tertiary hydrogen atom.

Ans. 2 – Methyl butane $(CH_3)_2$ CH – CH_2 – CH_3

9.Define heterolytic cleavage.

Ans. In heterolytic cleavage the bond breaks in such a fashion that the shared pair of electrons remains with one of the fragments.

10.Define carbocation.

Ans.A species having a carbon atom possessing sextet of electrons and a positive charge is called carbocation.

11.What are the nucleophiles?

Ans. The electron rich species are called mucleopiles. A nucleophile has affection for a positively charge centre.

eg OH^-, I^-, CN^-, : NH_3, NO_2^-.

12.How can the mixture of kerosene oil and water be separated?

Ans.The mixture of kerosene oil and water can be separated by using a separating funnel.

13.Lasaigne's test is not shown by diazonium salts. Why?

Ans.Diazonium salts usually leave N_2 on heating much before they have a chance to react with the fused sodium metal. Therefore, diazonium salts do not show positive lassaigne's test for nitrogen.

14.In which C – C bond of $CH_3CH_2CH_2Br$, the inductive effect is expected to be the least?

Ans .Magnitude of inductive effect diminishes as the number of intervening bonds increases. Hence the effect is least in C_3 – H bond.

15.Can you use potassium in place of sodium for fusing an organic compound in Lassaigne's test?

Ans . No, because potassium is more reactive than sodium.

16.Give the reason for the fusion of an organic compound with sodium metal for testing nitrogen, sulphur and halogens.

Ans. The element present in the compound are converted from covalent form into ionic form by fusing the compound with sodium metal.

17.Write the chemical composition of the compound formed when ferric chloride is added containing both N and S.

Ans

$$FeCl_3 + Na\,SCN \rightarrow \underset{\text{(blood red)}}{[Fe(SCN)]^{2+}} + 3NaCl$$

CBSE Class 12 Chemistry

Important Questions

Chapter 12

Organic Chemistry Some Basic Principles and Techniques

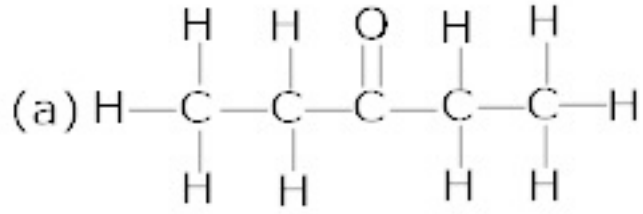
2 Marks Questions

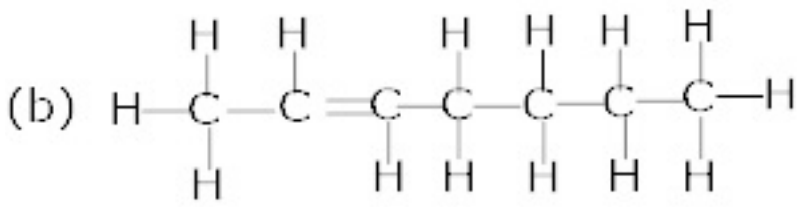
1.Write the expanded form of the following condensed formulas into their complete structural formulas.

(a) $CH_3CH_2COCH_2CH_3$.

(b) $CH_3CH{=}CH(CH_2)_3CH_3$.

Ans.





2.How does hybridization affect the electronegativity ?

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

3.Why is sp hybrid orbital more electronegative than sp2 or sp3 hybridized orbitals?

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

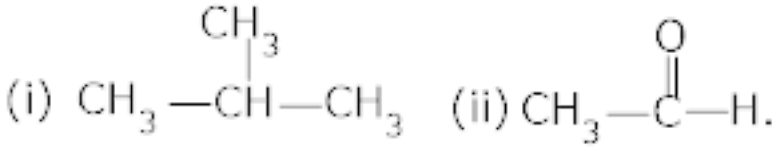
eg: hydroxyl group (- OH)

aldehyde group (- CHO)

carboxylic acid group (-COOH) etc.

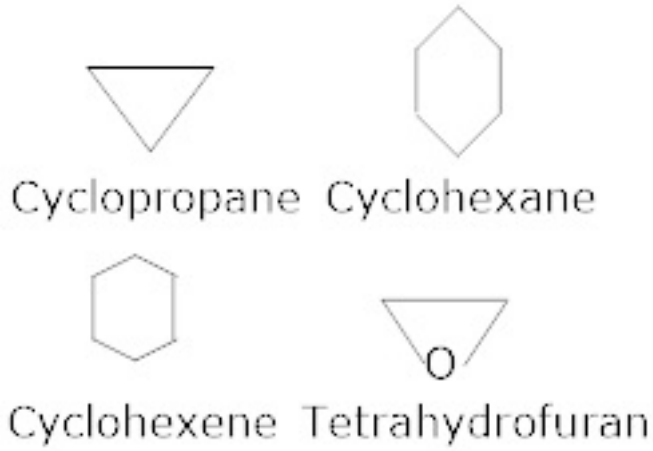
4.Give two examples of aliphatic compounds.

Ans.



5.Write an example of alicyclic compound.

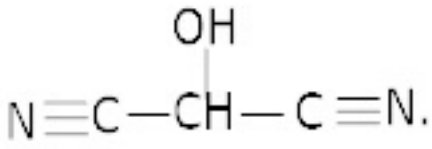
Ans.



6.For each of the following compounds write a condensed formula and also their bondline formula.

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

(b)

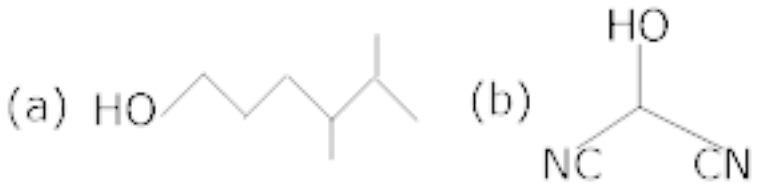


AnsCondensed formula

(a) HO $(CH_2)_5CH\ CH_3\ CH\ (CH_3)_2$

(b) $HOCH\ (CN)_2$.

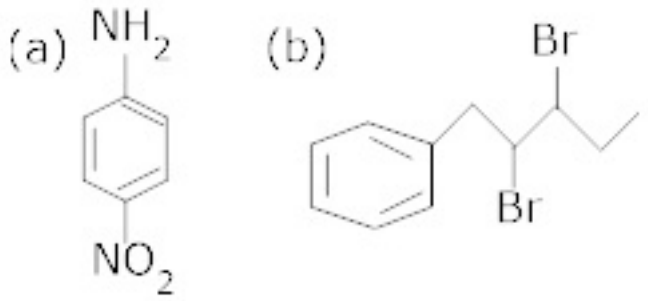
Bond line formula.



7.Write the structural formula of

(a) p – Nitro aniline (b) 2,3 – Dibromo-1-phenylpentane.

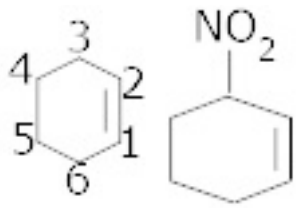
Ans.



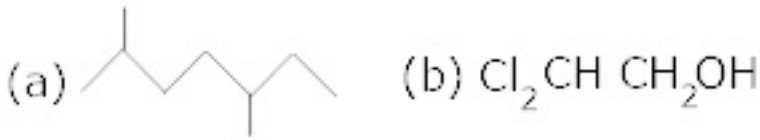
8.Derive the structure of 3 – Nitrocyclohexene.

Ans.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:



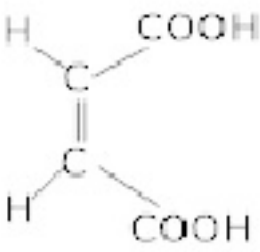
9.Give the IUPAC of the following –



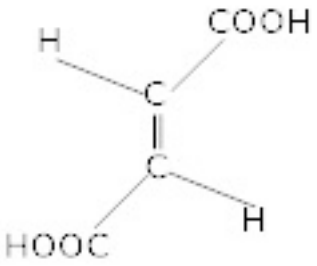
Ans.(a) 2,5 – dimethyl heptanes (b) 2,2 – dichloro ethanol.

10.Draw the two geometrical isomers of, but – 2 – en – 1, 4 dioic acid. Which of the will have higher dipole movement?

Ans.



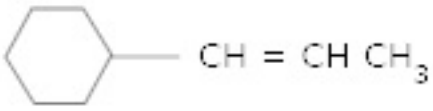
Cis but-2-en-1, 4 dific acid
more dipole movement

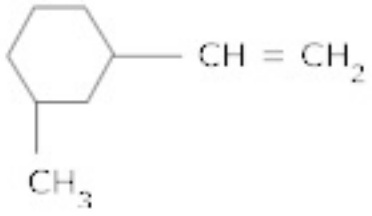


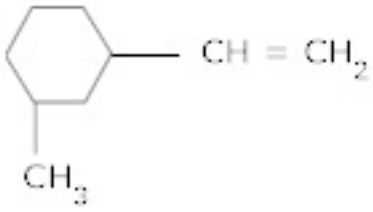
but-2-en-dioicacid
zero dipole moment

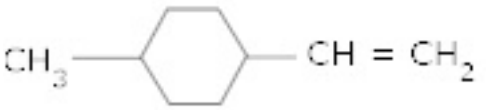
11.How many structural isomers and geometrical isomers are possible for a cyclohexane derivative having the molecular formula C_9H_{16}?

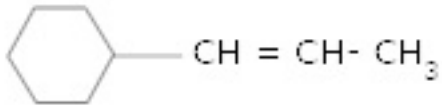
Ans. Five structural isomers

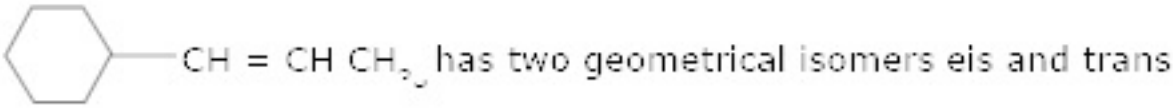












12.Alkynes does not exhibit geometrical isomers. Give reason.

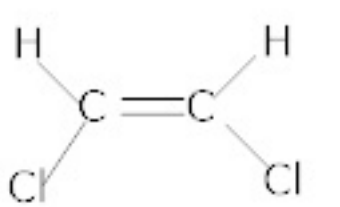
Ans. Because of linear geometry.

13.Which of the following shows geometrical isomerism?

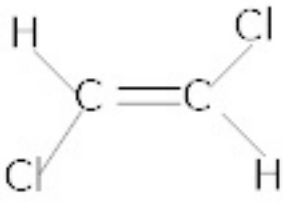
(a) CH Cl = CH Cl (b) CH_2 = C Cl_2 (c) C Cl_2 = CH Cl.

Ans.Only compound (a) will show geometrical isomers.

(a) CH Cl = CH Cl



Cis-1,2-dichloro ethenc



trans-1,2-dichloro ethenc

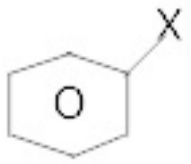
14.What is a functional group?

Ans. It may be defined as an atom or group of atoms joined in a specific manner which is

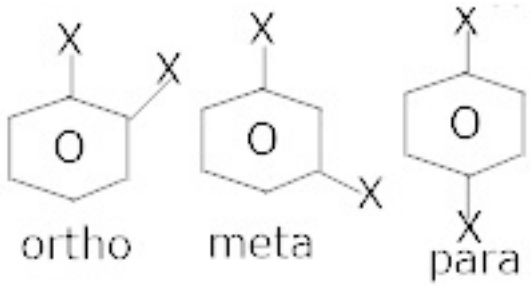
responsible for the characteristic chemical properties of the organic compounds.

15.How many isomers are possible for monosubstituted and disubstituted benzene?

Ans. There is one, monosubstituted benzene as



There are three disubstituted benzenes.



16.Identify electrophilic centre in the following: $CH_3CH=O, C\overset{+}{H}_3C, CH_3I.$

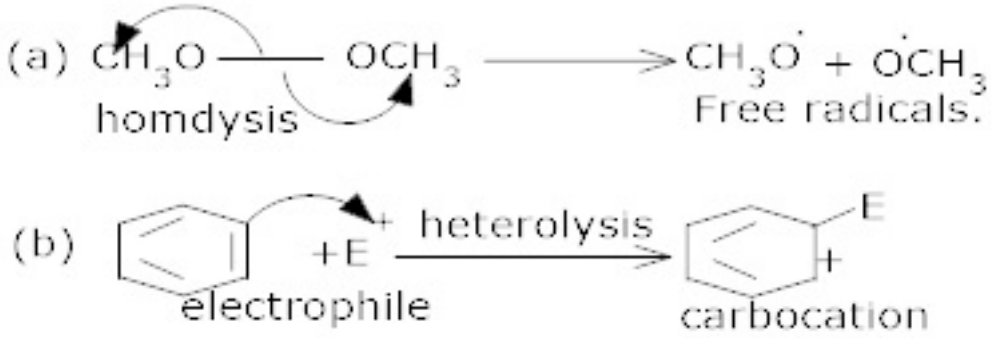
Ans. The shared carbon atoms are electrophilic centres as they will have partial positive charge **due to polarity of the bond. CH_3 HC = O, H_3 CC = N, H_3 C – I.**

17.For the following bond cleavages, use curved arouse to the electron flow and classify each as photolysis or heterolysis. Identify the reaction intermediates products as free radical carbocation or carban ion.

(a) CH_3 O – O CH_3 →CH_3 $\bar{O}+\bar{O}CH_3.$

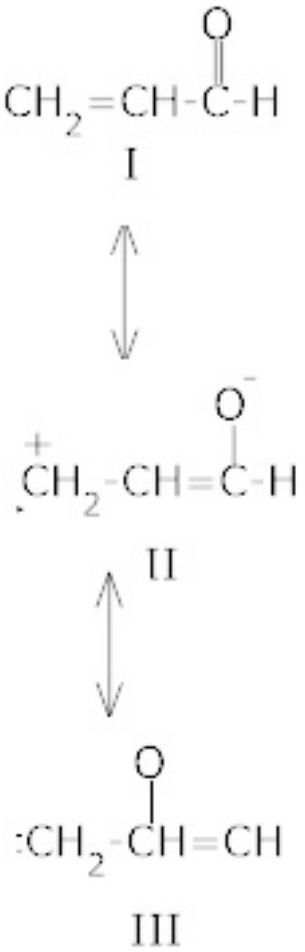
(b) 

Ans.



18.Write resonance structures of CH_2 = CH – CHO. Indicate relative stability of the contributing structure.

Ans.

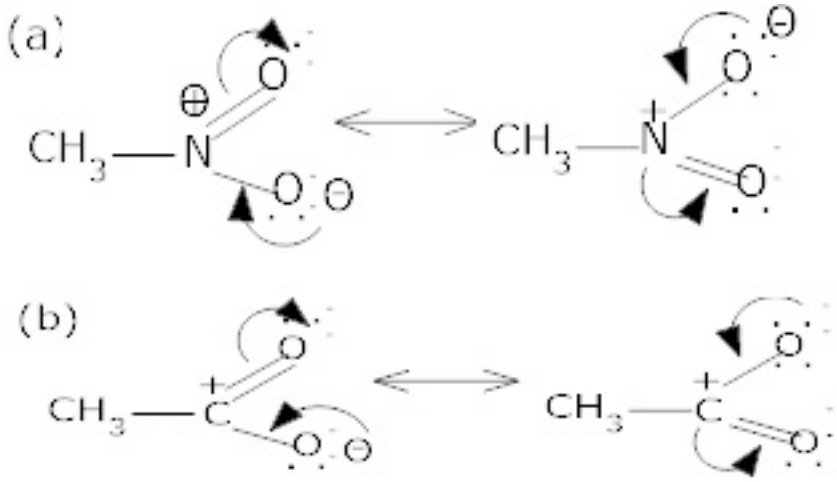


Stability I>II>III.

19.Write the resonance structures of

(a) CH_3NO_2 (b) CH_3COO^-

Ans.

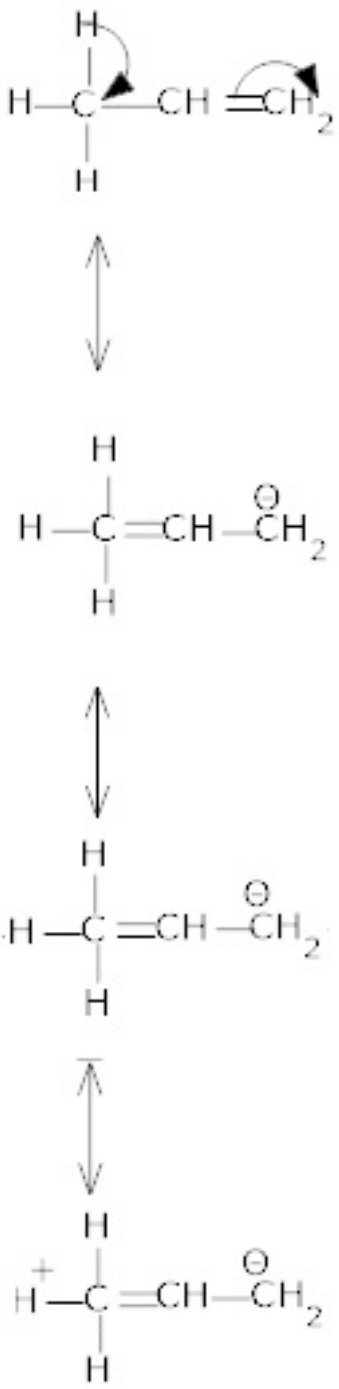


20.Explain why is $(CH_3)_3C^+$ more stable than $CH_3CH_2^+$ and CH_3^+ is the least stable cation.

Ans. Hyper conjugation interaction in $(CH_3)_3C^+$ is greater than in $CH_3CH_2^+$ as $(CH_3)_3C^+$ has nine C-H bonds. In CH_3^+, The C-H bond the nodal plane of the vacant 2p orbital and hence can not overlap with it. Thus, CH_3^+ locus hyper conjugat*e stability*.

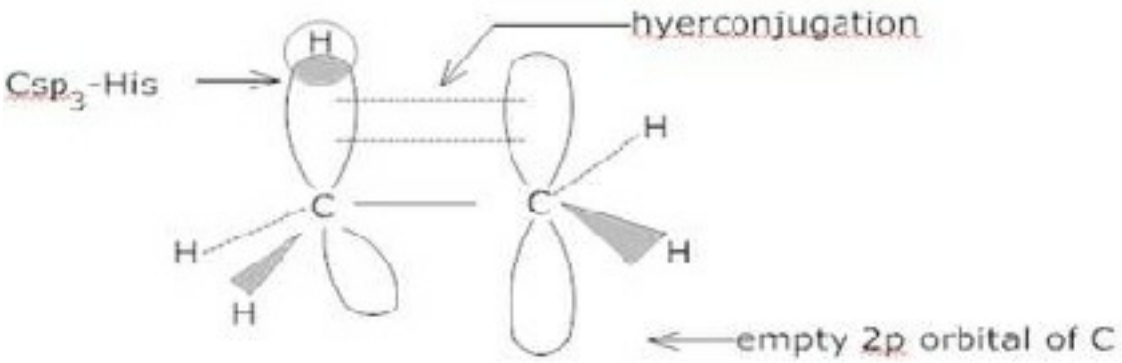
21.Show how hyper conjugation occurs in propene molecule.

Ans.



22.Draw the orbital diagram showing *hyperconjugation* in ethyl cations

Ans.



23.Name the common techniques used for purification of organic compounds.

Ans.(i) Sublimation **(ii)** Crystallization **(iii)** Distillation **(iv)** Differential extraction and **(v)** Chromatography.

24.Will C Cl_4 give white precipitate of Ag Cl on heating it with Ag NO_3?

Ans. CCl_4 does not give white precipitate with silver nitrate solution.

CCl_4 + Ag NO_3 →No reaction.

Carbon tetrachloride contains chlorine but it is bonded to carbon by a covalent bond. Therefore it is not in ionic form. Hence, it does not combine with Ag NO_3 solution.

25.Without using column chromatography, how will you separate a mixture of camphor and benzoic acid?

Ans. Sublimation can not be used since both camphor and benzoic acid sublime on heating. Therefore a chemical method using $NaHCO_3$ solution is used when benzoic acid dissolves leaving camphor behind. The filtrate is cooled and then acidified with dil HCl, to get benzoic acid.

26.A liquid (1.0g) has three components. Which technique will you employ to separate them?

Ans. Column chromatography.

27.Name two methods which can be safely used to purify aniline.

Ans.(i) vacuum distillation method

(ii) steam distillation method.

28.What is the basic principle of chromatography?

Ans. The method of chromatography is based on the difference in the rates at which the components of a mixture are adsorbed on a suitable adsorbent.

29.How will you separate a mixture of two organic compounds which have different solubility's in the same solvent?

Ans. By fractional crystallization.

CBSE Class 12 Chemistry

Important Questions

Chapter 12

Organic Chemistry Some Basic Principles and Techniques

3 Marks Questions

1.What is the shape of the following molecules:

(a) H_2 C=O (b) CH_3F (c) HC≡N.

Ans.(a) sp^2 hybridized carbon, trigocal planar

(b) sp^3 hybridized carbon, tetrahedral

(c) sp hybridized carbon, linear.

2.Giving justification, categories the following molecules or ions as nucleophle or electrophile: HS^-, BF_3, $C_2H_5O^-$, $(CH_3)_3N$:, Cl^-, $CH_3C^+ = O$,

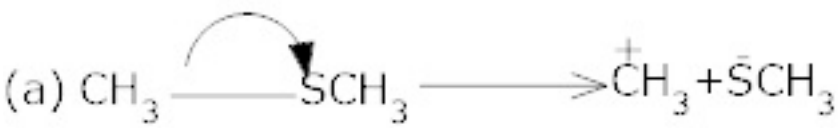
Ans.Nucleophiles : HS^-, $C_2H_5O^-$, $(CH_3)_3$ N:, H_2N^-: (have unshared pair of electrons which can be donated and shared with an electrophile)

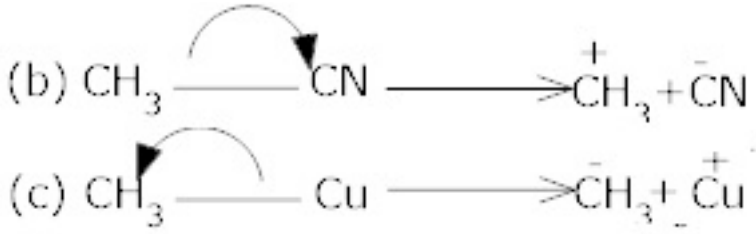
Electrophile : BF_3, Cl^+, $CH_3C^+ = O^+$ NO_2[have only six electrons which can be accept electron from a nucleophile].

3. Using curved – arrow notation, show the formation of reactive intermediates when the following covalent bond undergo heterolysis cleavage.

(a) $CH_3 – SCH_3$, (b) $CH_3 – CN$, (c) $CH_3 – Cu$.

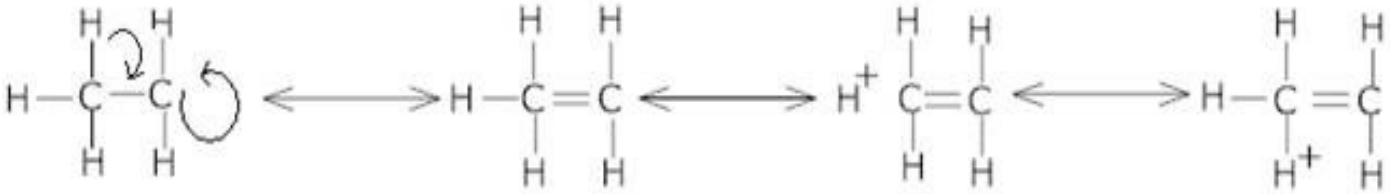
Ans.





4.Benzyl carbonation is more stable than ethyl carbonation. Justify.

Ans. In ethyl carbocation, there is only hyper conjugation of the three α – hydrogen atoms and as a result, the following contributing structures are feasible.

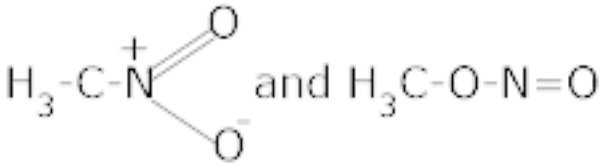


But benzyl carbocation is more stable due to the presence of resonance and the following

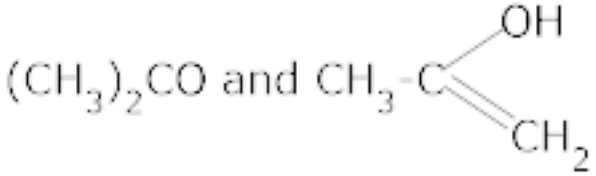
resonating structures are possible

5.Which of the following pairs of structures do not constitute resonance structures?

(a)



(b)



(c) $CH_3CH=CHCH_3$ and $CH_3CH_2CH = CH_2$.

Ans.

(a) H_3C-O-N=O

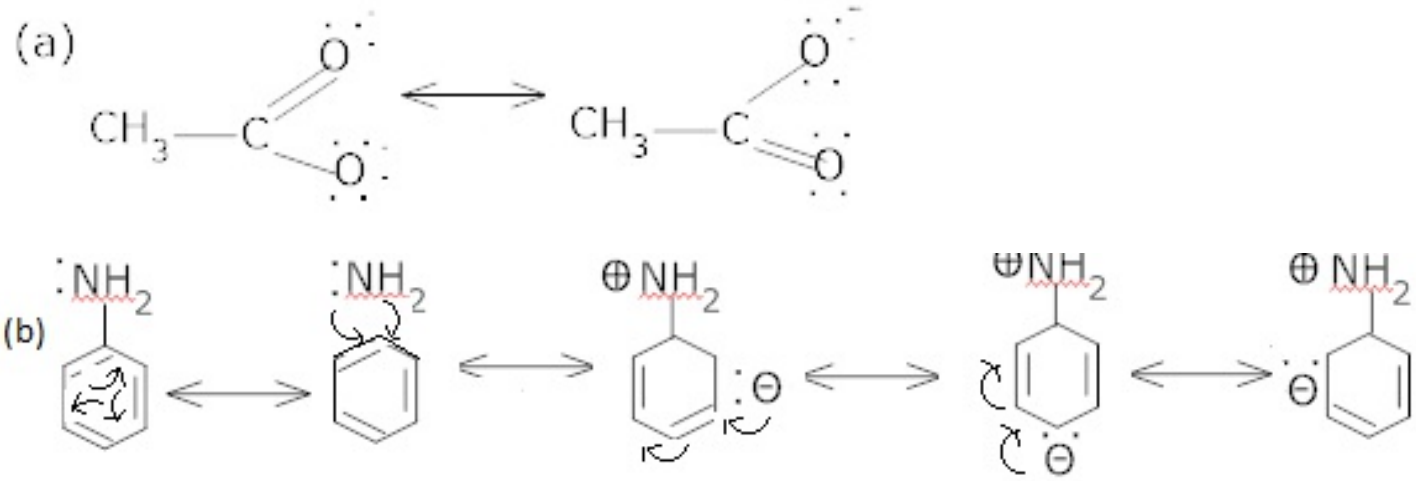
(b) $(CH_3)_2$ CO

(c) $CH_3CH_2CH=CH_2$.

6.Write resonance structures of

(a)CH_3COO^- (b) $C_6H_5NH_2$.

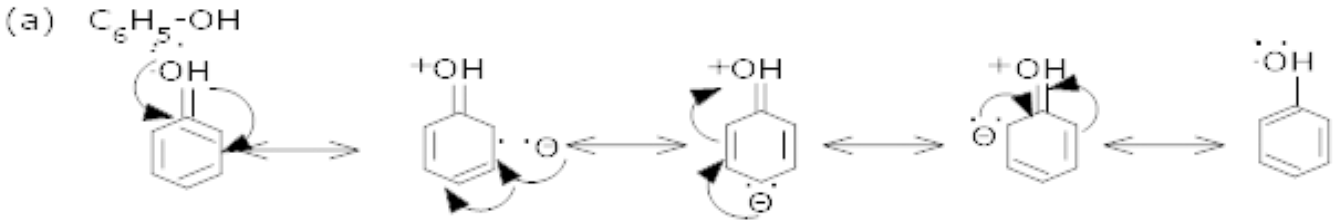
Ans.

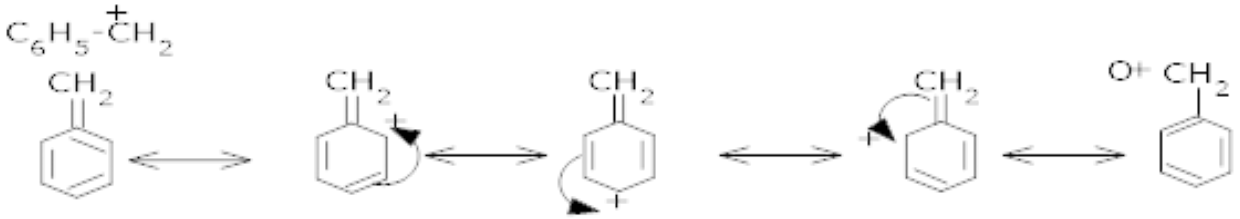


7.Draw the resonance structures for the following compounds

(a) C_6H_5OH (b) C_6H_5 - $\overset{+}{C}H_2$

Ans.



(b) 

8. 0.395 g of an organic compound by Carius method for the estimation of sulphur gave 0.582 g of $BaSO_4$. Calculate the percentage of sculpture in the compound.

Ans. Mass of $BaSO_4$ = 0.582g

$BaSO_4$ = S

233 32

233g of $BaSO_4$ contain sulphur = 32g

0.582g of $BaSO_4$ contains sulphur $= \frac{32}{233} x0.582$

Percentage of sulphur = $\frac{wt.of\ \text{sulphur}}{wt.of\ \text{compound}} x100$

$= \frac{32x0.582}{233x0.395} x100$

20.24%

9. 0.40g of an organic compound gave 0.3g of Ag Br by Carious method. Find the percentage of bromine in the compound.

Ans.

Mass of the compound = 0.40g

Now 188g of Ag Br will contain Br = 80g

Therefore, 0.3g of Ag Br will contain Br = $\frac{80}{188} x0.3 = 0.127g$

The percentage of Br in the organic compound

= $\frac{0.127}{0.40} x100 = 31.75\%$

10. 0.12g of organic compound containing phosphorus gave 0.22g of $Mg_2P_2O_7$ by the usual analysis. Calculate the percentage of phosphorus in the compound.

Ans. Here the mass of the compound taken = 0.12g

Mass of $Mg_2P_2O_7$ formed = 0.22g of atoms of P

Now 1 mole of $Mg_2P_2O_7$ = (2x24+2x31+1687)

= 222g of $Mg_2P_2O_7$

= 62%

i.e; 222g of $Mg_2P_2O_7$ contain phosphorus = 62g.

∴ 0.22g of $Mg_2P_2O_7$ will contain phosphorus.

= $\frac{62}{222} x0.22$

But this is the amount of phosphorus present in 0.12g of organic compound

Hence, percentage of phosphorus

= $\frac{62}{222} \frac{x0.22}{0.12} x100$

= $\underline{51.20}$

11. Ammonia produced when 0.75g of a substance was kjeldahlized, neutralized 30cm^3

of 0.25 N H_2SO_4. Calculate the percentage of nitrogen in the compound.

Ans. Mass of organic compound = 0.75g

Volume of H_2SO_4 used us = $30cm^3$

Normality of H_2SO_4 = 0.25N

$30cm^3$ of H_2SO_4 of normality 0.25N ≡ 30ml of NH_3 solution of normality 0.25N

But $1000cm^2$ of NH_3 of normality 1 contains 14g of nitrogen

$\therefore$ $30cm^3$ of 0.25N NH_3 contains nitrogen $\frac{=14}{1000} x30x0.25$

% of nitrogen = $\frac{Mass\ of\ nitrogen}{Mass\ of\ substance} x1000$

= $\frac{14}{1000} x \frac{30x0.25}{0.75} x100$

$\underline{\underline{=14.00}}$.

Organic Chemistry Some Basic Principles & Technique

Short Answer Type Questions

Note : Consider structures I to VII and answer the questions 23–26.

I. $CH_3—CH_2—CH_2—CH_2—OH$

II. $CH_3—CH_2—\underset{\displaystyle OH}{\underset{|}{CH}}—CH_3$

III. $CH_3—\overset{\displaystyle CH_3}{\overset{|}{\underset{\displaystyle OH}{\underset{|}{C}}}}—CH_3$

IV. $CH_3—\underset{\displaystyle CH_3}{\underset{|}{CH}}—CH_2—OH$

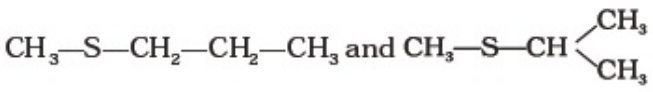
V. $CH_3—CH_2—O—CH_2—CH_3$

VI. $CH_3—O—CH_2—CH_2—CH_3$

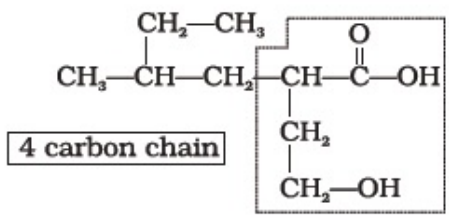
VII. $CH_3—O—\underset{\displaystyle CH_3}{\underset{|}{CH}}—CH_3$

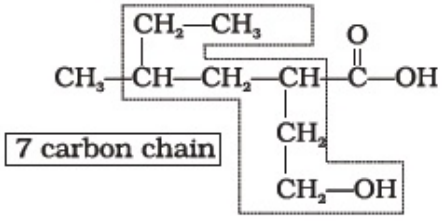
1. Which of the above compounds form pairs of metamers?
2. Identify the pairs of compounds which are functional group isomers.
3. Identify the pairs of compounds that represents position isomerism.
4. Identify the pairs of compounds that represents chain isomerism.
5. For testing halogens in an organic compound with $AgNO_3$ solution, sodium extract (Lassaigne's test) is acidified with dilute HNO_3. What will happen if a student acidifies the extract with dilute H_2SO_4 in place of dilute HNO_3?
6. What is the hybridisation of each carbon in $H_2C = C = CH_2$.
7. Explain, how is the electronegativity of carbon atoms related to their state of hybridisation in an organic compound?

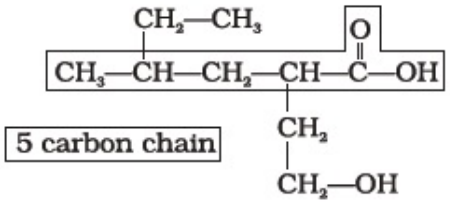
8. Show the polarisation of carbon-magnesium bond in the following structure.
   $CH_3—CH_2—CH_2—CH_2—Mg—X$
9. Compounds with same molecular formula but differing in their structures are said to be structural isomers. What type of structural isomerism is shown by

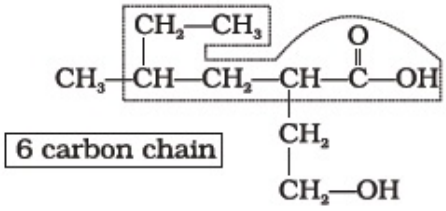


10. Which of the following selected chains is correct to name the given compound according to IUPAC system.







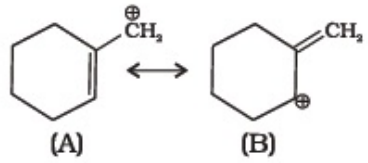


11. In DNA and RNA, nitrogen atom is present in the ring system. Can Kjeldahl method be used for the estimation of nitrogen present in these? Give reasons.
12. If a liquid compound decomposes at its boiling point, which method (s) can you choose for its purification. It is known that the compound is stable at low pressure, steam volatile and insoluble in water.

Note : Answer the questions 35 to 38 on the basis of information given below:
"Stability of carbocations depends upon the electron releasing inductive effect of groups adjacent to positively charged carbon atom involvement of neighbouring groups in hyperconjugation and resonance."

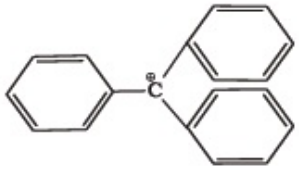
13. **Draw the possible resonance structures for $CH_3-\ddot{O}-\overset{+}{C}H_2$ and predict which of the structures is more stable. Give reason for your answer.**

14. Which of the following ions is more stable? Use resonance to explain your answer.

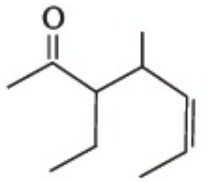


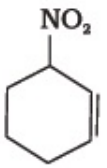
(A) (B)

15. The structure of triphenylmethyl cation is given below. This is very stable and some of its salts can be stored for months. Explain the cause of high stability of this cation.



16. Write structures of various carbocations that can be obtained from 2-methylbutane. Arrange these carbocations in order of increasing stability.
17. Three students, Manish, Ramesh and Rajni were determining the extra elements present in an organic compound given by their teacher. They prepared the Lassaigne's extract (L.E.) independently by the fusion of the compound with sodium metal. Then they added solid $FeSO_4$ and dilute sulphuric acid to a part of Lassaigne's extract. Manish and Rajni obtained prussian blue colour but Ramesh got red colour. Ramesh repeated the test with the same Lassaigne's extract, but again got red colour only. They were surprised and went to their teacher and told him about their observation. Teacher asked them to think over the reason for this. Can you help them by giving the reason for this observation. Also, write the chemical equations to explain the formation of compounds of different colours.
18. Name the compounds whose line formulae are given below :

(i) 

(ii) 

19. Write structural formulae for compounds named as-
    - (a) 1-Bromoheptane
    - (b) 5-Bromoheptanoic acid

20. Draw the resonance structures of the following compounds;

    (i) $CH_2 = CH—\ddot{\underset{\cdot\cdot}{C}}l:$

    (ii) $CH_2 = CH—CH = CH_2$

    (iii) $CH_2 = CH—\underset{\underset{H}{|}}{C} = O$

21. Identify the most stable species in the following set of ions giving reasons :

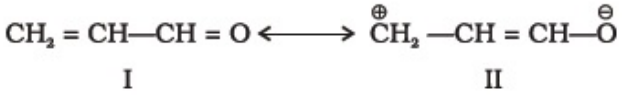
    (i) $\overset{+}{C}H_3$, $\overset{+}{C}H_2Br$, $\overset{+}{C}HBr_2$, $\overset{+}{C}Br_3$

    (ii) $\overset{\ominus}{C}H_3$, $\overset{\ominus}{C}H_2Cl$, $\overset{\ominus}{C}HCl_2$, $\overset{\ominus}{C}Cl_3$

22. Give three points of differences between inductive effect and resonance effect.
23. Which of the following compounds will not exist as resonance hybrid. Give reason for your answer :
    - (i) CH_3 OH
    - (ii) R—$CONH_2$
    - (iii) $CH_3CH = CHCH_2NH_2$

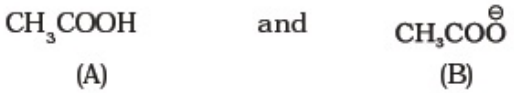
24. Why does SO_3 act as an electrophile?
25. Resonance structures of propenal are given below. Which of these resonating structures is

more stable? Give reason for your answer.



I II

26. By mistake, an alcohol (boiling point 97°C) was mixed with a hydrocarbon (boiling point 68°C). Suggest a suitable method to separate the two compounds. Explain the reason for your choice.
27. Which of the two structures (A) and (B) given below is more stabilised by resonance? Explain.



(A) and (B)

Long Answer Type Questions

1. What is meant by hybridisation? Compound $CH_2 = C = CH_2$ contains sp or sp^2 hybridised carbon atoms. Will it be a planar molecule?
2. Benzoic acid is a organic compound. Its crude sample can be purified by crystallisation from hot water. What characteristic differences in the properties of benzoic acid and the impurity make this process of purification suitable?
3. Two liquids (A) and (B) can be separated by the method of fractional distillation. The boiling point of liquid (A) is less than boiling point of liquid (B). Which of the liquids do you expect to come out first in the distillate? Explain.
4. You have a mixture of three liquids A, B and C. There is a large difference in the boiling points of A and rest of the two liquids i.e., B and C. Boiling point of liquids B and C are quite close. Liquid A boils at a higher temperature than B and C and boiling point of B is lower than C. How will you separate the components of the mixture. Draw a diagram showing set up of the apparatus for the process.
5. Draw a diagram of bubble plate type fractionating column. When do we require such type of a column for separating two liquids. Explain the principle involved in the separation of components of a mixture of liquids by using fractionating column. What industrial applications does this process have?
6. A liquid with high boiling point decomposes on simple distillation but it can be steam distilled for its purification. Explain how is it possible?