**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

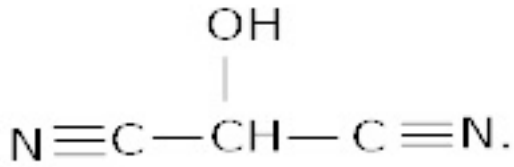
σ C – H : 6 σ C – H : 6

π C = C : 3 π C = C : 2

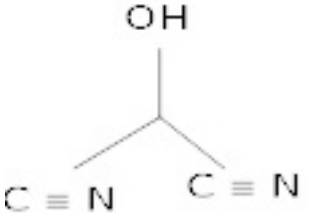
**2.Why are electrons easily available to the attacking reagents in π – bonds?**

**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.

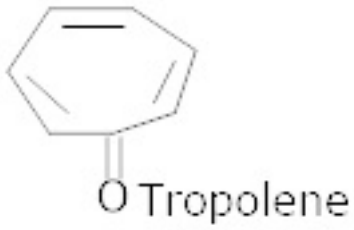
**(iii)** Aromatic compounds.

**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**

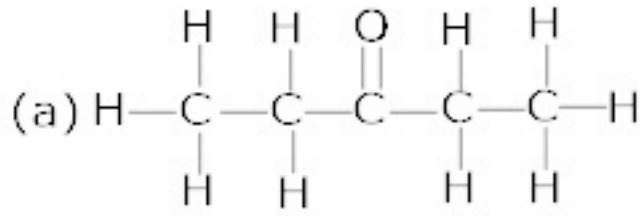
**2 Marks Questions**

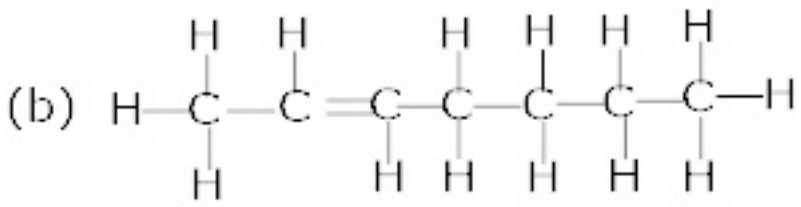
**1.Write the expanded form of the following condensed formulas into their complete structural formulas.**

**(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.**

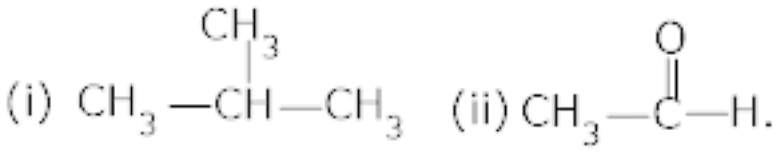
eg: hydroxyl group (- OH)

aldehyde group (- CHO)

carboxylic acid group (-COOH) etc.

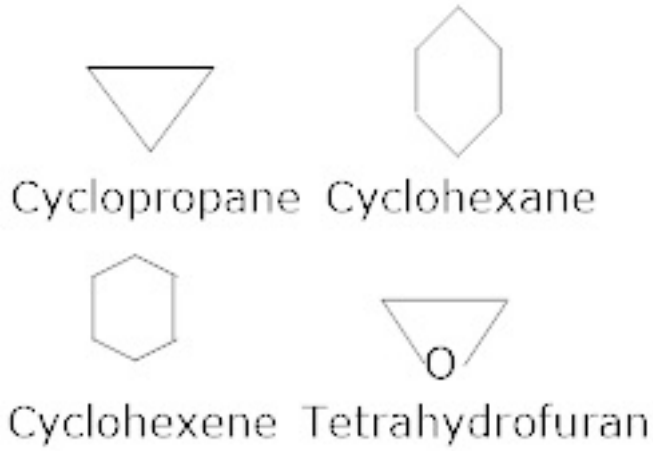
**4.Give two examples of aliphatic compounds.**

**Ans.**



**5.Write an example of alicyclic compound.**

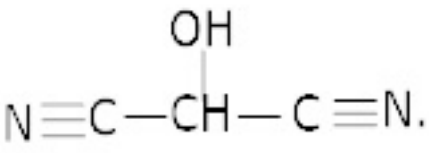
**Ans.**




**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)**

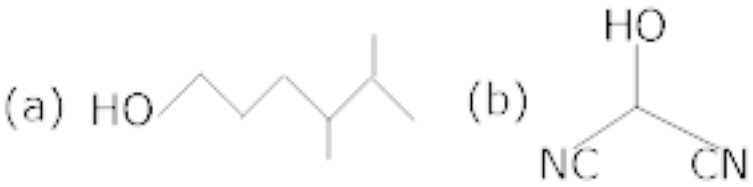


**Ans**Condensed formula

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

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

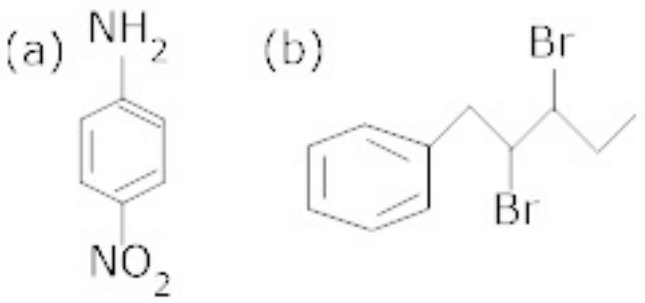
Bond line formula.



**7.Write the structural formula of**

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

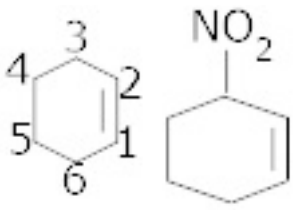
**Ans.**



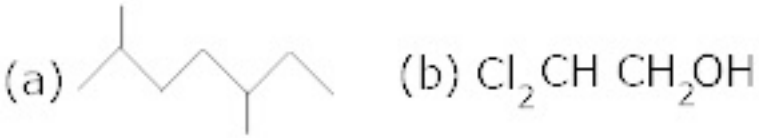
**8.Derive the structure of 3 – Nitrocyclohexene.**

**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:



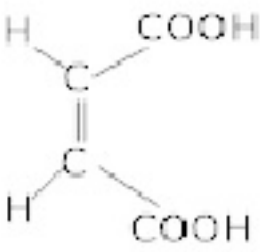

**9.Give the IUPAC of the following –**



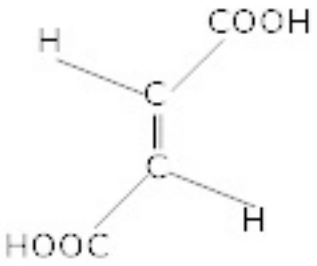

**Ans.**(a) 2,5 – dimethyl heptanes (b) 2,2 – dichloro ethanol.

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

**Ans.**



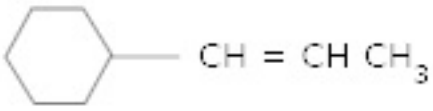

Cis but-2-en-1, 4 dific acid
more dipole movement

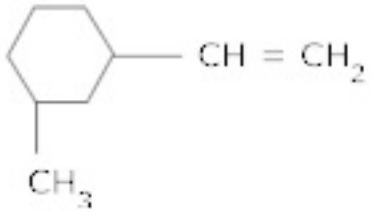


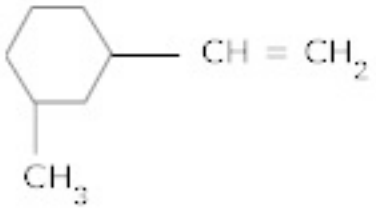

but-2-en-dioicacid
zero dipole moment

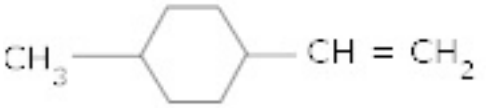
**11.How many structural isomers and geometrical isomers are possible for a cyclohexane derivative having the molecular formula $C_9H_{16}$?**

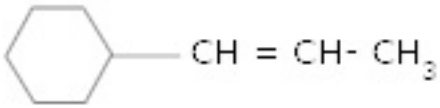
**Ans.**Five structural isomers

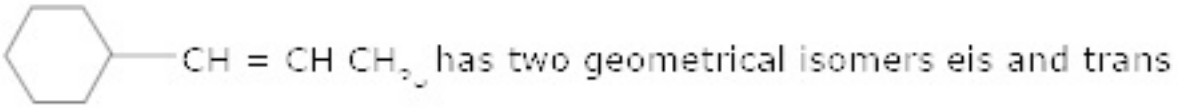



**12.Alkynes does not exhibit geometrical isomers. Give reason.**

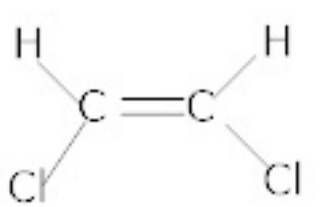
**Ans.**Because of linear geometry.

**13.Which of the following shows geometrical isomerism?**

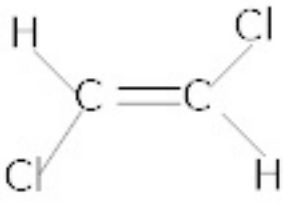
**(a) CH Cl = CH Cl (b) $CH_2$ = C $Cl_2$ (c) C $Cl_2$ = CH Cl.**

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

(a) CH Cl = CH Cl




Cis-1,2-dichloro ethenc




trans-1,2-dichloro ethenc

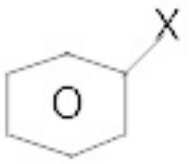
**14.What is a functional group?**

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

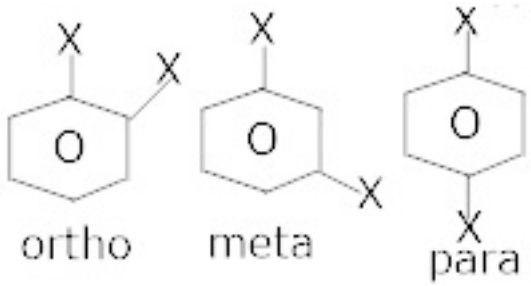
responsible for the characteristic chemical properties of the organic compounds.

**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:** $CH_3CH=O, C\overset{+}{H}_3C, CH_3I.$

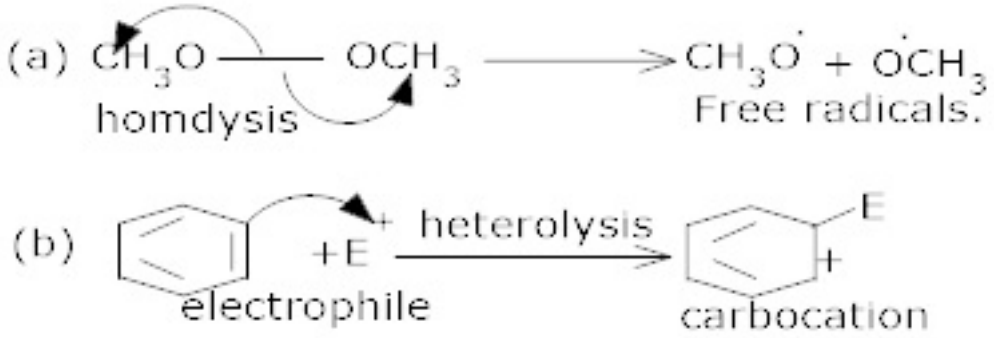
**Ans.** The shared carbon atoms are electrophilic centres as they will have partial positive charge **due to polarity of the bond. $CH_3$ HC = O, $H_3$ CC = N, $H_3$ C – I.**

**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 $CH_3$ →$CH_3$** $\bar{O}+\bar{O}CH_3.$

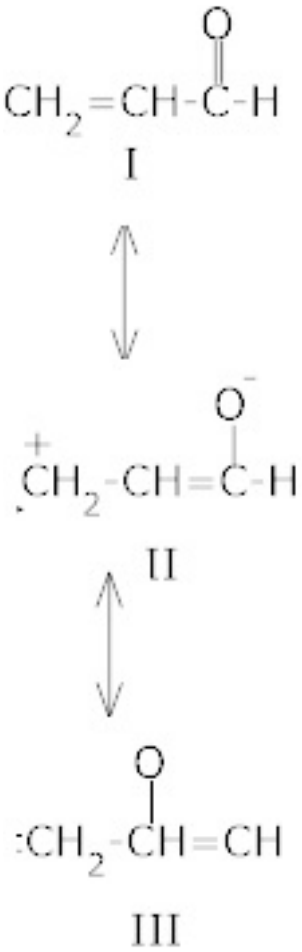
**(b)** 

**Ans.**




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

**Ans.**

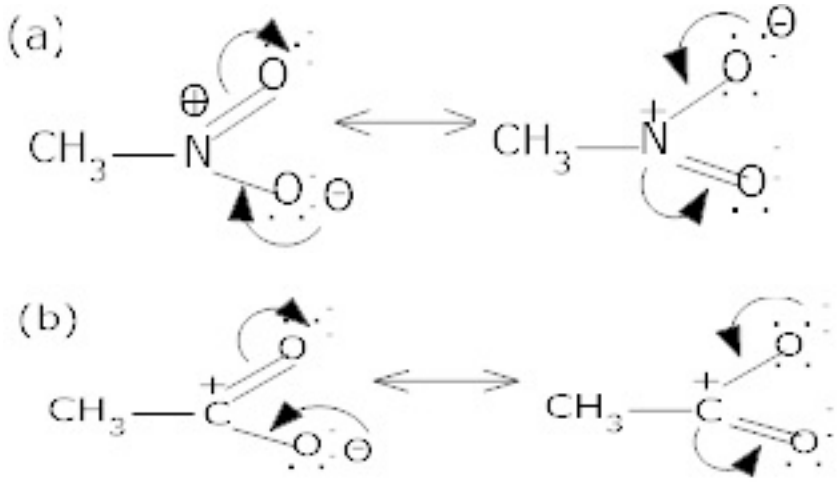



Stability I>II>III.

**19.Write the resonance structures of**

**(a) $CH_3NO_2$ (b) $CH_3COO^-$**

**Ans.**

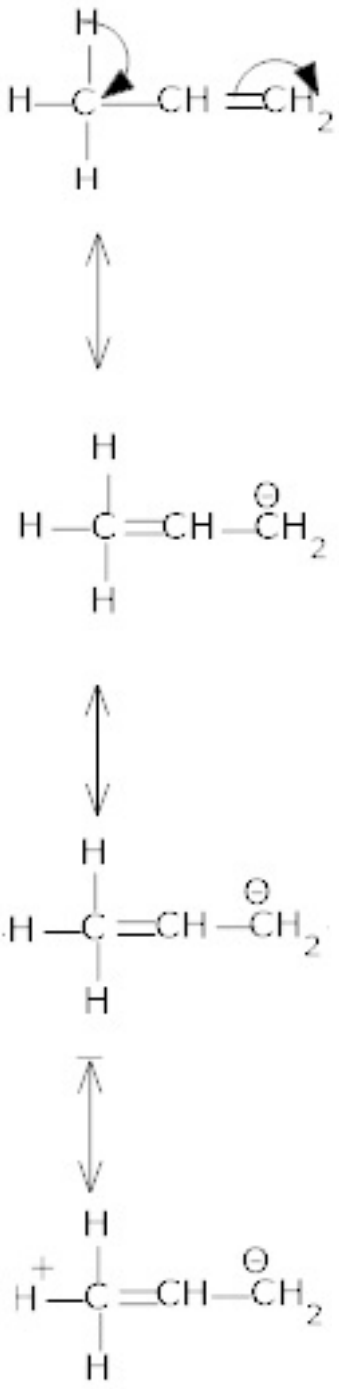



**20.Explain why is $(CH_3)_3C^+$ more stable than $CH_3CH_2^+$ and $CH_3^+$ is the least stable cation.**

**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*.

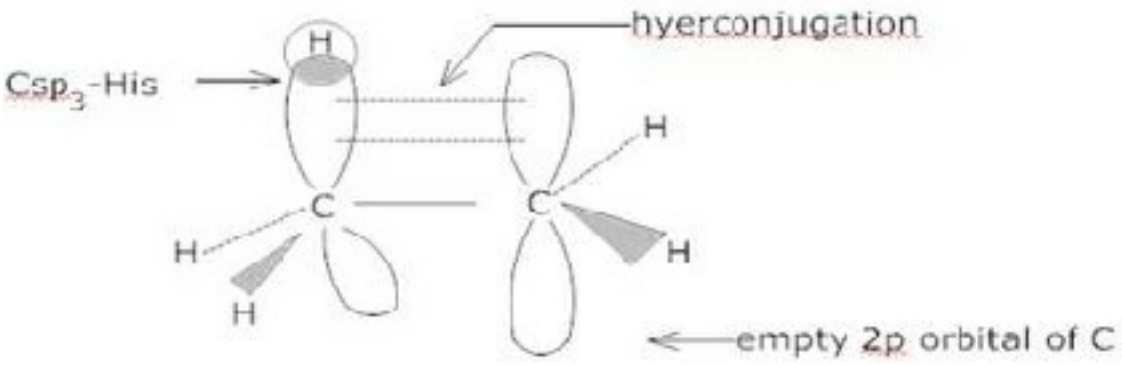
**21.Show how hyper conjugation occurs in propene molecule.**

**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: $HS^-$, $BF_3$, $C_2H_5O^-$, $(CH_3)_3N$:, $Cl^-$, $CH_3C^+ = O$,** 

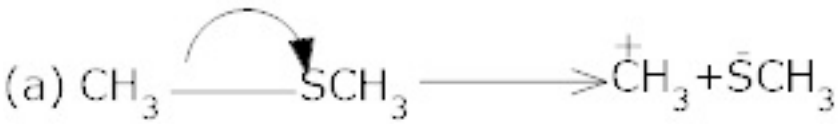
**Ans**.Nucleophiles : $HS^-$, $C_2H_5O^-$, $(CH_3)_3$ N:, $H_2N^-$: (have unshared pair of electrons which can be donated and shared with an electrophile)

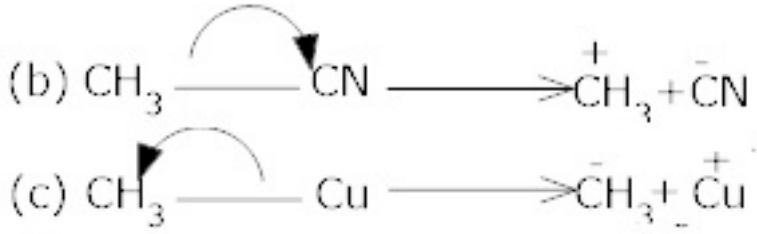
Electrophile : $BF_3$, $Cl^+$, $CH_3C^+ = O^+$ $NO_2$[have only six electrons which can be accept electron from a nucleophile].

**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) $CH_3 – Cu$.**

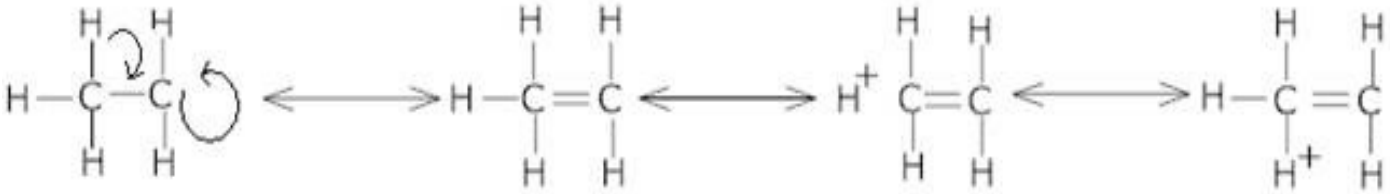
**Ans.**





**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.

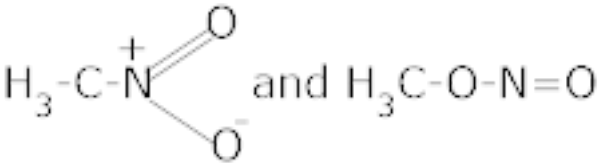


But benzyl carbocation is more stable due to the presence of resonance and the following

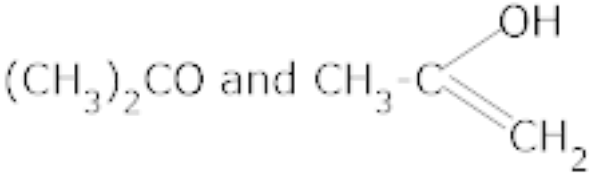
resonating structures are possible

**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

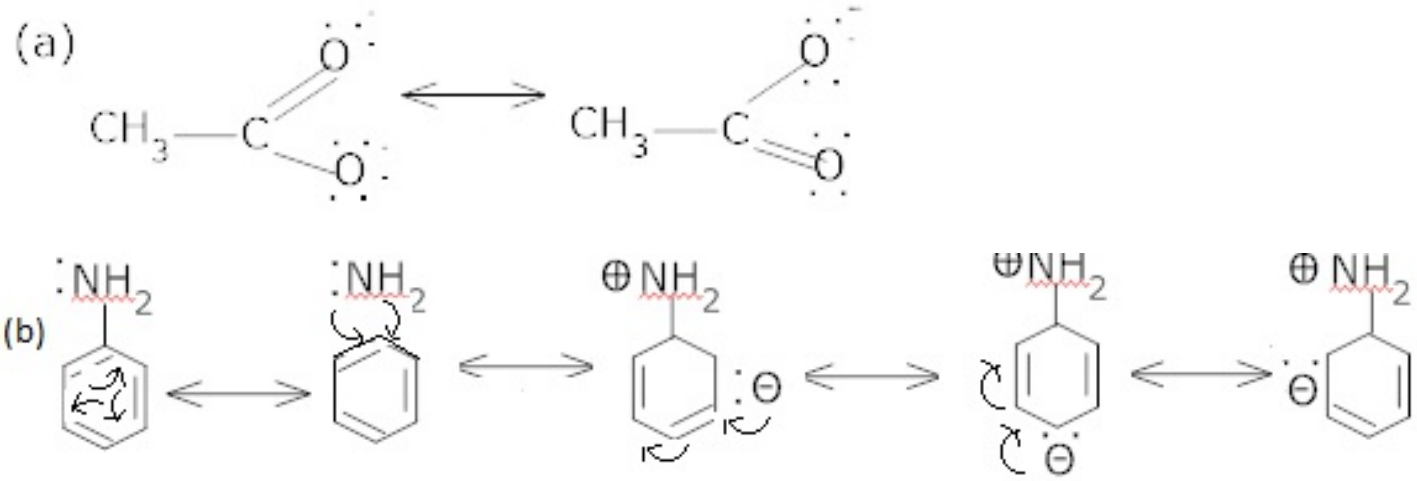
**(b)** $(CH_3)_2$ CO

**(c)** $CH_3CH_2CH=CH_2$.

**6.Write resonance structures of**

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

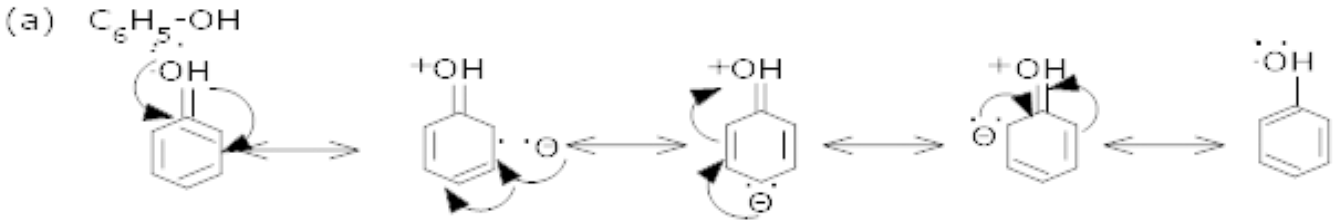
**Ans.**

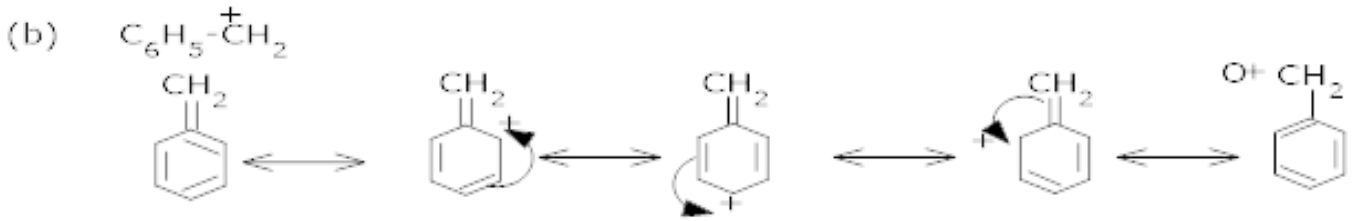



**7.Draw the resonance structures for the following compounds**

**(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 = $\frac{Mass\ of\ nitrogen}{Mass\ of\ substance} x1000$

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

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