

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) $\text{HC}\equiv\text{CC}\equiv\text{CCH}_3$ (b) $\text{CH}_2=\text{C}=\text{CHCH}_3$.

Ans. (a) $\sigma \text{ C} = \text{C} : 4$ (b) $\sigma \text{ C} = \text{C} : 3$

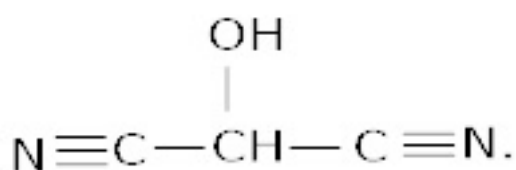
$\sigma \text{ C} - \text{H} : 6$ $\sigma \text{ C} - \text{H} : 6$

$\pi \text{ C} = \text{C} : 3$ $\pi \text{ C} = \text{C} : 2$

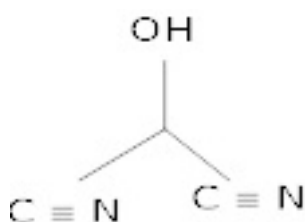
2. Why are electrons easily available to the attacking reagents in π – bonds?

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.

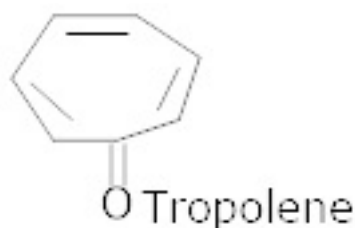
(iii) Aromatic compounds.

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.



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 $(CH_3)_2CH - CH_2 - CH_3$

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 nucleophiles. A nucleophile has affection for a positively charge centre.

eg OH^- , I^- , CN^- , $:\text{NH}_3$, 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. Lassaingne'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 lassaingne's test for nitrogen.

14. In which C – C bond of $\text{CH}_3\text{CH}_2\text{CH}_2\text{Br}$, 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 $\text{C}_3 - \text{H}$ bond.

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

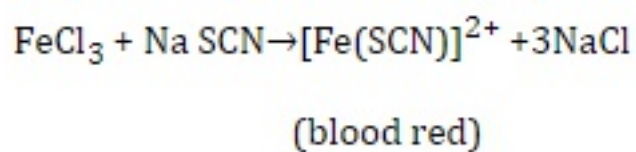
Ans. No, because potassium is more reactive than sodium.

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



CBSE Class 12 Chemistry

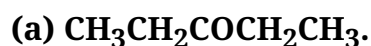
Important Questions

Chapter 12

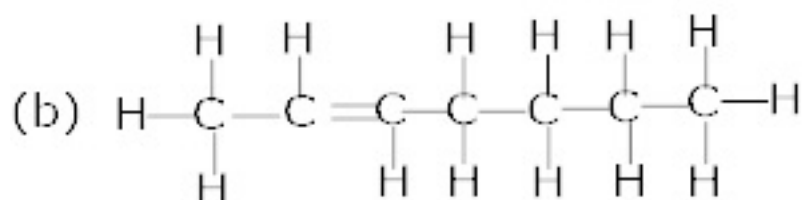
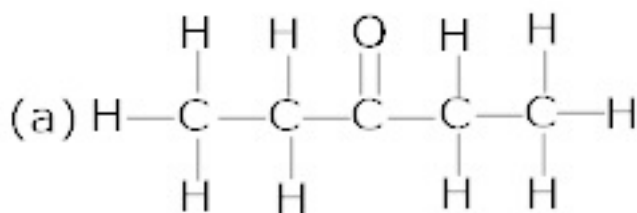
Organic Chemistry Some Basic Principles and Techniques

2 Marks Questions

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



Ans.



2. How does hybridization affect the electronegativity ?

Ans. The greater the s – character of the hybrid orbital's, the greater 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 sp² or sp³ hybridized orbital's.

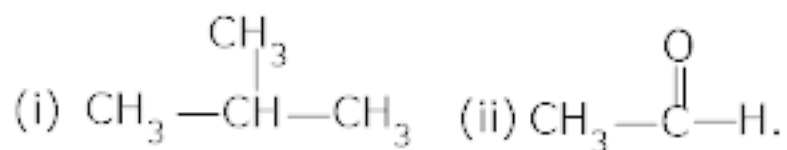
eg: hydroxyl group (- OH)

aldehyde group (- CHO)

carboxylic acid group (-COOH) etc.

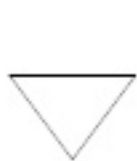
4. Give two examples of aliphatic compounds.

Ans.



5. Write an example of alicyclic compound.

Ans.



Cyclopropane



Cyclohexane



Cyclohexene

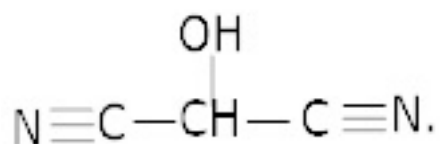


Tetrahydrofuran

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

(a) $\text{HOCH}_2 \text{CH}_2 \text{CH}_2 \text{CH}(\text{CH}_3) \text{CH}(\text{CH}_3) \text{CH}_3$

(b)

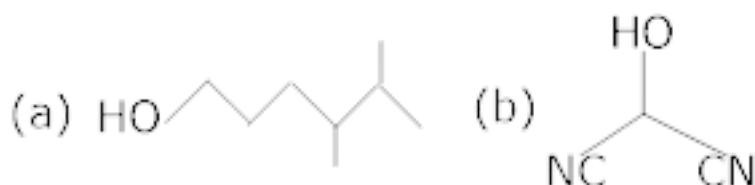


Ans Condensed formula

(a) $\text{HO}(\text{CH}_2)_5\text{CH}(\text{CH}_3)_2$

(b) $\text{HOCH}(\text{CN})_2$.

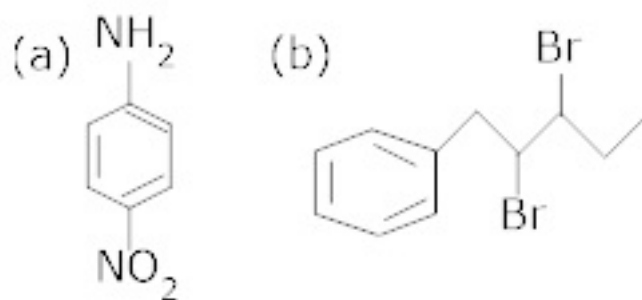
Bond line formula.



7. Write the structural formula of

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

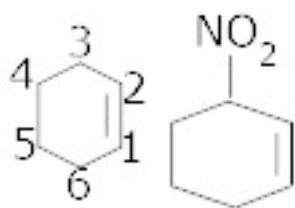
Ans.



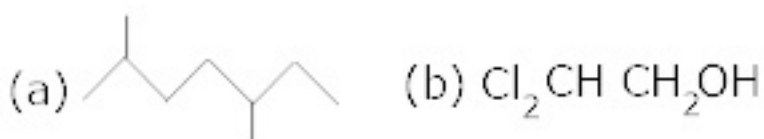
8. Derive the structure of 3 – Nitrocyclohexene.

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:



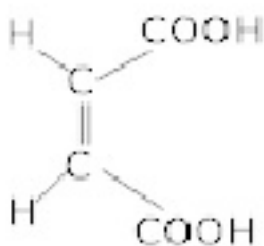
9. Give the IUPAC of the following –



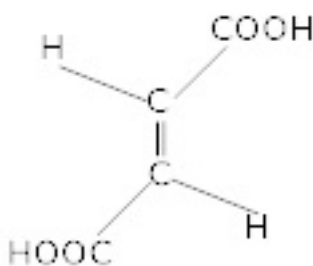
Ans. (a) 2,5 – dimethyl heptanes (b) 2,2 – dichloro ethanol.

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

Ans.



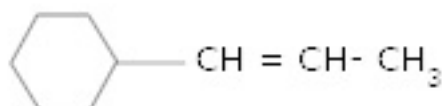
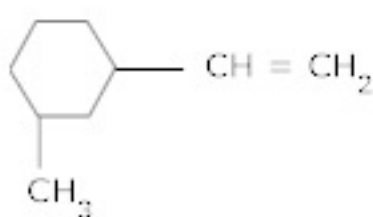
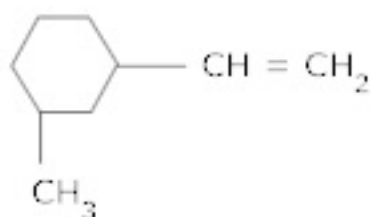
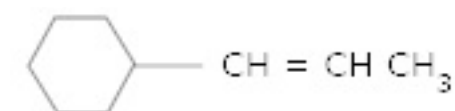
Cis but-2-en-1, 4 dicarboxylic acid
more dipole movement



but-2-en-dicarboxylic acid
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



has two geometrical isomers cis and trans

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

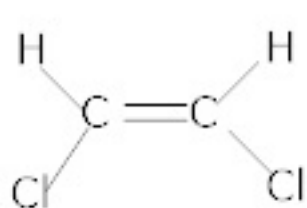
Ans. Because of linear geometry.

13. Which of the following shows geometrical isomerism?

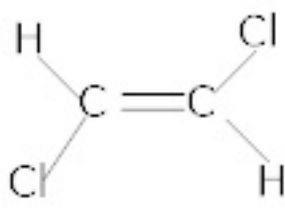
(a) $\text{CHCl}=\text{CHCl}$ (b) $\text{CH}_2=\text{CCl}_2$ (c) $\text{CCl}_2=\text{CHCl}$.

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

(a) $\text{CHCl}=\text{CHCl}$



Cis-1,2-dichloroethene



trans-1,2-dichloroethene

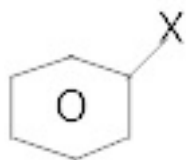
14. What is a functional group?

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

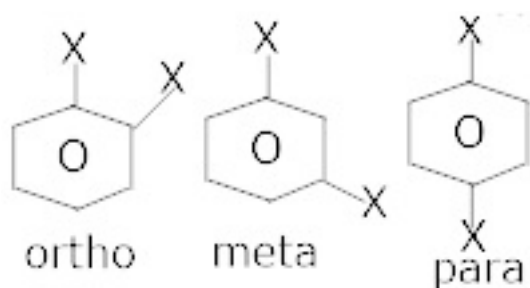
responsible for the characteristic chemical properties of the organic compounds.

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

Ans. There is one, monosubstituted benzene as



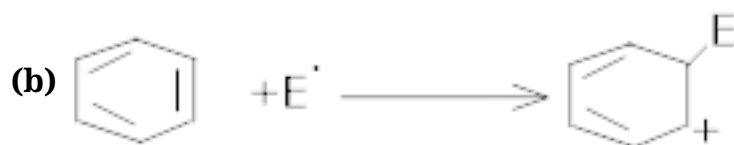
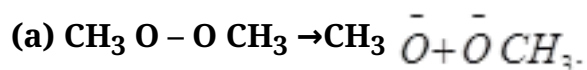
There are three disubstituted benzenes.



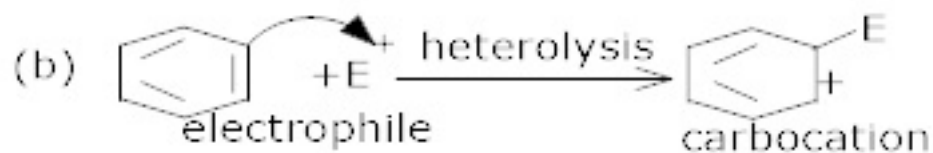
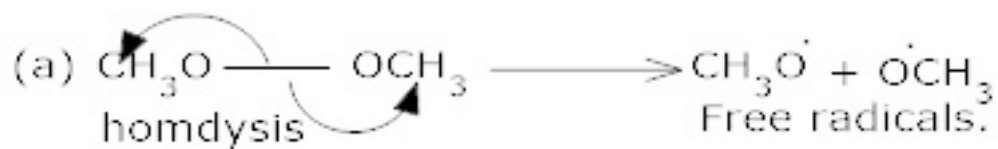
16. Identify electrophilic centre in the following: $\text{CH}_3\text{CH}=\text{O}$, CH_3^+C , CH_3I .

Ans. The shared carbon atoms are electrophilic centres as they will have partial positive charge **due to polarity of the bond**. $\text{CH}_3\text{HC}=\text{O}$, $\text{H}_3\text{CC}=\text{N}$, $\text{H}_3\text{C}-\text{I}$.

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

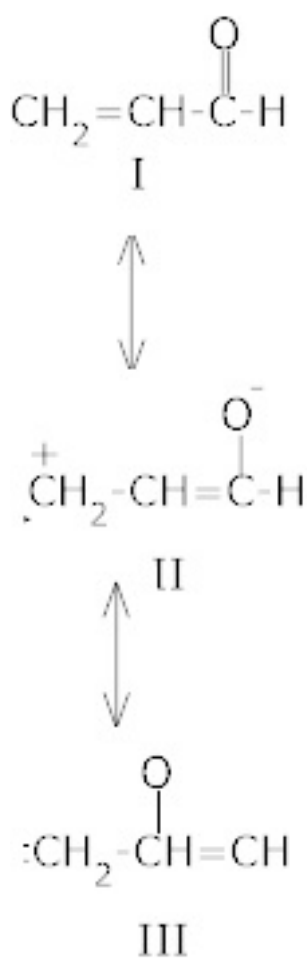


Ans.



18. Write resonance structures of $\text{CH}_2 = \text{CH} - \text{CHO}$. Indicate relative stability of the contributing structure.

Ans.

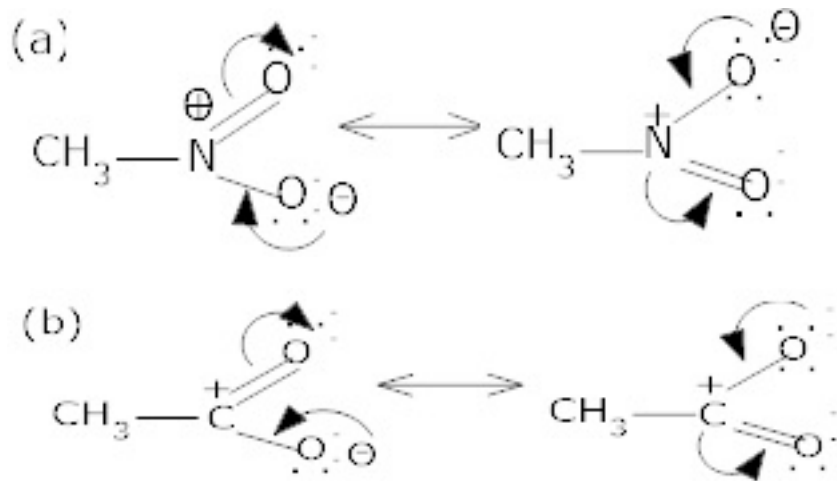


Stability $\text{I} > \text{II} > \text{III}$.

19. Write the resonance structures of

(a) CH_3NO_2 (b) CH_3COO^-

Ans.

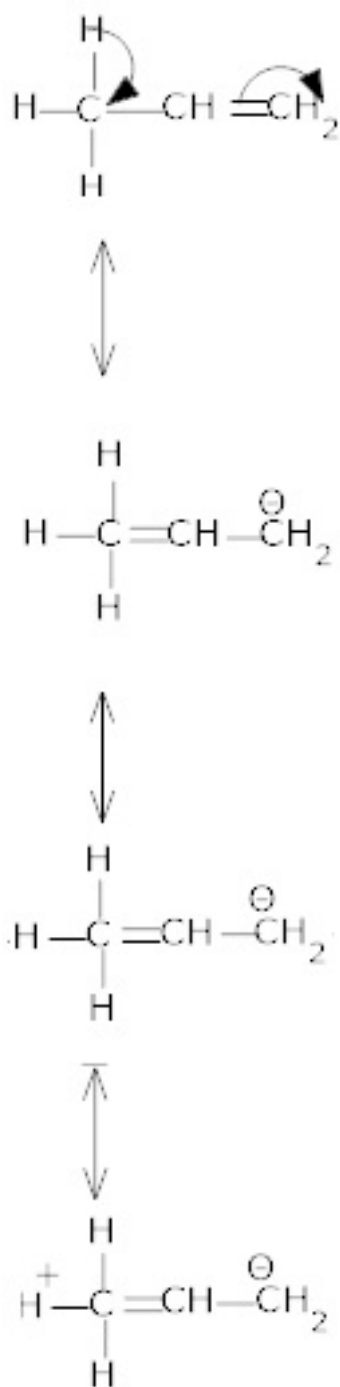


20. Explain why is $(\text{CH}_3)_3\text{C}^+$ more stable than CH_3CH_2^+ and CH_3^+ is the least stable cation.

Ans. Hyper conjugation interaction in $(\text{CH}_3)_3\text{C}^+$ is greater than in CH_3CH_2^+ as $(\text{CH}_3)_3\text{C}^+$ 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 conjugate stability.

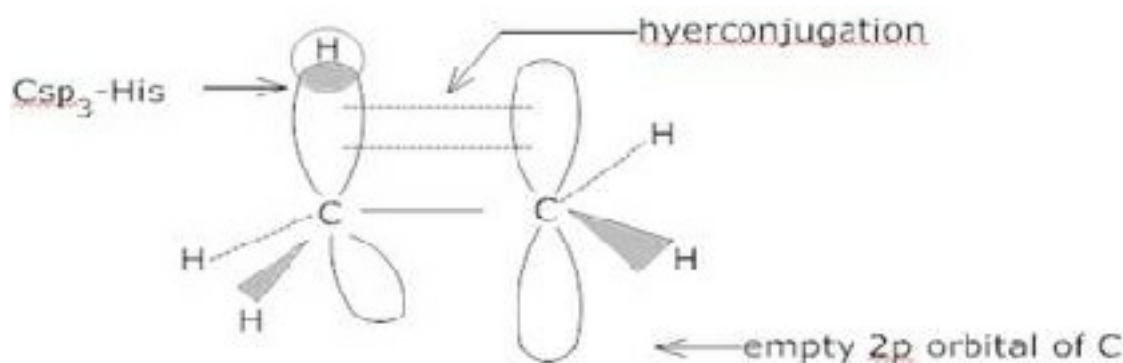
21. Show how hyper conjugation occurs in propene molecule.

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 CCl_4 give white precipitate of AgCl on heating it with AgNO_3 ?

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

$\text{CCl}_4 + \text{AgNO}_3 \rightarrow \text{No reaction.}$

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 AgNO_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.

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3 Marks Questions

1. What is the shape of the following molecules:

(a) $\text{H}_2\text{C}=\text{O}$ (b) CH_3F (c) $\text{HC}\equiv\text{N}$.

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

(b) sp^3 hybridized carbon, tetrahedral

(c) sp hybridized carbon, linear.

2. Giving justification, categories the following molecules or ions as nucleophile or electrophile: HS^- , BF_3 , $\text{C}_2\text{H}_5\text{O}^-$, $(\text{CH}_3)_3\text{N}:$, Cl^- , $\text{CH}_3\text{C}^+=\text{O}$, H_2N^+ , NO_2^+

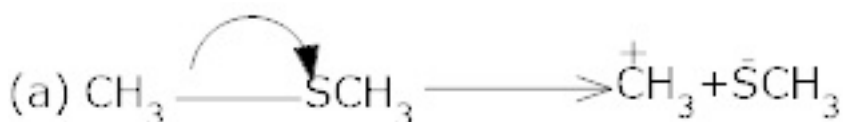
Ans. Nucleophiles : HS^- , $\text{C}_2\text{H}_5\text{O}^-$, $(\text{CH}_3)_3\text{N}:$, H_2N^- : (have unshared pair of electrons which can be donated and shared with an electrophile)

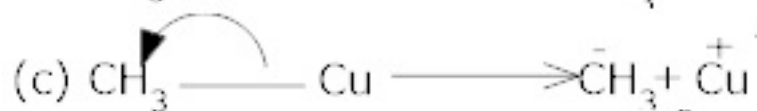
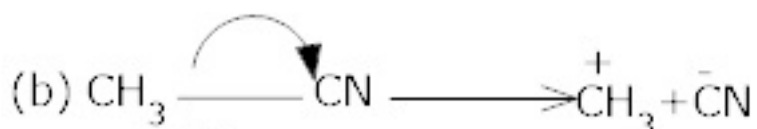
Electrophile : BF_3 , Cl^+ , $\text{CH}_3\text{C}^+=\text{O}$, NO_2^+ [have only six electrons which can be accept electron from a nucleophile].

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

(a) $\text{CH}_3 - \text{SCH}_3$, (b) $\text{CH}_3 - \text{CN}$, (c) $\text{CH}_3 - \text{Cu}$.

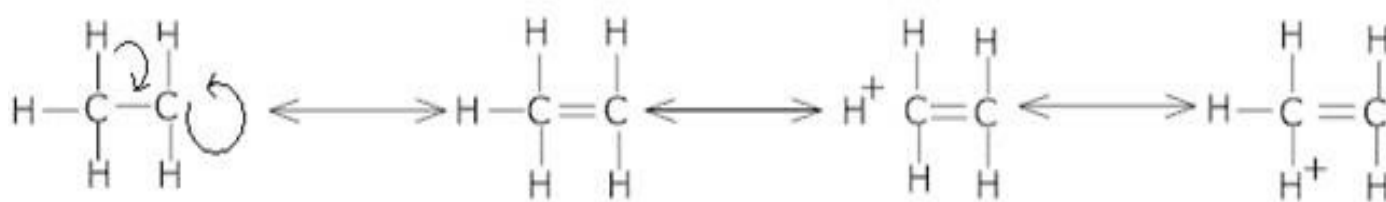
Ans.





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

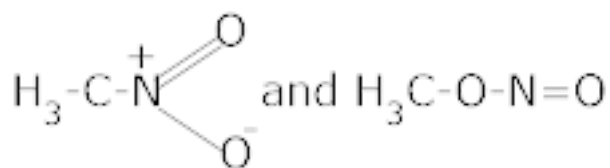
Ans. In ethyl carbocation, there is only hyper conjugation of the three α – hydrogen atoms and as a result, the following contributing structures are feasible.



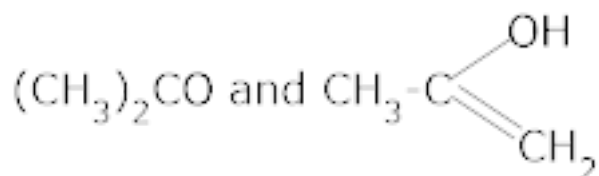
But benzyl carbocation is more stable due to the presence of resonance and the following resonating structures are possible

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

(a)

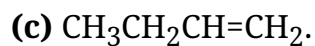
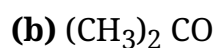
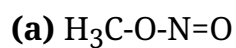


(b)

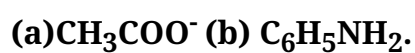


(c) $\text{CH}_3\text{CH}=\text{CHCH}_3$ and $\text{CH}_3\text{CH}_2\text{CH}=\text{CH}_2$.

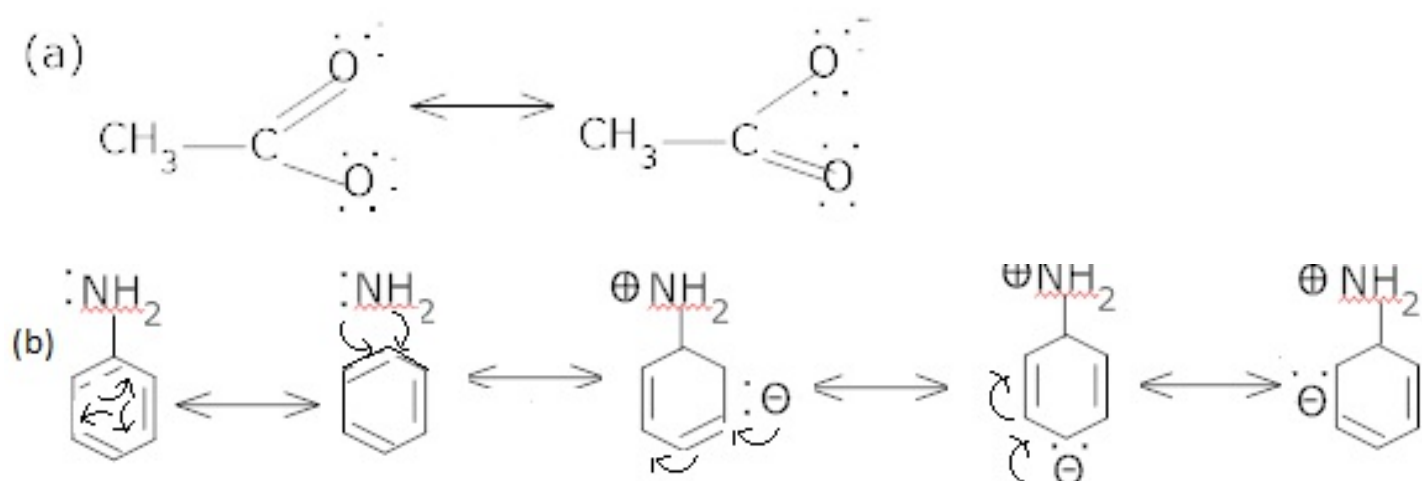
Ans.



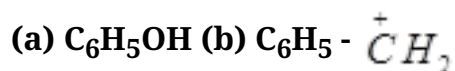
6. Write resonance structures of



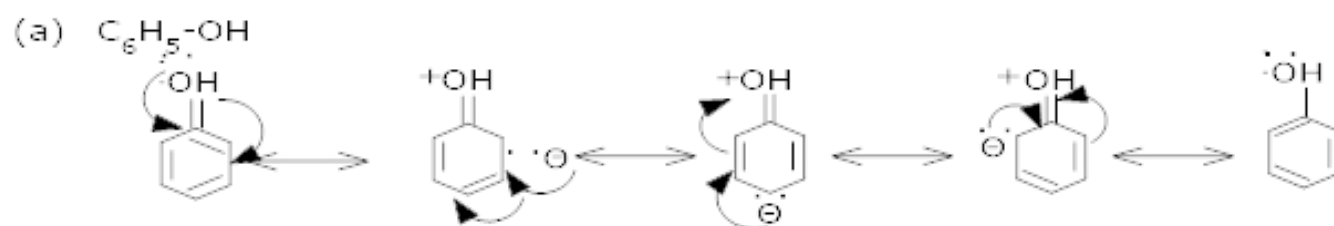
Ans.

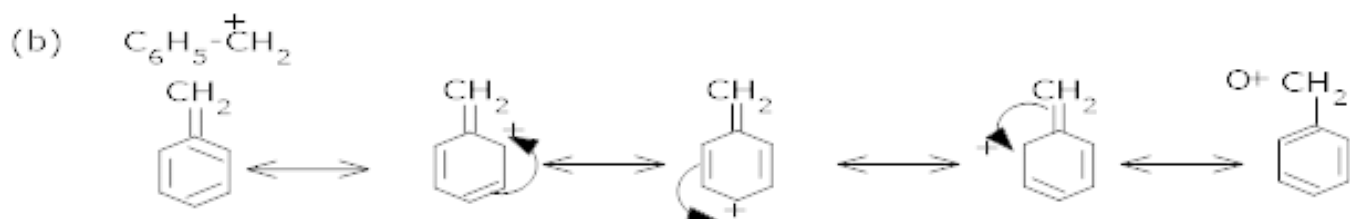


7. Draw the resonance structures for the following compounds



Ans.





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 sulphur in the compound.

Ans. Mass of $\text{BaSO}_4 = 0.582\text{g}$

$\text{BaSO}_4 = \text{S}$

233 32

233g of BaSO_4 contain sulphur = 32g

0.582g of BaSO_4 contains sulphur = $\frac{32}{233} \times 0.582$

Percentage of sulphur = $\frac{\text{wt. of sulphur}}{\text{wt. of compound}} \times 100$

= $\frac{32 \times 0.582}{233 \times 0.395} \times 100$

20.24%

9. 0.40g of an organic compound gave 0.3g of Ag Br by Carius 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 = $\frac{80}{188} \times 0.3 = 0.127 \text{ g}$

The percentage of Br in the organic compound

$$= \frac{0.127}{0.40} \times 100 = 31.75\%$$

10. 0.12g of organic compound containing phosphorus gave 0.22g of $\text{Mg}_2\text{P}_2\text{O}_7$ by the usual analysis. Calculate the percentage of phosphorus in the compound.

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

Mass of $\text{Mg}_2\text{P}_2\text{O}_7$ formed = 0.22g of atoms of P

Now 1 mole of $\text{Mg}_2\text{P}_2\text{O}_7 = (2 \times 24 + 2 \times 31 + 16 \times 7)$

= 222g of $\text{Mg}_2\text{P}_2\text{O}_7$

= 62%

i.e; 222g of $\text{Mg}_2\text{P}_2\text{O}_7$ contain phosphorus = 62g.

\therefore 0.22g of $\text{Mg}_2\text{P}_2\text{O}_7$ will contain phosphorus.

$$= \frac{62}{222} \times 0.22$$

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

Hence, percentage of phosphorus

$$= \frac{62}{222} \times \frac{0.22}{0.12} \times 100$$
$$= \underline{51.20}$$

11. Ammonia produced when 0.75g of a substance was kjeldahlized, neutralized 30cm³

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 \equiv 30ml of NH_3 solution of normality 0.25N

But 1000cm^3 of NH_3 of normality 1 contains 14g of nitrogen

$\therefore 30\text{cm}^3$ of 0.25N NH_3 contains nitrogen $\frac{=14}{1000} \times 30 \times 0.25$

% of nitrogen = $\frac{\text{Mass of nitrogen}}{\text{Mass of substance}} \times 1000$

$$= \frac{14}{1000} \times \frac{30 \times 0.25}{0.75} \times 100$$

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