



## CHEMISTRY

### NCERT - NCERT CHEMISTRY(ENGLISH)

# ORGANIC CHEMISTRY- SOME BASIC PRINCIPLES AND TECHNIQUES

#### Solved Example

1. How many  $\sigma$  and  $\pi$  bonds are present in each of the following molecules?

(a)  $HC \equiv CCH = CHCH_3$  (b)  $CH_2 = C = CHCH_3$



Watch Video Solution

2. What is the type of hybridization of each carbon in the following compounds?

$CH_3Cl$  (b)  $(CH_3)_2CO$  (c)  $CH_3CN$  (d)  $HCONH_2$  (e)

$CH_3CH = CHCN$

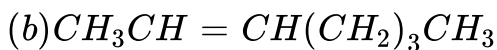
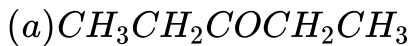
 [Watch Video Solution](#)

3. Write the hybridised state of carbon in the following compounds and shapes of each of each of the molecules.

(a)  $H_2C = O$  (b)  $CH_3F$  (c)  $H - C \equiv N$

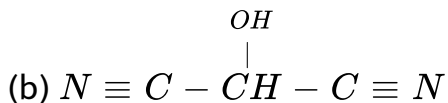
 [Watch Video Solution](#)

4. Expand each of the following condensed formulas into their complete structural formulas.



 [Watch Video Solution](#)

5. For each of the following compounds, write a condensed formula and also their bond-line formula.



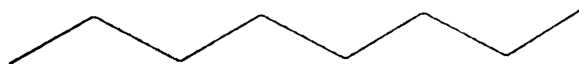
 [Watch Video Solution](#)

6. Expand each of the following bond-line formulas to show all the atoms including carbon and hydrogen

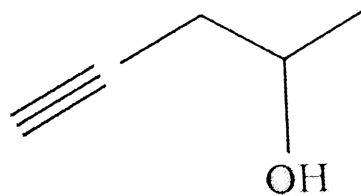
(a)



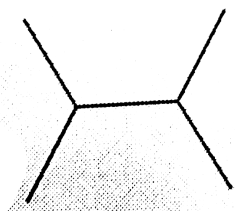
(b)



(c)

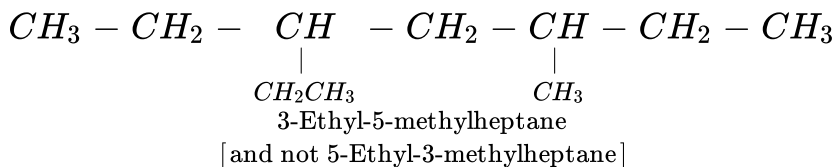
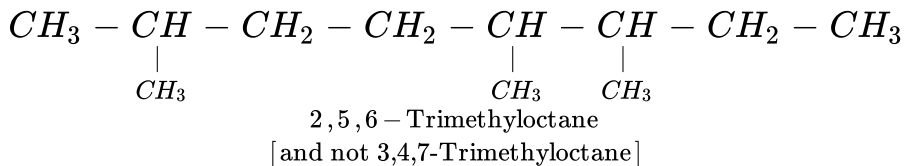


(d)



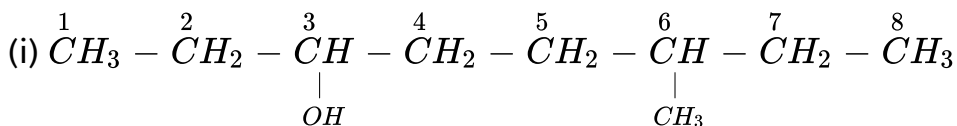
 [Watch Video Solution](#)

7. Structures and IUPAC names of some hydrocarbons are given below. Explain why the names given in the parentheses are incorrect.



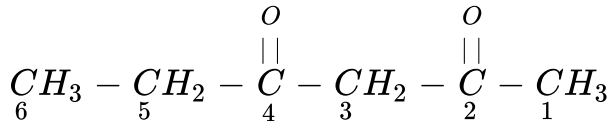
 **Watch Video Solution**

8. Write the IUPAC names of the compounds i-iv from their given structures.



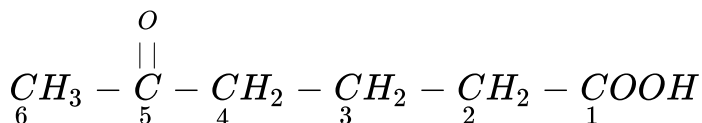
 **Watch Video Solution**

9. Write the IUPAC names of the compounds i-iv from their given structures.



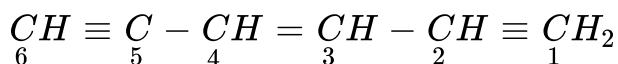
 [Watch Video Solution](#)

10. Write the IUPAC names of the compounds i-iv from their given structures.



 [Watch Video Solution](#)

11. Write the IUPAC names of the compounds i-iv from their given structures.



 [Watch Video Solution](#)

12. Derive the structure of (i) 2-Chlorohexane, (ii) Pent-4-en-2-ol, (iii) 3- Nitrocyclohexene, (iv) Cyclohex-2-en-1-ol, (v) 6-Hydroxyheptanal.

 [Watch Video Solution](#)

13. Write the structural formula of:

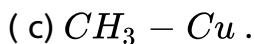
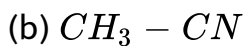
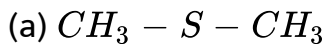
(a) o-Ethylanisole, (b) p-Nitroaniline,

(c) 2,3 - Dibromo -1 - phenylpentane,

(d) 4-Ethyl-1-fluoro-2-nitrobenzene.

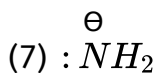
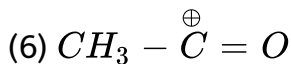
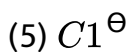
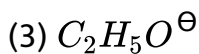
 [Watch Video Solution](#)

14. Using the curved-arrow notation, show the formation of reactive intermediates when the following covalent bonds undergo heterolytic cleavage :



 [Watch Video Solution](#)

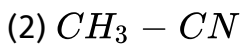
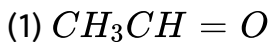
15. Categorise the following molecules/ions as nucleophile or electrophile.



 [Watch Video Solution](#)

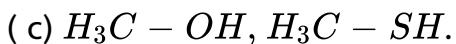
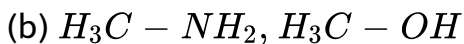


16. Identify electrophilic centre in the following :



 [Watch Video Solution](#)

17. Which bond is more polar in the following pairs of molecules ?



 [Watch Video Solution](#)

18. In which ( $C - C$ ) bond of  $\left( H_3\overset{3}{C} - \overset{2}{C}H_2 - \overset{1}{C}H_2 - Br \right)$ , the inductive effect is expected to be the least ?

 [Watch Video Solution](#)

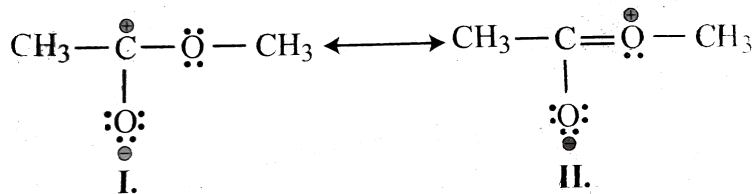
19. Write resonance structures of  $CH_3COO^-$  and show the movement of electrons by curved arrows.

 [Watch Video Solution](#)

20. Write the resonance structures of (1)  $CH_3COO^\ominus$  and (2)  $CH_2 = CH - CHO$ . Indicate the relative stability of the contributing structures.

 [Watch Video Solution](#)

21. Explain why the following two structures (I) and (II) cannot be the major contributors to the real structures of  $CH_3COOCH_3$ .



 Watch Video Solution

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

 Watch Video Solution

23. On complete combustion, 0.246 g of an organic compound gave 0.198g of carbon dioxide and 0.1014g of water. Determine the

percentage composition of carbon and hydrogen in the compound

 [Watch Video Solution](#)

**24.** In Dumas' method for estimation of nitrogen, 0.3g of an organic compound gave 50mL of nitrogen collected at 300K temperature and 715mm pressure. Calculate the percentage composition of nitrogen in the compound. (Aqueous tension at 300K=15 mm)

 [Watch Video Solution](#)

**25.** During estimation of nitrogen present in an organic compound by Kjeldahl's method, the ammonia evolved from 0.5 g of the compound in Kjeldahl's estimation of nitrogen, neutralized

10 mL of 1 M  $H_2SO_4$ . Find out the percentage of nitrogen in the compound.

 [Watch Video Solution](#)

26. 0.15 gm of an organic compound gave 0.12 gm of silver bromide by the carius method. Find the percentage of bromine in the compound.

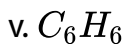
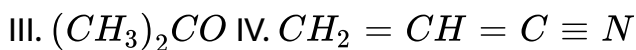
 [Watch Video Solution](#)

27. In sulphur estimation, 0.157 g of an organic compound gave 0.4813 g of barium sulphate. What is the percentage of sulphur in the compound?

 [Watch Video Solution](#)

## Exercise

1. Given the hybridization state of each carbon in the following compounds :



A. `

B.

C.

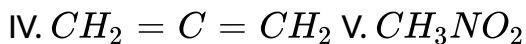
D.

**Answer:**



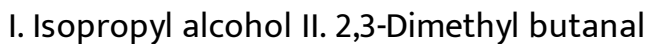
[Watch Video Solution](#)

2. Indicate the  $\sigma$  – and  $\pi$  – bonds in the following molecules:



 [Watch Video Solution](#)

3. Write the bond line formula for the following compounds:



 [Watch Video Solution](#)

4. Give the IUPAC names of the following compounds :

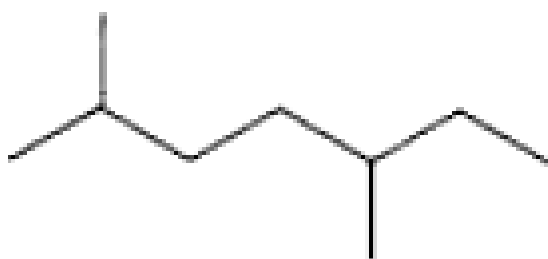
(a)



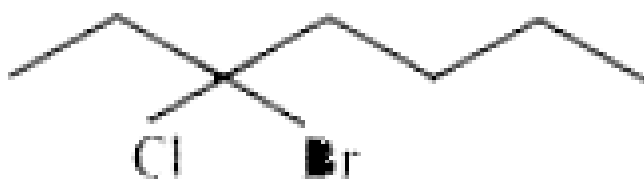
(b)



(c)

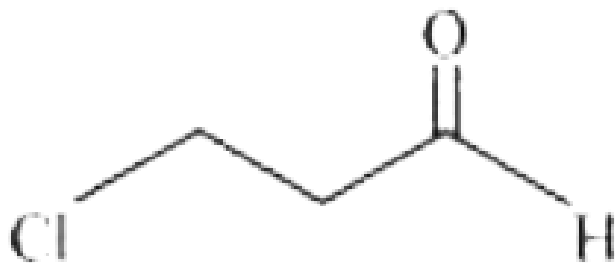


(d)





(e)



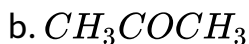
 [Watch Video Solution](#)

5. Which of the following represents the correct *IUPAC* name for the compounds concerned?

- a. 2,2-Dimethyl pentane or 2-Dimethyl pentane
- b. 2,4,7-Trimethyloctane or 2,5,7-Trimethyloctane
- c. 2-Chloro-4-methylpentane or 4-Chloro-2-methylpentane
- d. But-3-yn-1-ol or But-4-ol-1-yne

 [View Text Solution](#)

6. Draw the formulae for the first five numbers of each homologous series beginning with the following compounds:



 [Watch Video Solution](#)

7. Give condensed and bond line structural formulas and identify the functional group(s) present, if any, for :

(a) 2,2,4-Trimethylpentane

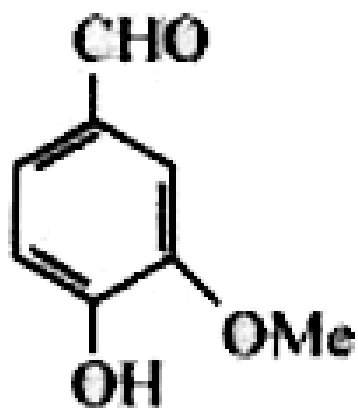
(b) 2-Hydroxy-1,2,3-propanetricarboxylic acid

(c) Hexanedial

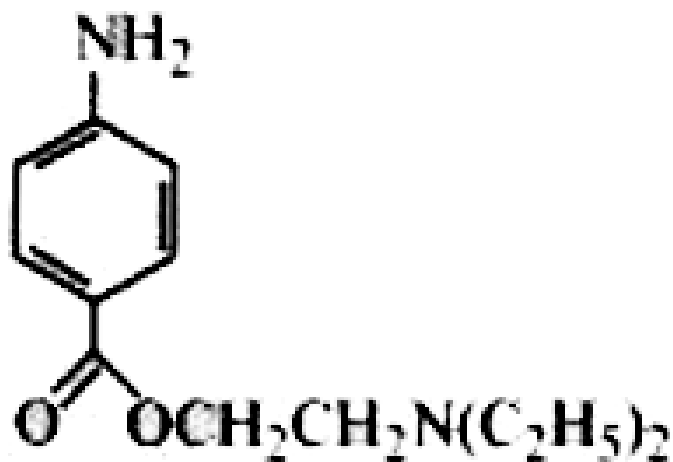
 [Watch Video Solution](#)

8. Identify the functional groups in the following compounds

(a)

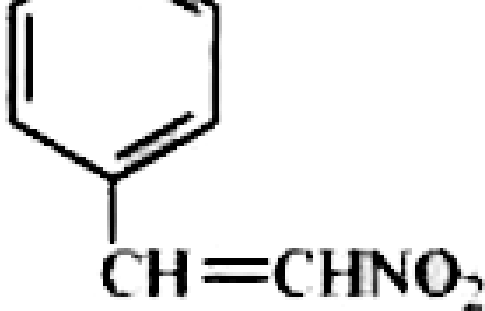


(b)



(c)





 [Watch Video Solution](#)

9. Which of the two:  $\text{O}_2\text{NCH}_2\text{CH}_2\text{O}^-$  or  $\text{CH}_3\text{CH}_2\text{O}^-$  is expected to be more stable and why?

 [Watch Video Solution](#)

10. Explain why alkyl groups act as electron donors when attached to a  $\pi$  - system.

 [Watch Video Solution](#)

11. Draw the resonance structures for the following compounds.

Show the electron shift using curved-arrow notation.

(a)  $C_6H_5OH$  (b)  $C_6H_5NO_2$  (c)  $CH_3CH = CHCHO$  (d)

$C_6H_5-CHO$  (e)  $C_6H_5 - \overset{+}{C}H_2$  (f)  $CH_3CH = \overset{+}{C}HCH_2$



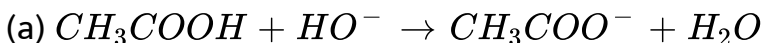
[View Text Solution](#)

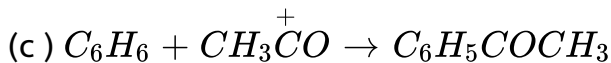
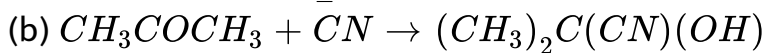
12. What are electrophiles and nucleophiles ? Explain with examples.



[Watch Video Solution](#)

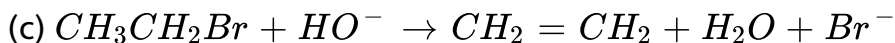
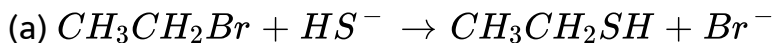
13. Identify the reagents shown in bold in the following equations as nucleophiles or electrophiles:



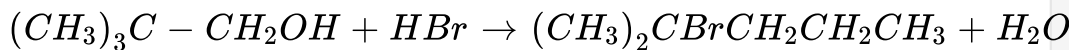


 [Watch Video Solution](#)

14. Classify the following reactions in one of the reaction type studied in this unit.



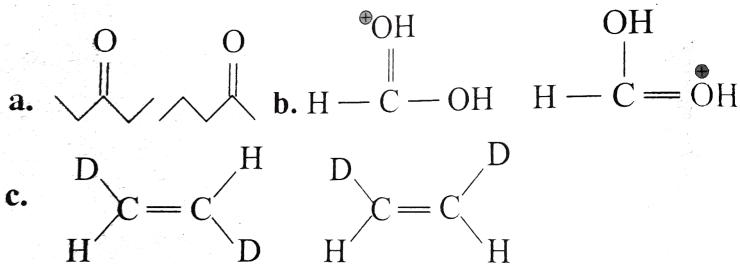
(d)



 [Watch Video Solution](#)

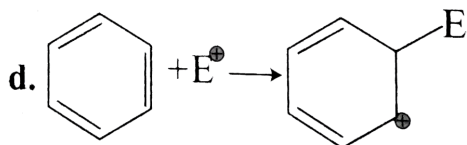
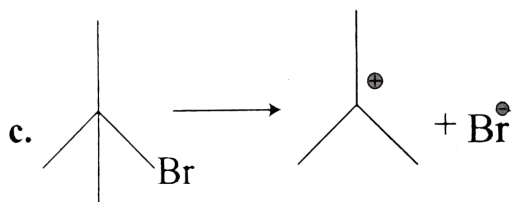
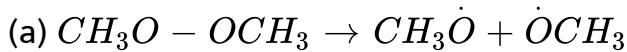
15. What is the relationship between the members of the following pairs of structures describing them as identical ,

structural, or geometrical isomers, or resonance contributors ?



 [Watch Video Solution](#)

16. For the following bond cleavages, use curved-arrow to show the electron flow and classify each as homolysis or heterolysis. Identify intermediate products as free radical, carbocation, and carbanion.



 Watch Video Solution

17. Explain the terms Inductive and Electromeric effects. Which electron displacement effect explains the following correct orders of acidity of the carboxylic acids?



(b)



 Watch Video Solution



**18.** Give a brief description of the principles of the following techniques taking an example in each case.

(a) Crystallisation (b) Distillation (c) Chromatography

 [Watch Video Solution](#)

**19.** Describe the method, which can be used to separate two compounds with different solubilities in a solvent S.

 [Watch Video Solution](#)

**20.** What is the difference between distillation, distillation under reduced pressure and steam distillation ?

 [Watch Video Solution](#)

**21.** Discuss the chemistry of Lassaigne's test.

 [Watch Video Solution](#)

**22.** Differentiate between the principle of estimation of nitrogen in an organic compound by (i) Dumas method and (ii) Kjeldahl's method.

 [Watch Video Solution](#)

**23.** Discuss the principle of estimation of halogens, sulphur and phosphorus present in an organic compound.

 [Watch Video Solution](#)

**24.** Explain the principle of paper chromatography.

 [Watch Video Solution](#)

**25.** Why is nitric acid added to sodium extract before adding silver nitrate for testing halogens?

 [Watch Video Solution](#)

**26.** Explain the reason for the fusion of an organic compound with metallic sodium for testing nitrogen, sulphur and halogens

 [Watch Video Solution](#)

27. Name a suitable technique of the components from a mixture of calcium sulphate and camphor.

 [Watch Video Solution](#)

28. Explain why an organic liquid vaporises at a temperature below its boiling point in steam distillation?

 [Watch Video Solution](#)

29. Will  $CCl_4$  give white precipitate of  $AgCl$  on heating with nitrate? Give reason for your answer

 [Watch Video Solution](#)

**30.** Why is solution of potassium hydroxide used to absorb carbon dioxide evolved during the estimation of carbon present in an organic compound?

 [Watch Video Solution](#)

**31.** Why is it necessary to use acetic acid and not sulphuric acid for the acidification of sodium extract for testing sulphur by lead acetate test?

 [Watch Video Solution](#)

**32.** An organic compound contains 69% carbon and 4.8% hydrogen, the remainder being oxygen. Calculate the masses of carbon dioxide and water produced when 0.20 gm of this substance is subjected to complete combustion.



Watch Video Solution

33. 0.50 gm of an organic compound was treated according to Kjeldahl's method. The ammonia evolved was absorbed in 50 ml of 0.5  $MH_2SO_4$ . The residual acid required 60 ml of  $\frac{M}{2}NaOH$  solution. Find the percentage of nitrogen in the compound.



Watch Video Solution

34. 0.3080 gm of an organic chloro compound gave 0.5740 gm of silver chloride in gravimetric estimation. Calculate the percentage of chlorine present in the compound



Watch Video Solution

**35.** In the estimation of sulphur by carius method, 0.468 gm of an organic sulphur compound afforded 0.668 gm of barium sulphate. Find out the percentage of sulphur in the given compound.

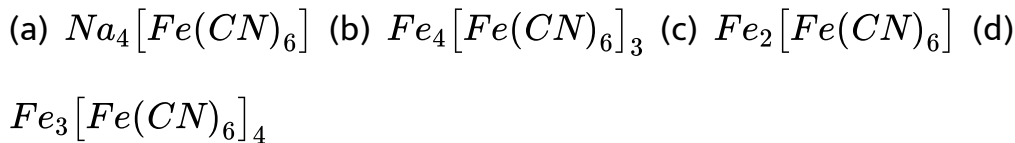
 [Watch Video Solution](#)

**36.** In the organic compound  $CH_2 = CH - CH_2 - CH_2 - C \equiv CH$ , the pair of hybridised orbitals involved in the formation of:  $C_2 - C_3$  bond is:

(a)  $sp - sp_2$  (b)  $sp - sp_3$  (c)  $sp_2 - sp_3$  (d)  $sp_3 - sp_3$

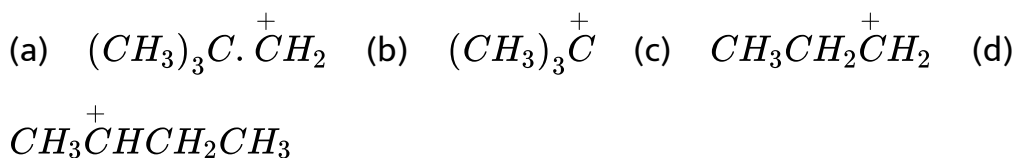
 [Watch Video Solution](#)

**37.** In the Lassaigne's test for nitrogen in an organic compound, the Prussian blue colour is obtained due to the formation of:



 [Watch Video Solution](#)

38. Which of the following carbocation is most stable ?



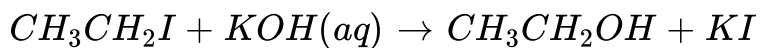
 [Watch Video Solution](#)

39. For the purification of organic compounds, the latest technique followed is

 [Watch Video Solution](#)



40. The reaction:



is classified as :

- (a) electrophilic substitution (b) nucleophilic substitution  
(c) elimination (d) addition



[Watch Video Solution](#)