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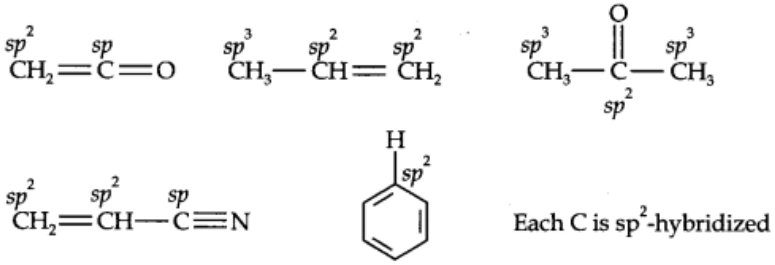
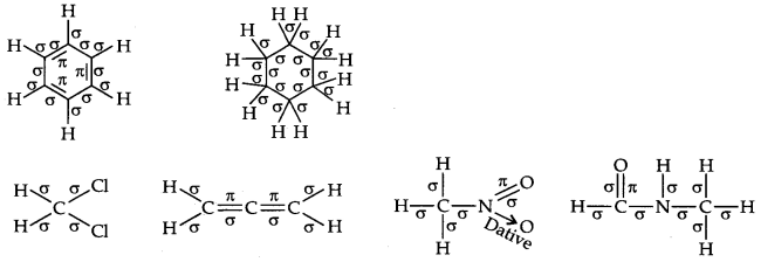
TEXTBOOK QUESTIONS SOLVED

Question 1. What are hybridisation states of each carbon atom in the following compounds?
CH_2=C=O, CH_3CH=CH_2, $(CH_3)_2CO$, CH_2=CHCN, C_6H_6.
Answer:

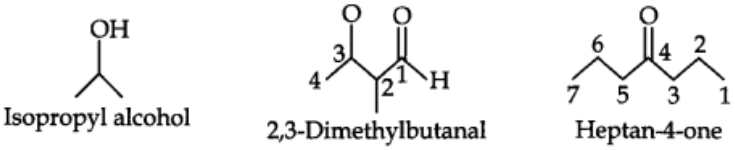


Question 2. Indicate the a- and n-bonds in the following molecules:
C_6H_6 , C_6H_{12}, CH_2Cl_2, CH=C=CH_2, CH_3NO_2, $HCONHCH_3$

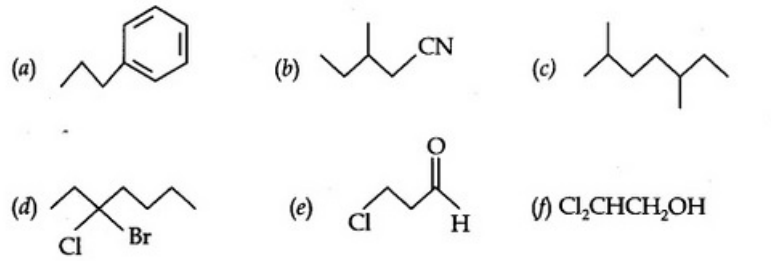
Answer:



Question 3. Write bond-line formulas for: Isopropyl alcohol, 2,3-Dimethylbutanal, Heptan-4-one.
Answer:



Question 4. Give the TUPAC names of the following compounds:



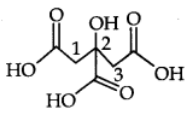
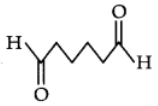
Answer:
(a) Propylbenzene
(b) 3-Methylpentanenitrite
(c) 2, 5-Dimethylheptane
(d) 3-Bromo- 3-chloroheptane
(e) 3-Chloropropanal

(f) 2, 2-Dichloroethanol

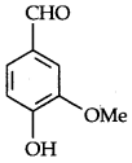
Question 5.Which of the following represents the correct TUPAC name for the compounds concerned?
(a) 2, 2-Dimethylpentane or 2-Dimethylpentane
(b) 2, 4, 7-Trimethyloctane or 2, 5, 7- Trimethyloctane
(c) 2-Chloro-4-methylpentane or 4-Chloro-2-methylpentane
(d) But-3-yn- l-ol or But-4-ol-yne.
Answer:
(a) 2, 2-Demethylpentane
(b) 2, 4, 7-Trimethyloctane. For two alkyl groups on the same carbon its locant is repeated twice, 2, 4, 7-locant set is lower than 2, 5, 7.
(c) 2- Chloro-4-methylpentane. Alphabetical order of substituents.
(d) But-3-yn-l-ol. Lower locant for the principal functional group, i.e., alcohol.

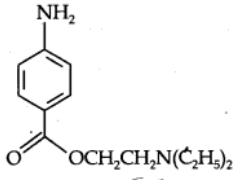
Question 6. Draw formulas for the first five members of each homologous series beginning with the following compounds,
(a) H—COOH
(b) CH_3COCH_3
(c) H—CH=CH_2
Answer:
(a) CH_3—COOH
CH_3CH_2—COOH $CH_3CH_2CH_2$—COOH
$CH_3CH_2CH_2CH_2$—COOH
(b) CH_3COCH_3
$CH_3COCH_2CH_3$
$CH_3COCH_2CH_2CH_3$
$CH_3COCH_2CH_2CH_2CH_3$
$CH_3CO(CH_3)_4CH_3$
(c) H—CH=CH_2
$CH_3CH=CH_2$
$CH_3CH_2CH=CH_2$
$CH_3CH_2CH_2CH=CH_2$
$CH_3CH_2CH_2CH_2CH=CH_2$

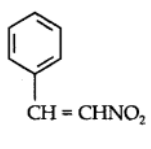
Question 7. Give condensed and bond line structural formulas and identify the functional group(s) present, if any, for: (a) 2, 2, 4-Trimethylpentane (b) 2-Hydroxy-l, 2, 3-propanetricarboxylic acid (c) Hexanedial.
Answer:

Condensed formula	Bond line formula	Functional group/s
(a) $(CH_3)_3CCH_2CH(CH_3)_2$		–
(b) HOOCCH$_2$C(OH) (COOH)CH$_2$COOH		—C—OH (carboxyl) and —OH (hydroxyl)
(c) OHC$(CH_2)_4$CHO		—C—H (aldehyde)

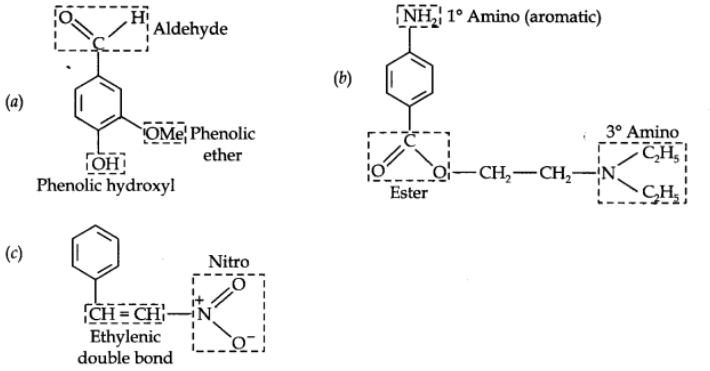
Question 8. Identify the functional groups in the following compounds:

(a) 

(b) 

(c) 

Answer:

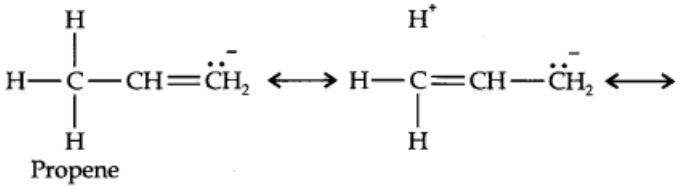


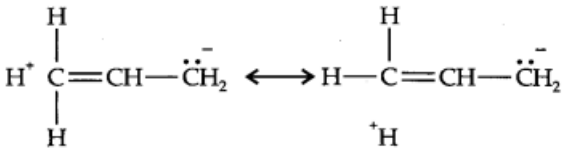
Question 9. Which of the two: $O_2NCH_2CH_2O^-$ or $CH_3CH_2O^-$ is expected to be more stable and why?

Answer: O_2N—----<------- CH_2—----<------- CH_2 —<------- O^- is more stable than CH_3—----<-------CH_2—----<-------O- because NO_2 group has -I-effect and hence it tends to disperse the -ve charge on the O-atom. In contrast, CH_3CH_2 has +I-effect. It, therefore, tends to intensify the -ve charge and hence destabilizes it.

Question 10. Explain why alkyl groups act as electron donors when attached to a π-system.

Answer: Due to hyperconjugation, alkyl groups act as electron donors when attached to a π- system as shown below:





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