

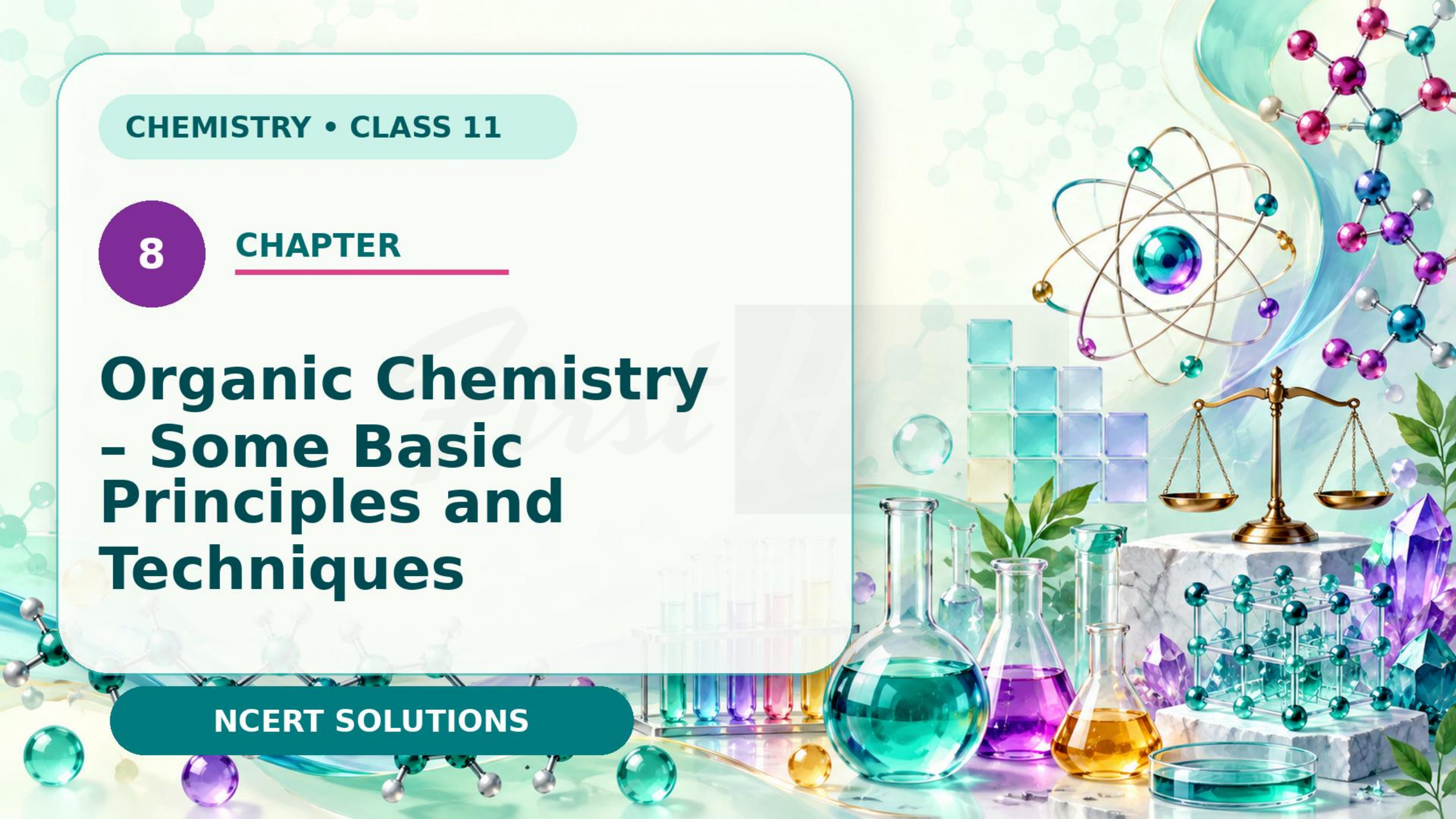
CHEMISTRY • CLASS 11

8

CHAPTER

Organic Chemistry - Some Basic Principles and Techniques

NCERT SOLUTIONS



EXERCISE SOLUTIONS: 8.1

8.1 What is the hybridisation of each carbon atom in these compounds?

Answer:

Compound	Carbon hybridisation
(a) $\text{CH}_2 = \text{C} = \text{O}$	CH_2 carbon: sp^2 ; central carbon: sp
(b) $\text{CH}_3\text{CH} = \text{CH}_2$	sp^3 , sp^2 , sp^2 (left to right)
(c) $\text{CH}_3 - \overset{\text{O}}{\underset{\parallel}{\text{C}}} - \text{CH}_3$	sp^3 , sp^2 , sp^3
(d) $\text{CH}_2 = \text{CH} - \text{C} \equiv \text{N}$	sp^2 , sp^2 , sp
(e) C_6H_6 (benzene)	all six carbons: sp^2

Count regions of sigma bonding around each carbon. A double or triple bond counts as one region for hybridisation.

4 regions $\rightarrow \text{sp}^3$; 3 $\rightarrow \text{sp}^2$; 2 $\rightarrow \text{sp}$

In ketene, the central carbon has two double bonds and is linear.

EXERCISE SOLUTIONS: 8.2

8.2 Indicate the sigma and pi bonds in C_6H_6 , C_6H_{12} , CH_2Cl_2 , $CH_2=C=CH_2$, CH_3NO_2 and $HCONHCH_3$.

Answer:

Molecule	Sigma bonds	Pi bonds
C_6H_6 (benzene)	$6\ C-C + 6\ C-H = 12$	3
C_6H_{12} (cyclohexane assumed)	$6\ C-C + 12\ C-H = 18$	0
CH_2Cl_2	$2\ C-H + 2\ C-Cl = 4$	0
$CH_2=C=CH_2$	$2\ C-C + 4\ C-H = 6$	2
CH_3NO_2	$3\ C-H + C-N + 2\ N-O = 6$	1
$H-C(=O)-NH-CH_3$	$4\ C-H + 1\ N-H + 1\ C-O + 2\ C-N = 8$	1

A single bond is sigma; a double bond adds one pi bond. Nitro-group pi bonding is delocalised.

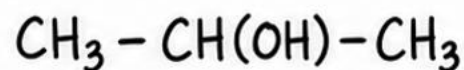
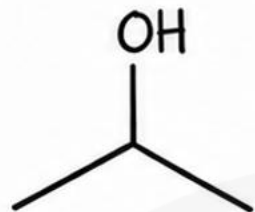
Structure matters: The formula C_6H_{12} alone is ambiguous. Cyclohexane is assumed above; an acyclic monoalkene instead has seventeen sigma bonds and one pi bond.

EXERCISE SOLUTIONS: 8.3

8.3 Draw bond-line formulas for isopropyl alcohol, 2,3-dimethylbutanal and heptan-4-one.

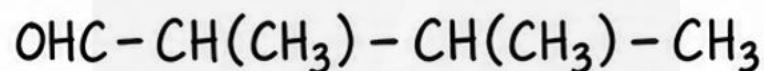
(a) isopropyl alcohol

Answer:



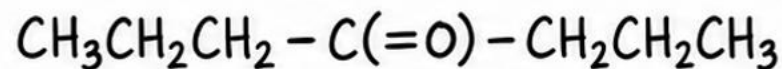
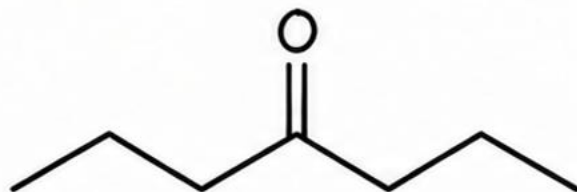
(b) 2,3-dimethylbutanal

Answer:



(c) heptan-4-one

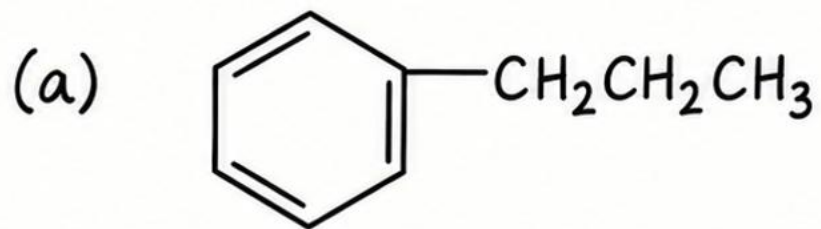
Answer:



Each unlabelled end or vertex represents carbon. Hydrogens on carbon are understood from carbon valency.

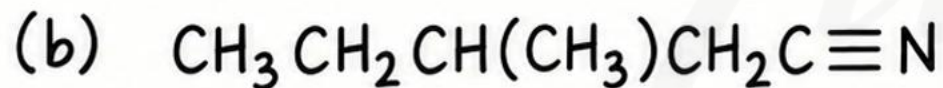
EXERCISE SOLUTIONS: 8.4a-c

8.4 (a-c) Give the IUPAC names of these structures.



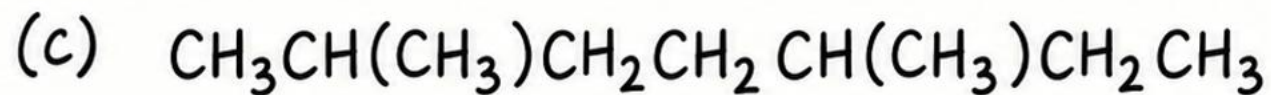
Answer: Propylbenzene

The side chain is unbranched propyl.



Answer: 3-Methylpentanenitrile

The nitrile carbon is carbon one of the five-carbon parent chain.



Answer: 2,5-Dimethylheptane

Choose the seven-carbon chain and the lower locant set.

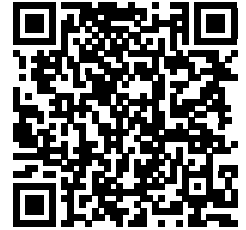


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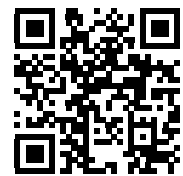


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