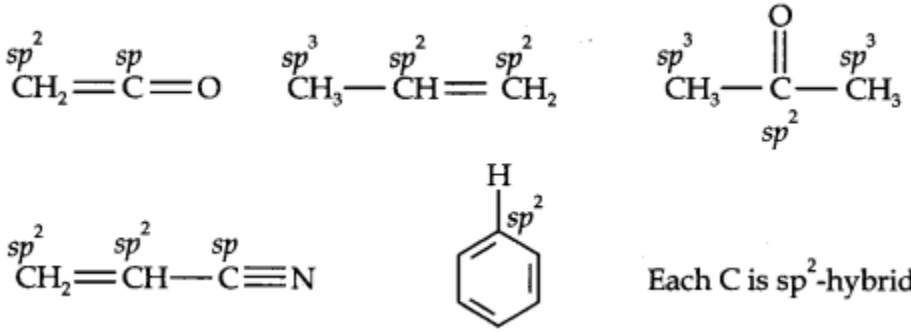
THE VILLAGE
INTERNATIONAL SCHOOL
"We Nurture Dreams"

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:

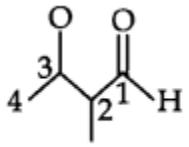
C_6H_6 , C_6H_{12}, CH_2Cl_2, $CH=C=CH_2$, CH_3NO_2, $HCONHCH_3$

Answer:

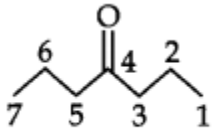
Question 3. Write bond-line formulas for: Isopropyl alcohol, 2,3-Dimethylbutanal, Heptan-4-one.

Answer:

Isopropyl alcohol

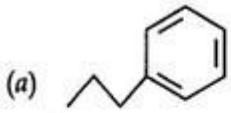


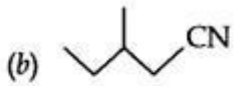
2,3-Dimethylbutanal

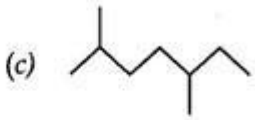


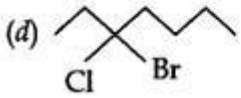
Heptan-4-one

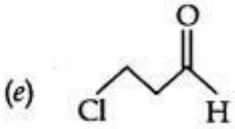
Question 4. Give the TUPAC names of the following compounds:











(f) Cl_2CHCH_2OH

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

$CH_3CH=CH_2$

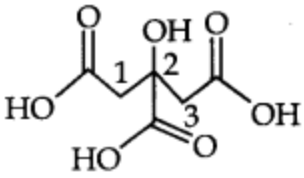
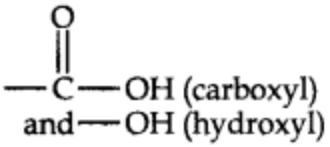
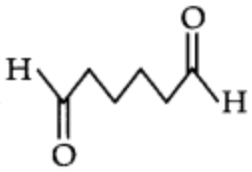
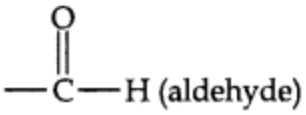
$CH_3CH_2CH=CH_2$

$CH_3CH_2CH_2CH=CH_2$

$CH_3CH_2CH_2CH_2CH=CH_2$

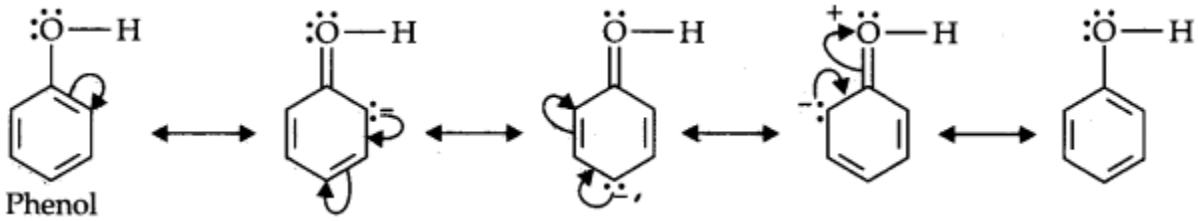
Question 7. Give condensed and bond line structural formulas and identify the functional group(s) present, if any, for: (a) 2, 2, 4-Trimethylpentane (b) 2-Hydroxy-l, 2, 3-propanetricarboxylic acid (c) Hexanedial.

Answer:

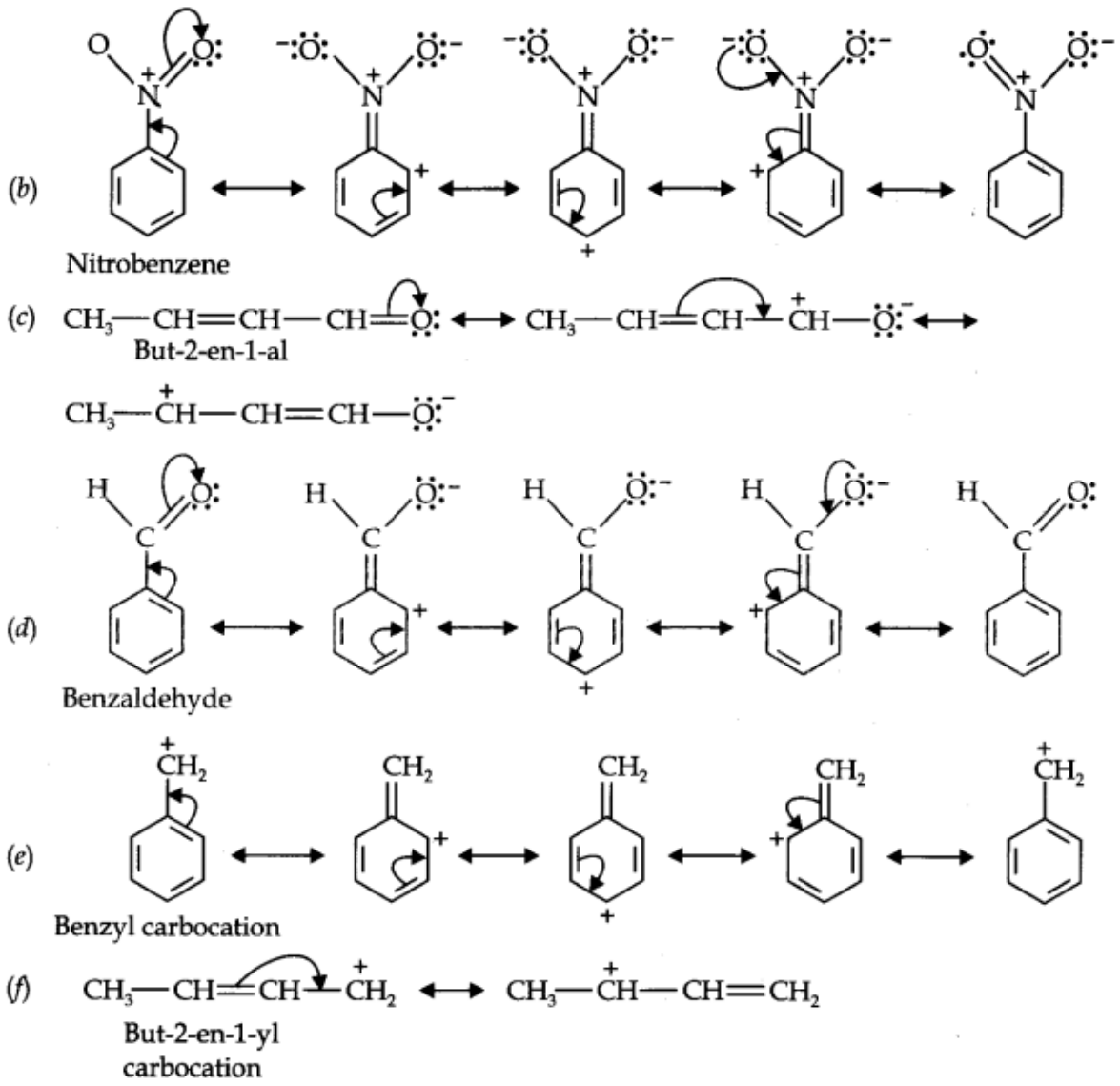
Condensed formula	Bond line formula	Functional group/s
(a) $(CH_3)_3CCH_2CH(CH_3)_2$		–
(b) $HOOCCH_2C(OH)(COOH)CH_2COOH$		
(c) $\dot{O}HC(CH_2)_4CHO$		

Question 8. Draw the resonance structures for the following compounds. Show the electron shift using curved-arrow notation. (a) C_6H_5OH (b) $C_6H_5N0_2$ (c) $CH_3CH=CHCHO$ (d) C_6H_5—CHO (e) C_6H_5—CH_2 (f) $Ch_3Ch=ChCh_2$

Answer:

(a) 

Phenol



Question 9. What are electrophiles and nucleophiles? Explain with examples:

Answer: Electrophiles: The name electrophiles means electron loving. Electrophiles are electron deficient. They may be positive ions or neutral molecules.

Ex: H^+, Cl^+, Br^+, NO_2^+, R_3C^+, RN_2^+, $AlCl_3$, BF_3
Nucleophiles: The name nucleophiles means 'nucleus loving' and indicates that it attacks the region of low electron density (positive centres) in a substrate molecule. They are electron rich they may be negative ions or neutral molecules.
Ex: Cl^- Br^-, CN^-, OH^-, RCR_2^-, NH_3, RNH_2, H_2O, ROH etc.

Question 10. Explain the terms inductive and electromeric effects. Which electron displacement effect explain the following correct orders of acidity of the carboxylic acids?
(a) $Cl_3CCOOH > Cl_2CHCOOH > ClCH_2COOH$
(b) $CH_3CH_2COOH > (CH_3)_2 CHCOOH > (CH_3)_3CCOOH$
Answer: Inductive Effect: The inductive effect refers to the polarity produced in a molecule as a result of higher electronegativity of one atom compared to another.Atoms or groups which lose electron towards a carbon atom are said to have +1 Effect.
Those atoms or groups which draw electron away from a carbon atom are said to have -I Effect.
Commomexamples of -I effect are:
NO_2, F, Cl, Br, I, OH etc.

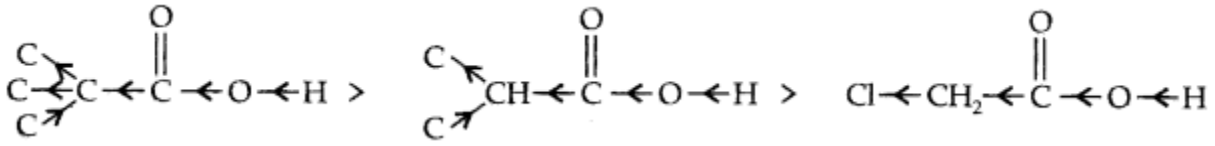
Examples of +1 effect are (Electron releasing)
$(CH_3)_2C$— , $(CH_3)_2CH$—, CH_3CH_2— CH_3— etc.
Electromeric effect: The electromeric effect refers to the polarity produced in a multiple bonded compound as it is approached by a reagent.

The atom A has lost its share in the electron pair and B has gained this share.
As a result A acquires a positive charge and B a negative charge. It is a temporary effect and takes place only in the presence of a reagent.

(a) -I-effect as shown below:

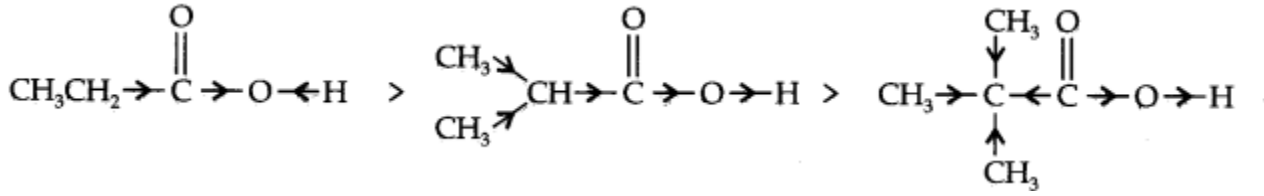
As the number of halogen atoms decreases, the overall -I- effect decreases

and the acid strength decreases accordingly.



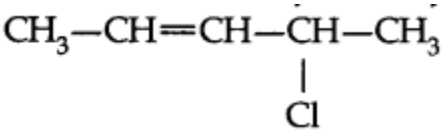
(b) +I-effect as shown below:

As the number of alkyl groups increases, the +I-effect increases and the acid strength
decreases accordingly.



Question 11.. Write the structural formula of 4-chloro-2-pentene.

Answer:

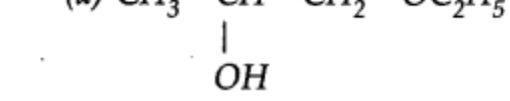


Question 12.

(i) Arrange the following carbocation in increasing order of their stability.

$(CH_3)_2\overset{\oplus}{C}H$, $CH_3\overset{+}{C}H_2$, $(CH_3)_3C^+$, $\overset{+}{C}H_3$

(ii) Write the IUPAC name of following compound.

(a) 

Answer:

(*i*) $\overset{\oplus}{C}H_3 < CH_3\overset{\oplus}{C}H_2 < (CH_3)_2\overset{\oplus}{C}H < (CH_3)_3\overset{\oplus}{C}$

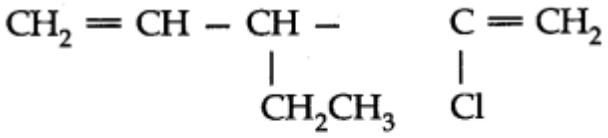
(*ii*) 1-Ethoxypropan-2-ol

Question13.. Which of the following compounds will exhibit cis-trans isomerism?

(a) 2-Butene (b) 2-Butyne (c) 1-Butene (d) 2-Butanol

Answer. c.

Question 14.



The IUPAC name of this compound is

(*a*) 3-ethyl-4-chloro-1, 4-pentadiene (*b*) 2-chloro-3-ethyl-1, 4-pentadiene

(*c*) 4-chloro ethyl-1-pentene (*d*) 3-ethyl-4-chloro-4-pentene

Answer.b.