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Mainly three systems are adopted for naming an organic compound: –

(i) Common Names or Trivial System
(ii) Derived System
(iii) IUPAC system or Geneva System

**COMMON OR TRIVIAL SYSTEM**

On the basis of

<table>
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<tr>
<th>Source</th>
<th>Property</th>
<th>Discovery</th>
<th>Structure</th>
</tr>
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</table>

(i) On the basis of source from which they were obtained.

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Organic Compound</th>
<th>Trivial Name</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>CH₃OH</td>
<td>Wood spirit or Methyl spirit</td>
<td>Obtained by destructive distillation of wood.</td>
</tr>
<tr>
<td>2.</td>
<td>NH₂CONH₂</td>
<td>Urea</td>
<td>Obtained from urine</td>
</tr>
<tr>
<td>3.</td>
<td>CH₄</td>
<td>Marsh gas (fire damp)</td>
<td>It was produced in marsh places.</td>
</tr>
<tr>
<td>4.</td>
<td>CH₃COOH</td>
<td>Vinegar</td>
<td>Obtained from Acetum - i.e. Vinegar</td>
</tr>
<tr>
<td>5.</td>
<td>COOH</td>
<td>Oxalic acid</td>
<td>Obtained from oxalis plant.</td>
</tr>
<tr>
<td>6.</td>
<td>HCOOH</td>
<td>Formic acid</td>
<td>Obtained from formicus [Red ant]</td>
</tr>
<tr>
<td>7.</td>
<td>CH₃ – CH – COOH</td>
<td>Lactic acid</td>
<td>Obtained from lactous (milk)</td>
</tr>
<tr>
<td></td>
<td>OH</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>CH₂ – COOH</td>
<td>Malic acid</td>
<td>Obtain from Apple</td>
</tr>
<tr>
<td></td>
<td>CH(OH)COOH</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>CH₃CH₂CH₂COOH</td>
<td>Butyric acid</td>
<td>Obtained from butter.</td>
</tr>
<tr>
<td>10.</td>
<td>CH₃(CH₂)₄COOH</td>
<td>Caproic acid</td>
<td>Obtained from goats.</td>
</tr>
<tr>
<td>11.</td>
<td>C₂H₅OH</td>
<td>Grain alcohol</td>
<td>Obtained from barley.</td>
</tr>
</tbody>
</table>
(ii) On the basis of property
1. Glucose - Sweet in test 2. Glycol - Sweet poisons
3. Glycerol - Sweet (Glycus - Sweet)

(iii) On the basis of discovery
1. RMgx (Grigard Reagent) 2. \( R_2Zn \) (Frankland reagent)

(iv) On the basis of structure

<table>
<thead>
<tr>
<th>S.No.</th>
<th>No. of Carbon atom</th>
<th>Word Root</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i)</td>
<td>1C</td>
<td>Meth</td>
</tr>
<tr>
<td>(ii)</td>
<td>2C</td>
<td>Eth</td>
</tr>
<tr>
<td>(iii)</td>
<td>3C</td>
<td>Prop</td>
</tr>
<tr>
<td>(iv)</td>
<td>4C</td>
<td>But</td>
</tr>
<tr>
<td>(v)</td>
<td>5C</td>
<td>Pent</td>
</tr>
<tr>
<td>(vi)</td>
<td>6C</td>
<td>Hex</td>
</tr>
<tr>
<td>(vii)</td>
<td>7C</td>
<td>Hept</td>
</tr>
<tr>
<td>(viii)</td>
<td>8C</td>
<td>Oct</td>
</tr>
<tr>
<td>(ix)</td>
<td>9C</td>
<td>Non</td>
</tr>
<tr>
<td>(x)</td>
<td>10C</td>
<td>Dec</td>
</tr>
</tbody>
</table>

Common Names for Hydrocarbon Derivatives

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Compound</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>R – X</td>
<td>Alkyl halide</td>
</tr>
<tr>
<td>2.</td>
<td>R – OH</td>
<td>Alkyl alcohol</td>
</tr>
<tr>
<td>3.</td>
<td>R – SH</td>
<td>Alkyl thio alcohol</td>
</tr>
<tr>
<td>4.</td>
<td>R – NH(_2)</td>
<td>Alkyl amine</td>
</tr>
<tr>
<td>5.</td>
<td>R–O–R</td>
<td>Dialkyl ether</td>
</tr>
<tr>
<td>6.</td>
<td>R–C–R</td>
<td>Dialkyl ketone</td>
</tr>
<tr>
<td>7.</td>
<td>R–NH–R</td>
<td>Dialkyl amine</td>
</tr>
<tr>
<td>8.</td>
<td>R–N–R</td>
<td>Trialkyl amine</td>
</tr>
<tr>
<td>9.</td>
<td>R–O–R’</td>
<td>Alkyl alkyl’ ether</td>
</tr>
<tr>
<td>10.</td>
<td>R–C–R’</td>
<td>Alkyl alkyl’ ketone</td>
</tr>
<tr>
<td>11.</td>
<td>R–NH–R’</td>
<td>Alkyl alkyl’ amine</td>
</tr>
<tr>
<td>12.</td>
<td>R–N–R’</td>
<td>Alkyl alkyl’ alkyl” amine</td>
</tr>
</tbody>
</table>

R is termed as alkyl -
GROUPS

Atom or a group of atoms which possess any ‘free valency’ are called as Groups. If their are two structure of same molecular formula then some prefix (n, iso, neo) are used two differentiate them.

Normal group : –
(a) It is represented by ‘n’.
(b) Groups having no branch (Straight chain).
(c) Free bond will come either on lst carbon atom or on last carbon atom.
   n – butyl \[ \text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{CH}_2 - \]
   n – propyl \[ \text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \]

Iso group : –
When one methyl group is attached to the second last carbon of the straight carbon chain is named as iso group.

\[
\begin{align*}
\text{H}_3\text{C} - & \text{CH} - \\
\text{CH}_3 & \\
\text{Isopropyl} & \text{Isobutyl} & \text{Isopentyl}
\end{align*}
\]

Exception :

\[
\begin{align*}
\text{CH}_3 & \quad \text{CH}_3 \\
\text{CH}_3 - & \text{C} - \text{CH}_2 - \text{CH} - \text{CH}_2 - \\
\text{CH}_3 & \quad \text{CH}_3 \\
\text{(i) Iso octyl} & \text{(ii) Iso heptyl}
\end{align*}
\]

Neo group : –
(a) When two methyl groups on second last carbon of a straight carbon chain is attached to other four carbon atom group is named as neo group.
(b) It is represented by following structure -
   \[
   \begin{align*}
   & \text{C} - \text{C} - \text{C} - \\
   & \text{C} \quad \text{for eg. C} - \text{C} - \text{C} - \text{Neo pentyl}
   \end{align*}
   \]
(c) There should be one 4\(^\circ\) carbon and atleast three methyl group on 4\(^\circ\) carbon.

NOTE : (Optically Active) = If all valency are attached to different atoms.

Amyl group : –

\[
\begin{align*}
\text{CH}_3 - & \text{CH}_2 - \text{C} - \text{CH}_2 - \\
\text{CH}_3 & \\
\text{Active amyl} & \text{Secondary amyl} & \text{Active secondary amyl} & \text{Active iso secondary amyl}
\end{align*}
\]
Secondary group:

(a) The carbon having free valency attached to two carbon is called secondary carbon.

(b) It is represented by following structure, \( C - C - C \)

\[
\text{eg. (i) } CH_3-C=CH_2-CH_3 \quad \text{(secondary butyl)}
\]

\[
\text{eg. (ii) } CH_3-C=CH_2-CH_2-CH_3 \quad \text{(secondary pentyl)}
\]

Tertiary group:

(a) The carbon having free valency attached to three other carbon.

(b) It is represented by following structure, \( C - C - C \)

\[
\text{e.g. (i) } CH_3-C=CH_3 \quad \text{CH}_3-C=CH_2-CH_3 \quad \text{(Tertiary butyl)}
\]

\[
\text{e.g. (ii) } CH_3-C=CH_2-CH_3 \quad \text{(Tertiary pentyl)}
\]

Alkyl group:

When a hydrogen is removed from Alkane (saturated hydrocarbon) then alkyl group is formed.
A bond is vacant on alkyl group on which any functional group may come.

\[
\text{alkane} \xrightarrow{\text{H}} \text{Alkyl -} \quad (\text{C}_n\text{H}_{2n+2}) \quad (\text{C}_n\text{H}_{2n+1})
\]

\[
\text{e.g.}
\]

(i) \( \text{CH}_4 \xrightarrow{\text{H}} \text{CH}_3 \quad \text{Methane} \quad \text{Methyl} \)

(ii) \( \text{CH}_3-\text{CH}_3 \xrightarrow{\text{H}} \text{CH}_3-\text{CH}_2- \quad \text{Ethane} \quad \text{ethyl} \)

(iii) \( \text{CH}_3-\text{CH}_3-\text{CH}_3 \xrightarrow{\text{H}} \text{CH}_3-\text{CH}_2- \)

\[
\text{n-Propyl}
\]

\[
\text{iso-Propyl}
\]

(iv) \( \text{CH}_3-\text{CH}_2-\text{CH}_2-\text{CH}_3 \xrightarrow{\text{H}} \text{CH}_3-\text{CH}_2- \)

\[
\text{n-Butyl}
\]

\[
\text{Sec. Butyl}
\]

(v) \( \text{CH}_3-\text{CH} \quad \text{iso-butane} \)

\[
\text{iso-butyl}
\]

\[
\text{tertiary-butyl}
\]
(vi) \( \text{CH}_3\text{-CH-CH}_2\text{-CH}_2\text{-CH}_3 \) → \( \text{CH}_3\text{-CH-CH}_2\text{-CH}_2\text{-CH}_2\text{-H} \)  
\( n\)-pentane  
\( \text{CH}_3\text{-CH-CH}_2\text{-CH}_2\text{-CH}_2\text{-CH}_3 \)  
active secondary amyl  
\( \text{C}_9\text{H}_8\text{-CH-C}_2\text{H}_5 \)  
secondary amyl

(vii) \( \text{CH}_3\text{-CH-CH}_2\text{-CH}_2\text{-CH}_3 \) → \( \text{CH}_3\text{-CH-CH}_2\text{-CH}_2\text{CH}_3 \)  
\( n\)-pentane  
\( \text{CH}_3\text{-CH-CH}_2\text{-CH}_2\text{-CH}_3 \)  
tertiary-pentyl  
\( \text{C}_9\text{H}_8\text{-CH-CH}_2\text{-CH}_3 \)  
active amyl  
\( \text{CH}_3\text{-CH-CH}_2\text{-CH}_2\text{CH}_3 \)  
Active isosecondary amyl

(viii) \( \text{CH}_3\text{-C-CH}_3 \) → \( \text{CH}_3\text{-C-CH}_2\text{-CH}_3 \)  
\( \text{CH}_3\text{-C-CH}_3 \)  
neo-pentane  
\( \text{CH}_3\text{-C-CH}_2\text{-CH}_3 \)  
neo-pentyl

Alkenyl group:  
\[ \text{alkene} \xrightarrow{-\text{H}} \text{Alkenyl} \]  
\( \text{C}_n\text{H}_{2n} \)  
(\( \text{C}_n\text{H}_{2n-1} \))  
\( \text{CH}_2=\text{CH}- \)  
Vinyl  
\( \text{CH}_2=\text{CH}-\text{CH}_2- \)  
Allyl  
\( \text{CH}_3-\text{CH} = \text{CH}- \)  
Propenyl(1-propenyl)

\( \text{CH}_3-\text{C}=\text{CH}_2 \)  
Isopropenyl (1-methyl-1-ethenyl)
Alkynyl group –

\[
\text{alkyne } \xrightarrow{\text{-H}} \text{ Alkynyl - (C}_n\text{H}_{2n-2}) \quad (C}_n\text{H}_{2n-3})
\]

\[
\begin{align*}
\text{CH} & \equiv \text{C} - & \text{CH} & \equiv \text{C} - \text{CH}_2- \\
\text{Ethynyl} & & \text{Propargyl (2-propynyl)} & \text{Propynyl (1-propynyl)}
\end{align*}
\]

Alkylidene group –

\[
\text{alkane } \xrightarrow{\text{-2H from same carbon}} \text{ Alkylidene -}
\]

Alkyylene group

\[
\text{alkane } \xrightarrow{\text{-2H from different carbon}} \text{ Alkyylene -}
\]

Position of double bond : –

In an unsaturated hydrocarbon if the position of double bond is on 1st or last carbon then it’s prefix will be \( \alpha \) (alpha) if it is on 2nd carbon it is termed as \( \beta \) (Beta) & the \( \gamma \) (gamma) & \( \delta \) (delta) and so on.

eg. \( \text{H}_2\text{C} = \text{CH} - \text{CH}_2 - \text{CH}_3 \quad \alpha - \text{butylene} \)
\( \text{H}_3\text{C} - \text{CH} = \text{CH} - \text{CH}_3 \quad \beta - \text{butylene} \)
\( \text{H}_3\text{C} - \text{CH}_2 - \text{CH} = \text{CH}_2 \quad \alpha - \text{butylene} \)
\( \text{H}_2\text{C} = \text{CH} - \text{CH}_3 \) or \( \text{H}_3\text{C} - \text{CH} = \text{CH}_2 \quad \text{(Both are same positions, propylene)} \)
\( \begin{align*}
\text{H}_3\text{C} - \text{C} = \text{CH}_2 \\
\text{CH}_3 \\
\text{Isobutylene}
\end{align*} \)

\( \text{CH}_3 - \text{CH}_2 - \text{CH} = \text{CH} - \text{CH}_2 - \text{CH}_3 \quad \gamma - \text{hexylene} \)
\( \text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{CH} = \text{CH} - \text{CH}_2 - \text{CH}_2 - \text{CH}_3 \quad \delta - \text{octylene} \)

**COMMON – NAMING OF DIHALIDES**

(a) When two same halogen atoms are attached to the same carbon such compounds are called Gemdihalides.

(b) Common names of such compounds are alkylidene halides

\[
\begin{align*}
\text{CH}_2 - \text{CH}_2 - \text{Cl} & \quad \text{CH}_2 - \text{CH} - \text{CH}_2 - \text{I} \\
\text{Ethylidene chloride} & \quad \text{Isobutylidene Iodide}
\end{align*}
\]

Exception : Methylidene halide (wrong)

\[
\text{CH}_3 - \text{CH}_2 - \text{X}
\]

Methylene halide (right)
(c) When two same halogen atoms are attached to adjacent carbon, these are called as vicinal dihalides. Common names of such compounds are alkylene halide.

\[ \text{eg.} \quad \text{CH}_3 - \text{CH} - \text{CH}_2 \quad \text{Propylene Iodide} \quad \text{H}_3\text{C} - \text{C} - \text{CH}_2 - \text{Cl} \quad \text{Isobutylene chloride} \]

\[ \text{eg.} \quad \text{CH}_2 - \text{CH}_2 - \text{CH}_2 \quad \text{Trimethylene Iodide} \quad \text{CH}_2 - \text{CH}_2 - \text{CH}_2 - \text{CH}_2 - \text{CH}_2 \quad \text{Pentamethylene Bromide} \]

Exception : –
\[ \text{CH}_2 - \text{X dimethylene halide} \quad \text{(wrong)} \]
\[ \text{CH}_2 - \text{X ethylene halide} \quad \text{(right)} \]

**COMMON - NAMING OF DI-HYDROXY COMPOUNDS**

(a) When two –OH groups are attached to adjacent carbon atoms they are termed as alkylene glycol.

\[ \text{eg.} \quad \text{CH}_3 - \text{CH}_2 - \text{CH} - \text{CH}_2 \quad \text{Butylene glycol} \quad \text{CH}_3 - \text{CH}_2 - \text{C} - \text{CH}_2 - \text{OH} \quad \text{Active amylene glycol} \]

(b) When two –OH group are attached at the two ends of a carbon chain, these compounds are named as polymethylene glycol.

\[ \text{eg.} \quad \text{CH}_2 - \text{CH}_2 - \text{CH}_2 - \text{CH}_2 \quad \text{Tetra methylene glycol} \quad \text{CH}_2 - \text{CH}_2 - \text{CH}_2 - \text{CH}_2 - \text{CH}_2 - \text{CH}_2 \quad \text{Hexamethylene glycol} \]

Exception :
\[ \text{CH}_2 - \text{OH dimethylene glycol (wrong)} \]
\[ \text{CH}_2 - \text{OH ethylene glycol (right)} \]
PROBLEMS

Make the structure of following organic compounds -
1. Isopropylidene Bromide  2. Active amylene Iodide
3. Isobutylene glycol  4. Isobutylene  5. Trimethylene glycol

ANSWERS

1. $\text{CH}_3\text{C}<\text{Br}
2. $\text{CH}_3\text{C}-\text{CH}_2-\text{I}$
3. $\text{CH}_3\text{C}-\text{CH}_2-\text{OH}$
4. $\text{H}_2\text{C}-\text{C}=\text{CH}_2$
5. $\text{CH}_2-\text{CH}_2-\text{CH}_2$

COMMON-NAMING OF THE FUNCTIONAL GROUP HAVING CARBON

(Common naming for Hydrocarbon derivatives)

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Functional group</th>
<th>Suffix</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i)</td>
<td>$\text{O} \quad \text{C} \quad \text{OH}$</td>
<td>-ic Acid</td>
</tr>
<tr>
<td>(ii)</td>
<td>$\text{O} \quad \text{O} \quad \text{O} \quad \text{C} \quad \text{O} \quad \text{C} \quad \text{O}$</td>
<td>-ic anhydride</td>
</tr>
<tr>
<td>(iii)</td>
<td>$\text{C} \quad \text{O} \quad \text{R}$</td>
<td>-ate</td>
</tr>
<tr>
<td>(iv)</td>
<td>$\text{O} \quad \text{C} \quad \text{NH}_2$</td>
<td>-amide</td>
</tr>
<tr>
<td>(v)</td>
<td>$\text{O} \quad \text{C} \quad \text{X}$</td>
<td>-yl halide</td>
</tr>
<tr>
<td>(vi)</td>
<td>$\text{O} \quad \text{C} \quad \text{H}$</td>
<td>-aldehyde</td>
</tr>
<tr>
<td>(vii)</td>
<td>$\text{C} \equiv \text{N}$</td>
<td>-o-nitrite</td>
</tr>
<tr>
<td>(viii)</td>
<td>$\text{N} \equiv \text{C}$</td>
<td>-o-isonitrile</td>
</tr>
</tbody>
</table>

Prefix : –

1 Carbon $\rightarrow$ Form-
3 Carbon $\rightarrow$ Propion-
5 Carbon $\rightarrow$

Valer $\rightarrow$ Normal-
3 C + (=) double bond = Acryl-
4 C + double bond = Croton-
**NOMENCLATURE OF ESTER**

The group which is attached to the oxygen is written as alkyl & the remaining structure is named on the basis of Functional Group suffix.

- *(i)* \( \text{CH}_3 - \text{C} - \text{O} - \text{CH}_3 \) Methyl formate
- *(ii)* \( \text{CH}_3 - \text{O} - \text{C} - \text{H} \) Methyl formate
- *(iii)* \( \text{CH}_3 - \text{C} - \text{O} - \text{H} \) Acetic acid
- *(iv)* \( \text{CH}_3 - \text{C} - \text{O} - \text{CH}_3 \) Methyl acetate
- *(v)* \( \text{CH}_3 - \text{C} - \text{O} - \text{CH}_2 - \text{CH}_3 \) Ethyl acetate
- *(vi)* \( \text{CH}_3 - \text{CH}_2 - \text{C} - \text{O} - \text{CH}_2 - \text{CH}_3 \) Ethyl propionate
- *(vii)* \( \text{CH}_2 = \text{CH} - \text{C} - \text{O} - \text{CH}_2 - \text{CH}_3 \) Ethyl acrylate
- *(viii)* \( \text{CH}_3 - \text{CH} = \text{CH} - \text{C} - \text{O} - \text{CH}_3 \) Methyl crotonate

**NOMENCLATURE OF ANHYDRIDE**

**Rule**: – Add the total number of carbon atoms & divide it by 2, the substract will give you the number of C - atom. Now name it according to suffix use for anhydride.

\[
\frac{\text{Total}}{2} = \text{Substract} = \text{Number of C atom}
\]

- \( \frac{4}{2} = 2 \) \( \text{CH}_3 - \text{C} - \text{O} - \text{C} - \text{CH}_3 \) Acetic anhydride
- \( \frac{6}{2} = 3 \) \( \text{C}_2\text{H}_5 - \text{C} - \text{O} - \text{C} - \text{C}_2\text{H}_5 \) Propionic anhydride
If \( R \neq R' \), You need not to find out substract.

\[
O \quad O
\]

\[
\text{CH}_3\text{-C-O-} \quad \text{C}_2\text{H}_5
\]

Acetic propionic anhydride (right)
Propionic Acetic anhydride (wrong)
Divide it in two parts as above & name it by suffixing ic anhydride (alphabetically)

\[
O \quad O
\]

\[
\text{CH}_3\text{-CH-} \quad \text{C}_2\text{H}_5
\]

Butyric propionic anhydride
Isobutyric Secondary valeric anhydride

\[
\text{CH}_3\text{-CH-} \quad \text{O}
\]

\[
\text{CH}_2\text{-CH-} \quad \text{O}
\]

Acrylic anhydride

**SOLVED EXAMPLE**

**Q.1** Which of the following is not a neo structure:–

(A) \( -\text{C-} \quad -\text{C-} \quad -\text{C-} \quad -\text{C-} \)

(B) \( -\text{C-} \quad \text{C-} \quad \text{C-} \quad \text{C-} \)

(C) \( -\text{C-} \quad \text{C-} \quad \text{C-} \)

(D) \( -\text{C-} \quad \text{C-} \quad \text{C-} \quad \text{C-} \)

*Ans.* C

*Sol.* A carbon must be attached with four carbons.

**Q.2** Acryl aldehyde is -

(A) A saturated aldehyde

(B) An alkene

(C) A polymer

(D) An unsaturated aldehyde

*Ans.* D

*Sol.* \( \text{CH}_2 = \text{CH} - \text{CHO} \) unsaturated aldehyde.

**Q.3** The common name of the compound \( \text{CH}_2 = \text{C-} \quad \text{CH} = \text{CH}_2 \) is -

(A) Divinyl ketone

(B) Diallyl ketone

(C) Both A and B

(D) None

*Ans.* A

*Sol.* \( \text{CH}_2 = \text{CH} - \) is called as vinyl group.
Q.4  Common name of CH$_2$=CH–CN is :
(a) acrylonitrile  (b) vinyl cyanide  (c) allyl cyanide  (d) allyl nitrile
(A) a, b and d  (B) a, and b  (C) only b  (D) a, b and c
Ans.  B

Q.5  The number of possible alkyl groups of iso octane are -
(A) 1  (B) 3  (C) 5  (D) 6
Ans.  B

Sol.  \[
\text{CH}_3 - \text{C} - \text{CH}_2 - \text{CH} - \text{CH}_3
\]
\[
\text{CH}_3 \quad \text{CH}_3
\]
\[
1 + 1 + 1 = 3
\]

Q.6  Write the common names of the following compounds

1. CH$_3$ – CH$_2$ – CN  
2. \[
\text{CH}_3 - \text{CH} - \text{CH}_2 - 1
\]
3. \[
\text{CH}_3 - \text{CH}_2 - \text{CH} - \text{CH}_2 - \text{F}
\]
4. \[
\text{CH}_3 - \text{CH} - \text{CH}_2 - \text{CH}_2 - \text{Cl}
\]
5. \[
\text{CH}_3 - \text{CH}_2 - \text{CH} - \text{CH}_2 - \text{OH}
\]
6. \[
\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{C} - \text{NH}_2
\]
7. CH$_2$ = CH – SH  
8. \[
\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{C} - \text{NH}_2
\]
9. \[
\text{CH}_3 - \text{CH}_2 - \text{CH} - \text{OH}
\]
10. \[
\text{CH}_3 - \text{C} - \text{CH}_2 - \text{SH}
\]
11. \[
\text{CH}_3 - \text{C} = \text{CH}_2
\]
12. CH $\equiv$ C – CH$_2$ – Br

ANSWERS

1. Ethyl cyanide  
2. Isobutyl Iodide  
3. Active amyl fluoride  
4. Iso pentyl chloride  
5. Active amyl alcohol  
6. Tertiary hexyl amine  
7. Vinyl thio alcohol  
8. Active secondary amyl amine  
9. Secondary amyl alcohol  
10. Neopentyl thio alcohol  
11. Isopropenyl amine  
12. Propargyl Bromide
MCQ

Q.1 Which of the following are secondary radicals:

(a) CH₃ – CH – C₂H₅  (b) CH₂ = C – CH₃  (c) CH₂ = CH–  (d) (CH₃)₂CH–

(A) a, b, c,  (B) a, d, c  (C) b, c, d  (D) a, b, d

Q.2 Common name of the structure

CH₂ – OH

CH₂ – OH

(A) Ethylene Glycol  (B) Ethene dialcohol  (C) Glycerol  (D) Ethylene alcohol

Q.3 Common name of the compound

CH₃ – CH₂ – C – NH₂  is -

(A) Acetamide  (B) Propionamide  (C) Butyramide  (D) Acetic amide

Q.4 The structure of 2–butenyl radical is:

(A) CH₃ – CH=CH – CH₂–  (B) CH₂ = CH=CH–CH₂–

(C) CH₃ – CH₂ – C – CH₃  (D) CH₂ = CH₂ – C – CH₃

Q.5 Which one is structure of Maleic acid

(A) HO – C – C – H  (B) HO – CH – COOH

CH₂ – COOH  (C) HO – CH – COOH  (D) H – C – C – OH

HO – CH – COOH

HO – CH – COOH

Q.6 Common name of the structure

CH₃ – C – O – CH = CH₂  is :

(A) vinyl acetate  (B) acryle acetate  (C) methyl acrylate  (D) Vinyl ethanoate

Q.7 Which is the structural formula of isoprene

(A) CH₃ – C = CH₂  (B) CH₂ = C – CH = CH₂

CH₃

Cl

(C) CH₂ = C – CH = CH₂  (D) CH₃ – CH=CH–CH₃
Q.8 The number of gem dihalides possible with the molecular formula \( \text{C}_2\text{H}_4\text{X}_2 \) and \( \text{C}_3\text{H}_6\text{X}_2 \) is given by the set :

(A) 1, 2  
(B) 2, 1  
(C) 2, 2  
(D) 1, 1

Q.9 Common name of the compound \( \text{C}_6\text{H}_5\text{CHO} \)

(A) Anisole  
(B) Benzaldehyde  
(C) Salicylaldehyde  
(D) None of these

ANSWERS

Q.1(D)  Q.2(A)  Q.3(B)  Q.4(B)  Q.5(D)  Q.6(A)  Q.7(B)  Q.8(A)  Q.9(B)

PROBLEMS

Q.1 Write down the structures of the following -

1. Di allyl amine  
2. Tri methyl amine  
3. Di isobutyl ether  
4. Di isopentyl ketone  
5. Di Active amyl amine  
6. Di normal propyl ether  
7. Tri neopentyl amine

Q.2 Write down the common names of the following :

1. \( \text{CH}_3 - \text{C} = \text{N} \equiv \text{C} \)  
2. \( \text{CH}_3 - \text{CH} = \text{C} - \text{Cl} \)  
3. \( \text{CH}_3 - \text{CH}_2 - \text{CH} = \text{C} - \text{NH}_2 \)

Ans. (1) 1. \( \text{CH}_2 = \text{CH} - \text{CH}_2 - \text{NH} - \text{CH}_2 - \text{CH} = \text{CH}_2 \)  
2. \( \text{CH}_3 - \text{N} - \text{CH}_3 \)

3. \( \text{H}_3\text{C} - \text{CH} - \text{CH}_2 - \text{O} - \text{CH}_2 - \text{CH} - \text{CH}_3 \)  
4. \( \text{H}_3\text{C} - \text{CH} - \text{CH}_2 - \text{CH}_2 - \text{C} - \text{CH}_2 - \text{CH}_2 - \text{CH} - \text{CH}_3 \)

5. \( \text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{NH} - \text{CH}_2 - \text{CH}_2 - \text{CH}_2 - \text{CH}_3 \)  
6. \( \text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{O} - \text{CH}_2 - \text{CH}_2 - \text{CH}_2 - \text{CH}_3 \)

7. \( \text{CH}_3 - \text{C} - \text{CH}_2 - \text{N} - \text{CH}_2 - \text{C} - \text{CH}_3 \)

Ans. (2) 1. Tertiary valero-isonitrile  
2. Isobutyryl chloride  
3. Secondary Valer amide
[SINGLE CORRECT CHOICE TYPE]

Q.1 The hybrid state of C-atoms which are attached to a single bond with each other in the following structure are: CH$_2$=CH–C≡CH
(A) sp$^{2}$, sp$^{1}$ (B) sp$^{1}$, sp$^{3}$ (C) sp$^{2}$, sp$^{2}$ (D) sp$^{2}$, sp$^{3}$

Q.2 In the compound HC≡C–CH$_2$–CH=CH–CH$_3$, the C$_2$–C$_3$ bond is the type of:
(A) sp – sp$^{2}$ (B) sp$^{3}$ – sp$^{3}$ (C) sp – sp$^{3}$ (D) sp$^{2}$ – sp$^{3}$

Q.3 The number of acetylenic bonds in the structure are: CH≡C–C–CH = CH–C≡N
(A) 2 (B) 3 (C) 1 (D) 4

Q.4 Which of the following is the first member of ester homologous series?
(A) Ethyl ethanoate (B) Methyl ethanoate (C) Methyl methanoate (D) Ethyl methanoate

Q.5 Which of the following compound’s prefix ‘iso’ is not correct –
(A) Iso pentane (B) Iso Hexane (C) Iso butane (D) Iso octane

Q.6 The group of heterocyclic compounds is:
(A) Phenol, Furane (B) Furane, Thiophene (C) Thiophene, Phenol (D) Furane, Aniline

Q.7 The compound which has one isopropyl group is:
(A) 2,2,3,3-tetramethyl pentane (B) 2,2-dimethyl pentane (C) 2,2,3-trimethyl pentane (D) 2-methyl pentane

Q.8 A substance containing an equal number of primary, secondary and tertiary carbon atoms is:
(A) Mesityl Oxide (B) Mesitylene (C) Maleic acid (D) Malonic acid

Q.9 How many secondary carbon atoms does methyl cyclopropane have?
(A) Nine (B) One (C) Two (D) Three

Q.10 (CH$_3$)$_3$C–CH = CH$_2$ has the IUPAC name:
(A) 3, 3–Dimethyl–1–butene (B) 2,2–Dimethyl–1–butene (C) 2,2–Dimethyl–3–butene (D) 1, 3–Dimethyl–1–propene

Q.11 IUPAC name of CH$_2$=CH–CH$_2$–CH$_2$–C≡CH is:
(A) 1,4–Hexenyne (B) 1–Hexen–5–yne (C) 1–Hexyne–5–ene (D) 1, 5–Hexyne
[REASONING TYPE]

These questions consist of two statements each, printed as Statement-I and Statement-II. While answering these Questions you are required to choose any one of the following four responses.

(A) If both Statement-I & Statement-II are True & the Statement-II is a correct explanation of the Statement-I.
(B) If both Statement-I & Statement-II are True but Statement-II is not a correct explanation of the Statement-I.
(C) If Statement-I is True but the Statement-II is False.
(D) If Statement-I is False but the Statement-II is True.

Q.1 Statement-I : Pentane and 2-methyl pentane are homologues.
Statement-II : Pentane is a straight-chain alkane, while 2-methyl pentane is a branched-chain alkane.

Q.2 Statement-I : All the C atom o but-2-ene lie in one plane.
Statement-II : Double-bond C atoms are sp\(^2\)-hybridised.

Q.3 Statement-I : The IUPAC name of citric acid is 2-hydroxy-propane-1, 2, 3-tricarboxylic acid.
       \[
       \text{COOH} \\
       \text{HOOC} \quad \text{COOH} \\
       \text{OH} \\
       \text{Citric acid}
       \]
Statement-II : When an unbranched C atom is directly linked to more than two like-functional groups, then it is named as a derivative of the parent alkane which does not include the C atoms of the functional groups.

Q.4 Statement-I : Rochelle’s salt is used as complexing agent in Tollens reagent.
Statement-II : Sodium potassium salt of tartaric acid is known as Rochelle’s salt. The IUPAC name of Rochelle’s salt \[
\left( \text{NaOOC} \quad \text{OH} \quad \text{COOK} \quad \text{OH} \right) \]
is sodium potassium -2, 3-dihydroxy butane-1, 4-dioate.

Q.5 Statement-I : The IUPAC name of isoprene is 2-methyl buta-1, 3-diene.
Statement-II : Isoprene unit is a monomer of natural rubber.

[MULTIPLE CORRECT CHOICE TYPE]

Q.6 Which of the following statements is/are wrong ?
(A) \(C_nH_{2n}\) is the general formula of alkanes
(B) In homologous series, all members have the same physical properties
(C) IUPAC means International Union of Physics and Chemistry
(D) Butane contains two 1º C atoms and 2º C atom
EXERCISE-3 (Miscellaneous Exercise)

Q.1

Q.2

Q.3

Q.4

Q.5

Q.6

Q.7

Q.8

Q.9

Q.10
EXERCISE-4

SECTION-A
(IIT JEE Previous Year's Questions)

Q.1 The IUPAC name of the compound having the formula is:

\[
\begin{align*}
&\text{H}_3\text{C} - \text{C} - \text{CH} = \text{CH}_2 \\
&\text{CH}_3
\end{align*}
\]

(A) 3,3,3-trimethyl-1-propene  (B) 1,1,1-trimethyl-2-propene
(C) 3,3-dimethyl-1-butene  (D) 2,2-dimethyl-3-butene  [JEE 1984]

Q.2 Write the IUPAC name of \( \text{CH}_3\text{CH}_2\text{CH} = \text{CHCOOH} \) [JEE 1986]

Q.3 The IUPAC name of the compound \( \text{CH}_2 = \text{CH} - \text{CH} (\text{CH}_3)_2 \) is:

(A) 1,1-dimethyl-2-propene  (B) 3-methyl-1-butene
(C) 2-vinyl propane  (D) None of the above  [JEE 1987]

Q.4 The number of sigma and pi-bonds in 1-butene 3-yne are:

(A) 5 sigma and 5 pi  (B) 7 sigma and 3 pi  (C) 8 sigma and 2 pi  (D) 6 sigma and 4 pi  [JEE 1989]

Q.5 Write I.P.A.C name of following:

(a) Me = methyl group  [JEE 1990]

(b) \[\begin{align*}
&\text{H}_3\text{C} - \text{N} - \text{CH} - \text{CH}_2\text{CH}_3 \\
&\text{CH}_3\text{C}_2\text{H}_5
\end{align*}\]  [JEE 1991]

Q.6 Write IUPAC name of succinic acid.  [JEE 1994]

Q.7 The IUPAC name of \( \text{C}_6\text{H}_5\text{COCl} \) is

(A) Benzoyl chloride  (B) Benzene chloro ketone
(C) Benzene carbonyl chloride  (D) Chloro phenyl ketone  [JEE 2006]
Q.8 The IUPAC name of the following compound is

\[
\begin{align*}
\text{CN} & \quad \text{Br} \\
\text{HO} & \\
\end{align*}
\]

(A) 4-Bromo-3-cyanophenol  
(B) 2-Bromo-5-hydroxybenzonitrile  
(C) 2-Cyano-4-hydroxybromobenzene  
(D) 6-Bromo-3-hydroxybenzonitrile

Q.9 The correct structure of ethylenediaminetetraacetic acid (EDTA) is

\[
\begin{align*}
\text{(A)} & \quad \text{HOOC–CH}_2 \quad \text{N–CH=CH–N} \quad \text{CH}_2–\text{COOH} \\
\text{(B)} & \quad \text{HOOC–CH}_2 \quad \text{N–CH–CH–N} \quad \text{COOH} \\
\text{(C)} & \quad \text{HOOC–CH}_2 \quad \text{N–CH–CH–N} \quad \text{COOH} \\
\text{(D)} & \quad \text{HOOC–CH}_2 \quad \text{N–CH} \quad \text{CH–N} \quad \text{CH–COOH} \\
\end{align*}
\]

Q.10 The correct decreasing order of priority for the functional groups of organic compounds in the IUPAC system of nomenclature is

\[
\begin{align*}
\text{(A)} & \quad \text{–SO}_3\text{H, –COOH, –CONH}_2, \text{–CHO} \\
\text{(B)} & \quad \text{–CHO, –COOH, –SO}_3\text{H, –CONH}_2 \\
\text{(C)} & \quad \text{–CONH}_2, \text{–CHO, –SO}_3\text{H, –COOH} \\
\text{(D)} & \quad \text{–COOH, –SO}_3\text{H, –CONH}_2, \text{–CHO} \\
\end{align*}
\]
## ANSWER KEY

### EXERCISE-1

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<tr>
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<th>Q.2</th>
<th>(C)</th>
<th>Q.3</th>
<th>(C)</th>
<th>Q.4</th>
<th>(C)</th>
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<td>Q.6</td>
<td>(B)</td>
<td>Q.7</td>
<td>(D)</td>
<td>Q.8</td>
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<td>Q.9</td>
<td>(C)</td>
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<td>(A)</td>
<td>Q.11</td>
<td>(B)</td>
<td>Q.12</td>
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<td>Q.16</td>
<td>[(A) Q; (B) R; (C) S; (D) P]</td>
<td>Q.17</td>
<td>[(A) R; (B) P; (C) S; (D) Q]</td>
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<td>Q.18</td>
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<td>Q.19</td>
<td>[(A) Q, R; (B) R, S; (C) P ]</td>
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### EXERCISE-4

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#### SECTION-B

| Q.10 | (D) | | | | | |
**EXERCISE-1**

**Q.1**  \[
\begin{align*}
\text{C} & \sigma^+ \\
\text{H} & \sigma^+ \\
\text{sp}^2 & \sigma^+ \\
\text{sp} & \sigma^+ \\
\text{C} & \sigma^+ \\
\end{align*}
\]

**Q.2**  \[
\begin{align*}
\text{HC} & = \text{C} - \text{CH}_3 - \text{CH} = \text{CH} - \text{CH}_1 \\
\end{align*}
\]

**Q.3**  \[
\begin{align*}
\text{C} & \equiv \text{C} - \text{C} - \text{CH} = \text{CH} - \text{C} = \text{N} \\
\text{Acetylnic group}
\end{align*}
\]

**Q.4**  \[
\begin{align*}
\text{H} & - \text{C} - \text{O} - \text{CH}_1 \\
\end{align*}
\]

**Q.5**  \[
\begin{align*}
\text{CH}_3 & - \text{C} - \text{CH}_2 - \text{CH} - \text{CH}_1 \\
\text{Iso group}
\end{align*}
\]

**Q.6**  \[
\begin{align*}
\text{Furan} & \\
\text{Thiophene}
\end{align*}
\]

**Q.7**  \[
\begin{align*}
\text{CH}_2 & - \text{CH}_3 - \text{CH} - \text{CH}_2 \\
\text{ISO group}
\end{align*}
\]

**Q.8**  \[
\begin{align*}
\text{1}^\circ & \text{Carbon} \Rightarrow 3 \\
\text{2}^\circ & \text{Carbon} \Rightarrow 3 \\
\text{3}^\circ & \text{Carbon} \Rightarrow 3
\end{align*}
\]

**Q.9**  \[
\begin{align*}
\text{2}^\circ & \Rightarrow \text{2}
\end{align*}
\]

**Q.10**  \[
\begin{align*}
\text{H}_2\text{C} - \text{C} & - \text{CH} = \text{CH}_2 \\
\text{CH}_1
\end{align*}
\]

3,3-dimethyl-1-butene

**Q.11**  \[
\begin{align*}
\text{H}_2\text{C} & = \text{CH} - \text{CH}_2 - \text{CH}_2 - \text{CH} = \text{CH}_1 \\
\text{1-Hexene-5-yne}
\end{align*}
\]

**Q.12**  \[
\begin{align*}
\text{H}_2\text{C} & = \text{CH} - \text{C} - \text{CH}_1 \\
\text{CH}_4 - \text{CH}_5 \\
\text{3-methyl-2-pentene}
\end{align*}
\]

**Q.13**  Compound having hetero-atom (as O, N, S etc) in cycle are known as heterocyclic compound.

**Q.15**  \[
\begin{align*}
\text{H}_2\text{C} & = \text{CH} - \text{CH}_2 - \text{CH} = \text{CH}_1 \\
\text{CH}_7 - \text{CH}_6 - \text{CH}_5 - \text{CH}_4 - \text{CH}_3 - \text{CH}_2 - \text{CH}_1 \\
\text{3,5-diethyl-4,5-dimethyl -5-[1-methyl ethyl] hept-3-ene}
\end{align*}
\]
Q.17 Ethyl
CH₃
Methyl

Q.18
H₂C – CH = CH – C = CH
Pent-3-ene-1-yne

Q.19
H₃C – C = C – C – CH₃
4, 4-dimethylpent-1-yne

Q.21
H₃C – CH – CH₂

Q.22
H₃C – CH₂ – C = N

Q.23
sp³
H₃C – CH₂ – C = N

Q.24
Functional group

Q.25
(Toluene)

Q.26
H₃C – CH₂ – CH – O – CH₂ – CH₃

1-Ethoxy-1-propanamine (√)
not
1-Amino-1-Ethoxypropane (×)

Q.27
CH₃ – CH₂ – CH₂ – CH₂ – CH₂ – CH₂ – CH₂ – C – CH₂ – CH₂ – CH₃

4-Ethyl-4, 5-dimethyldecane

Q.28
C₆H₄Br₂
Terminal gem dibromide
CH₃ – C – CH₂
Non-terminal gem dibromide
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admin@bansaltestprep.com  095710-42039