14. NOMENCLATURE OF COMPOUNDS WITH FUNCTIONAL GROUPS

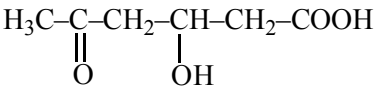
SOLUTIONS

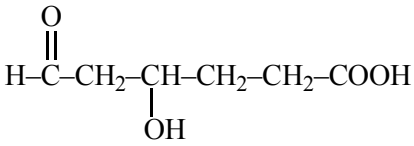
TEACHING TASK

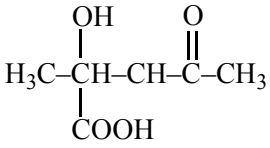
JEE MAINS LEVEL QUESTIONS

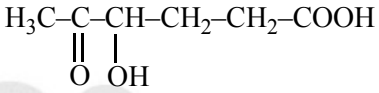
1. The structure for 3-hydroxy-5-oxohexanoic acid is

(FA & SA- 5 Marks/8 Marks)

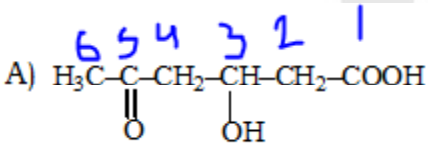
A) 

B) 

C) 

D) 

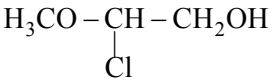
Answer:A

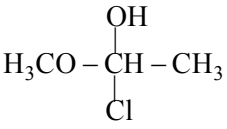
Solution: A) 

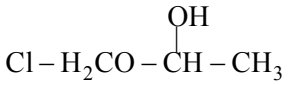
For option A ,at 3rd carbon have hydroxy and 5th carbon oxo

2. The structure of 2–chloromethoxyethanol

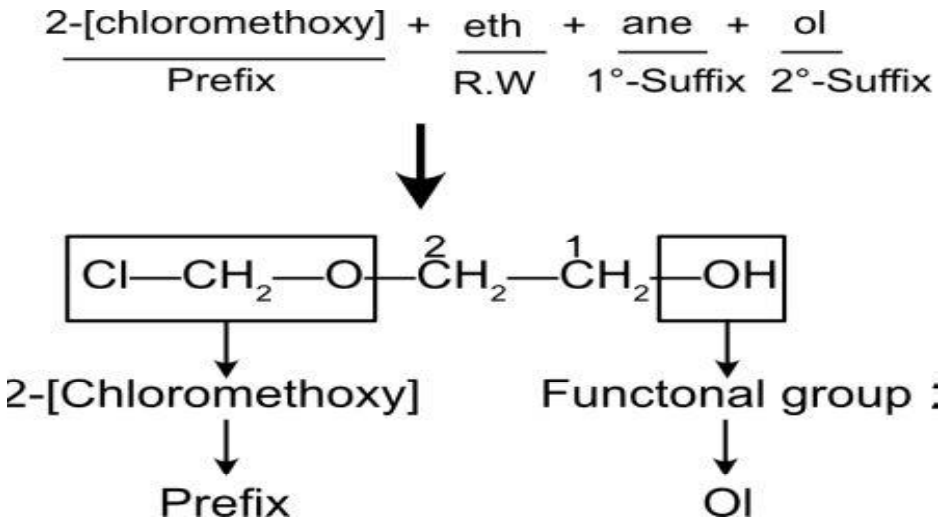
A) $ClCH_2OCH_2CH_2OH$

B) 

C) 

D) 

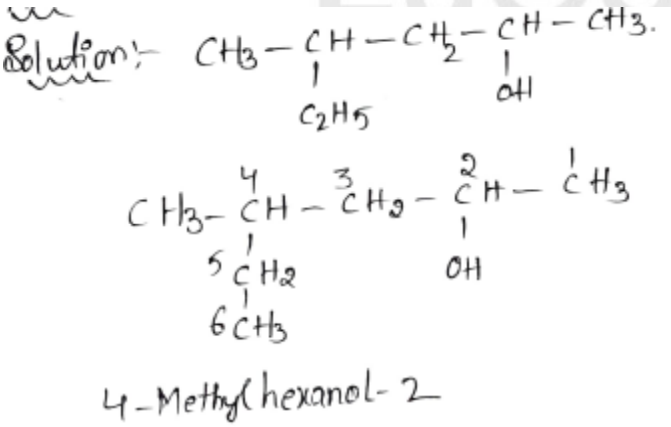
Answer:A



Solution:

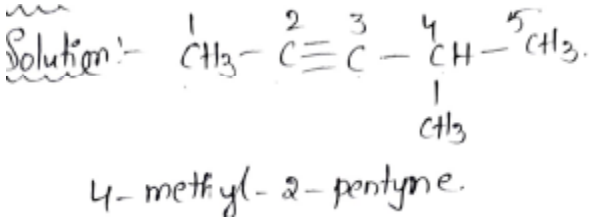
3. The IUPAC name of the compound $CH_3–CH(C_2H_5) –CH_2–CH(OH) – CH_3$ is
   A) 4-Ethylpentanol-2 B) 4-Methylhexanol-2
   C) 2-Ethylpentanol -2 D) 3-Methylhexanol-2

Answer:B



4. The IUPAC name of $CH_3 – C \equiv C – CH(CH_3)_2$ is
   A) 4 - Methyl-2-pentyne B) 4,4, -Dimethyl -2- butyne
   C) Isopropylmethyl acetylene D) 2-Methyl-4-pentyne

Answer:A



5. The IUPAC name of **(FA & SA- 3 Marks/4 Marks)**

$CH_3 - CH(CH_3) - C(=O) - CH_2 - CH_2OH$ is

A) 1-Hydroxy-4-methyl-3-pentanone B) 2-Methyl -5-hydroxy-3-pentanone

C) 4-Methyl -3-oxo-1-pentanol D) Hexanol-1-one-3

Answer:A

Solution:- $CH_3 - \underset{5}{CH}(CH_3) - \underset{4}{C}(=O) - \underset{3}{CH_2} - \underset{2}{CH_2}\underset{1}{OH}$

1-Hydroxy-4-methyl-3-pentanone

6. The correct IUPAC name of $CCl_3C - CH_2CHO$

A) 3,3,3-Trichloro propanal B) 1,1,1-Trichloro propanal

C) 2,2,2-Trichloro propanal D) Chloral

Answer:A

Solution:- $Cl - \underset{3}{C}(Cl)(Cl) - \underset{2}{CH_2} - \underset{1}{CHO}$

3,3,3-Trichloropropanal.

7. IUPAC name of $CH_3 - C(OH)(CH_2 - CH_3) = CH_2 - CH_2 - CH_3$

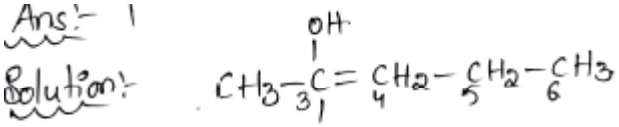
A) 3-methyl-3-hexanol B) 2-ethyl-2-pentanol

C) 2-ethyl-2-hydroxy pentane D) Any of these

Answer:A

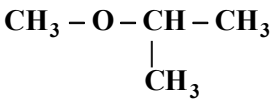
Ans:- 1

Solution:-



3-methyl-3hexen-2-ol.

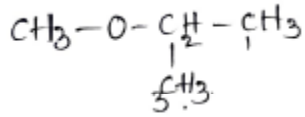
3-methyl-3 hexenol.

8. IUPAC name of 

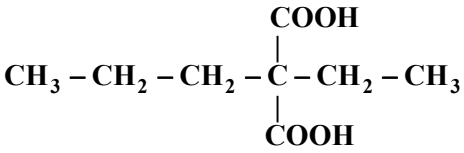
A) methyl propyl ether
B) methyl isopropyl ether
C) 2-methoxy propane
D) all the above

Answer:C

Solution:-



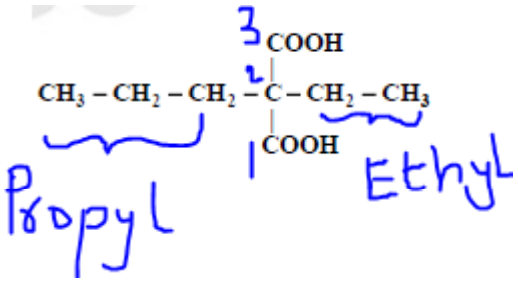
2-methoxy propane.

9. The IUPAC name of the given compound 

A) 2–Ethyl–2–propyl propanedioic acid
B) 2–Propyl–2–ethyl propanedioic acid
C) 2–Ethyl–2–carboxy pentanoic acid
D) 2–Carboxy–2–ethyl pentanoic acid

Answer:A

Solution:



The central carbon bears two –COOH groups (it's a substituted propanedioic

acid — malonic acid) and two alkyl groups (ethyl and propyl) at C-2.

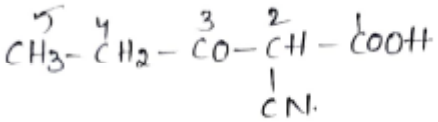
Numbering gives the substituents at carbon-2, so the correct name is 2-ethyl-2-propylpropanedioic acid

10. $CH_3 - CH_2 - CO - \underset{\underset{CN}{|}}{CH} - COOH$ The IUPAC name of the compund is

A) 3 - Ketonic -2- cyano pentanoic acid
B) cyanoketohexanoic acid
C) 3 - oxo -2 - cyano pentanoic acid
D) 2 - cyano -3 -oxo pentanoic acid

Answer:D

Solution:



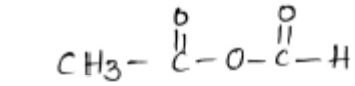
2 – Cyano – 3 – oxopentanoic acid.

11. The correct IUPAC name of $CH_3 - \overset{O}{\overset{\|}{C}} - O - \overset{O}{\overset{\|}{C}} - H$ is

A) Acetyl methanoate
B) Keto ethanoate
C) Ethoxy methanoate
D) Formyl ethanoate

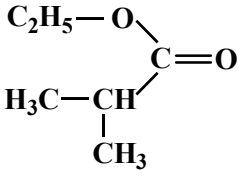
Answer:D

Solution:



Formyl Ethanoate

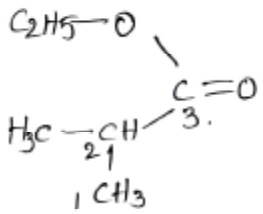
12. The IUPAC name of



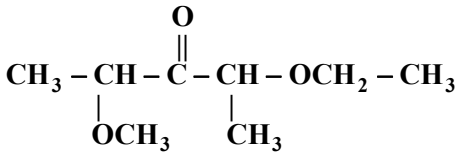
A) Ethoxy methanone
B) Ethoxy propanone
C) Ethyl-2-methyl propanoate
D) 2-methyl ethoxy propanone

Answer:C

Solution:-



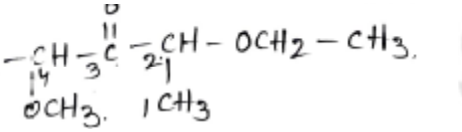
Ethyl-2-methyl propanoate

13. IUPAC name of 

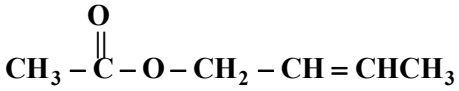
A) 2-Methoxy-4-ethoxy-3-pentanone B) 2-Ethoxy-4-methoxy-3-pentanone
C) 2,4-Dimethoxy hexanone D) 2-Ethoxy-3-methoxy-3-pentanone

Answer:B

Solution:-



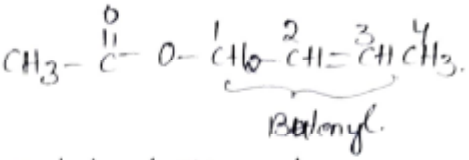
2-Ethoxy-4-methoxy-pentan-3-one.

14. The IUPAC name of 

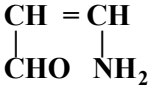
A) 1- acetyloxy -2- butane B) 4-acetoxy 2-butane
C) 2-butenylethanoate D) Methyl - 2-butanoate

Answer:C

Solution:



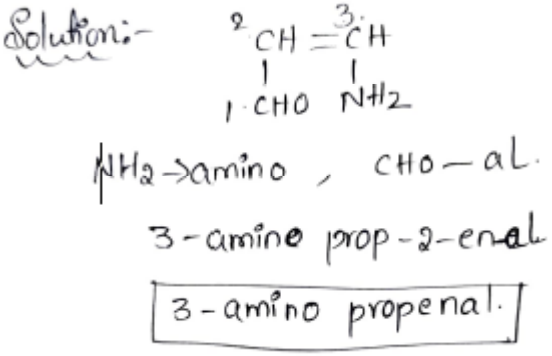
2-butenyl Ethanoate.

15. The IUPAC name of  is **(FA & SA- 2 Marks)**

A) 1- amino-2-propenol
B) 1- amino-2-formylethene
C) 3-aminopropenal
D) 1-oxo-3-propenamine

Answer:C

Solution:-

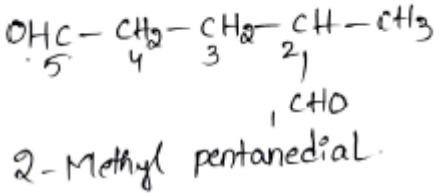


16. The IUPAC name of the compound $\mathbf{OHC-CH_2-CH_2-\underset{\displaystyle CHO}{\underset{|}{CH}}-CH_3}$ is :

A) 2–Formyl pentanal
B) 2–Methyl pentanedial
C) 2,4 –Diformyl butane
D) 1,3 – Diformyl butane

Answer:B

Solution:



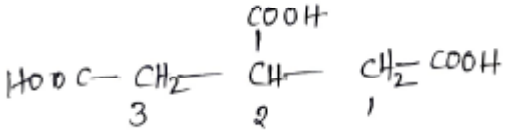
17. The structure for propane–1,2,3– tricarboxylic acid is

A) $HOOCCH_2-\underset{\displaystyle COOH}{\underset{|}{CH}}-CH_2COOH$
B) $CH_3-\underset{\displaystyle COOH}{\overset{\displaystyle COOH}{\overset{|}{\underset{|}{C}}}}-CH_2COOH$

C) $CH_3-\underset{\displaystyle COOH}{\overset{\displaystyle COOH}{\overset{|}{\underset{|}{C}}}}-CH_3$
D) $CH_3-CH-\underset{\displaystyle COOH}{\overset{\displaystyle COOH}{\overset{|}{\underset{|}{CH}}}}COOH$

Answer:A

Propane-1,2,3-tricarboxylic acid.

Solution: 

JEE ADVANCED LEVEL QUESTIONS

Multicorrect Answer Type

18. Correct statement(s) about the compound $CH_3–CH_2–CH_2–CHO$ is/are:
A) Its IUPAC name is Butanal.
B) It contains an aldehyde functional group as the principal group.
C) The secondary suffix is "-al".
D) It can also be named as Butan-1-al.

Answer:A,B,C,D

Solution:This is a straight-chain 4-carbon aldehyde.
A) Correct — 4-carbon aldehyde $\rightarrow$ butanal.
B)Correct — CHO is the highest priority group.
C) Correct — aldehydes use suffix –al.
D) Correct — position 1 is always understood, but writing it explicitly is allowed

19. Correct statement(s) about the compound $CH_3-CH(OH)-CH_2-CH_2-CHO$ is/ are:
A) Its IUPAC name is 5-hydroxypentanal.
B) The principal functional group is aldehyde.
C) The alcohol group is named as a prefix "hydroxy-".
D) The correct IUPAC name is 4-hydroxybutanal.

Answer:B,C

Solution:The name: 4-hydroxypentanal (pentane because 5 carbons, C1=CHO, OH on C4).
A) 5-hydroxypentanal $\rightarrow$ False (that would put OH on C5 if numbering from aldehyde, but here OH is on C4 if CHO is C1).
B) Principal functional group is aldehyde $\rightarrow$ True.
C) Alcohol group is named as prefix "hydroxy-" $\rightarrow$ True.
D) Correct IUPAC name is 4-hydroxybutanal $\rightarrow$ False (should be pentanal, not butanal — 5 carbons total).

Assertion and Reason Type:

A) Both the assertion and reason are true, and the reason is the correct explanation of the assertion.
B) Both the assertion and reason are true, but the reason is not the correct explanation of the assertion.
C) The assertion is true, but the reason is false.
D) Both the assertion and reason are false.

20 **Assertion** : The IUPAC name of the compound $CH_3-CH(CHO)-CH_2-COOH$ is 3-Formylbutanoic acid.

Reason : In IUPAC naming, when both –CHO and –COOH are present, –COOH is the principal functional group and the aldehyde group is named as a "formyl" substituent.

Answer:A

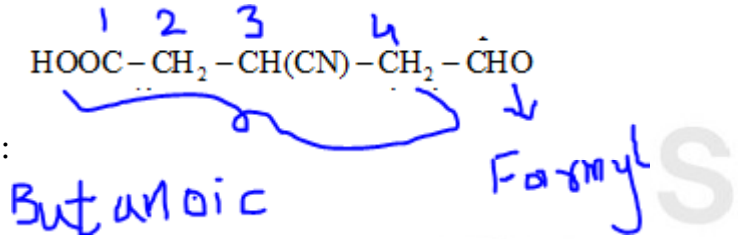
Solution: When –COOH and –CHO occur together the carboxyl (–COOH) is the principal group; the aldehyde is therefore cited as a substituent and is named by the prefix formyl- (not by its usual suffix –al). So the structure shown is correctly named 3-formylbutanoic acid

21. **Assertion** : The IUPAC name of the compound $HOOC-CH_2-CH(CN)-CH_2-CHO$ is 4-Cyano-5-oxopentanoic acid.

Reason : According to IUPAC priority, –COOH > –CHO > –CN, so –COOH is the principal functional group, –CHO is named as "oxo", and –CN is named as "cyano" as a prefix.

Answer:D(both incorrect)

Solution:



IUPAC name:3-Cyno -4-formyl-butanoic acid

Comprehension Type

If more than one functional group of the same type are present, their number . is indicated by adding di-, tri-, tetra-, etc., before the class suffix. Then the full name of the parent alkane is written before the class suffix.

22. If a compound has two –OH groups on a pentane chain, how is the presence of both groups indicated in the IUPAC name?
A) By using the prefix “di–” before the parent chain
B) By using “di–” before the suffix –ol
C) By doubling the name of the parent chain
D) By naming only one –OH group

Answer:B

Solution:For diols (two –OH groups),
IUPAC uses:Parent alkane name
Numbering of OH positions
Use “di–” before the suffix “–ol”

23. Which of the following is the correct IUPAC name for a propane molecule with three –COOH groups at positions 1, 2, and 3?
A) Propane-1,2,3-tricarboxylic acid
B) 1,2,3-Tricarboxypropane
C) Propanetricarboxylic acid
D) Tri-carboxypropane

Answer:A

Solution:Multiple –COOH groups → use carboxylic acid as suffix
For 3 groups: tricarboxylic acid
Parent chain = propane
Put locants 1,2,3 before "tricarboxylic acid"
Correct form: propane-1,2,3-tricarboxylic acid

Matrix Matching Type

23.

LIST - 1 (Structural formula)	**LIST - 2 (Name of compound)**
A) $CH_3-CH_2-CH_2-COOH$	1)Butanoic acid
B) $HOOC-COOH$	2)Ethanedioic acid
C) $CH_3-CO-CH_2-CHO$	3) 3-Oxobutanal
D) $CH_2=CH-CH_2-CN$	4)But-3-enenitrile
	5)Propenenitrile

Answer:A-1, B-2, C-3, D-4
Solution:

A) $CH_3-CH_2-CH_2-COOH$	1)Butanoic acid
B) $HOOC-COOH$	2)Ethanedioic acid
C) $CH_3-CO-CH_2-CHO$	3) 3-Oxobutanal
D) $CH_2=CH-CH_2-CN$	4)But-3-enenitrile

LEARNERS TASK

CONCEPTUAL UNDERSTANDING QUESTIONS (CQU'S)

1. In IUPAC nomenclature, the correct order for naming a compound is:
A)Prefix(es) + root word + primary suffix + secondary suffix
B)Root word + prefix(es) + primary suffix + secondary suffix
C)Primary suffix + prefix(es) + root word + secondary suffix
D)Primary suffix + root word + prefix(es) + secondary suffix

Answer:A
Solution:Standard order: Prefix(es) + root word + primary suffix + secondary suffix.

2. Which functional group has highest priority in polyfunctional compounds?
A)–CHO > –COOH > –OH > $–NH_2$
B)–COOH > –CHO > $–NH_2$ > –OH
C)–COOH > –OH > $–NH_2$ > –CHO
D) –COOH > –CHO > –OH > $–NH_2$

Answer:D
Solution:Carboxylic acids have highest suffix priority, then aldehydes, then alcohols, then amines

3. The functional group present in acyl chlorides is:
A)–COOH B)$–NH_2$ C) –COCl D) –COO–

Answer:C

Solution:Acyl chloride: –COCl.

4. The functional group present in amides is:

A) –COOH B) $-NH_2$ C)$-CONH_2$ D) –COO–

Answer:C

Solution:Amide: $-CONH_2$.

5. The carbonyl group (C=O) is present in:

A) Ketones only B) Aldehydes only

C) Carboxylic acids only D)All the above

Answer:D

Solution:ketones, aldehydes, carboxylic acids all contain C=O.

6. Which of the following groups is always represented as a prefix in IUPAC names?

A) –OH B) –CHO C)–COOH D)$-NH_2$

Answer:D

Solution:–OH can appear as suffix –ol if principal group

$-CHO \rightarrow$ suffix –al

$-COOH \rightarrow$ suffix –oic acid

$-NH_2 \rightarrow$ prefix "amino-" if not principal group

7. IUPAC name of $HOOC-CH_2-CHO$ is:

A) Formyl ethanoic acid B)2-Carboxyethanal

C) Prop-3-al-1-oic acid D) Prop-1-al-3-oic acid

Answer:A

Solution:– HOOC–CH_2–CHO.

priority order → COOH > CHO.

↳ Suffix ↳ prefix. (formyl)

HOOC– CH_2 –CHO

1 2 3.

∴ 3-formyl ethanoic acid.

or

Formyl ethanoic acid.

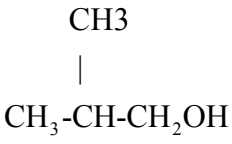
8. IUPAC name of $CH_3-CHCl-CH_2-CHO$ is:

A) 2-Chloro-4-butanol B) 3-Chlorobutanol

C) 2-Chloro-4-butanal D) 3-Chlorobutana1

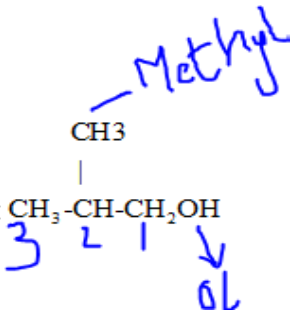
Answer:D

Solution:aldehyde gets C-1 (–CHO), chlorine is on C-3 $\rightarrow$3-chlorobutanal.

9. IUPAC name of 

A)sec-Butyl alcohol B)pri-Butyl alcohol
C) 2-Methylpropanal D)2-Methylpropanol

Answer:D

Solution: 

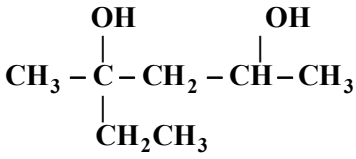
Parent chain -3carbons,Functional group-ol at C-1,Methyl at C-2
IUPAC name 2-Methylpropanol

10. $HOCH_2–CH_2–CH_2–COOH$
A) 3-Hydroxybutanoic acid B)4-Hydroxybutanoic acid
C)Butane-1,4-diol D)2-Hydroxybutanoic acid

Answer:B

Solution:Carboxyl is C-1, hydroxyl is on carbon 4 $\rightarrow$ 4-hydroxybutanoic acid

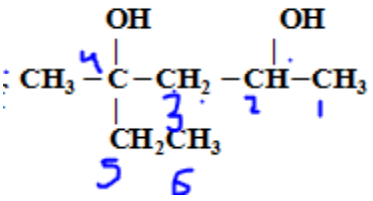
JEE MAINS LEVEL QUESTIONS

11. The IUPAC name of  **(FA & SA- 3 Marks/4 Marks)**

A) 1,1-dimethyl – 1, 3-butandiol B) 2-methyl –2, 4-pentandiol
C) 4-methyl – 2, 4-hexanediol D) 1, 2, 3 – trimethyl –1, 3-propanediol

Answer:C

Solution:



First find the longest continuous carbon chain that contains both –OH groups.

Choose the chain that runs from the ethyl end (left bottom) through the central C to the right end → a 6-carbon chain.

Numbering from the right (to give the OH substituents the lowest possible locants) places –OH groups at C-2 and C-4, and the extra methyl (the left-most CH_3) appears at C-4.

So the correct IUPAC name is 4-methyl-2,4-hexanediol

12. Which of the following compounds has correct IUPAC name ?

A) $CH_3–CH_2–CH_2–COO–CH_2CH_3 \rightarrow$ butanal

B) $CH_3-\underset{\underset{CH_3}{|}}{CH}-CH_2-CHO \rightarrow$ 3–methyl–3–butanol

C) $CH_3-\underset{\underset{OH}{|}}{CH}-\underset{\underset{CH_3}{|}}{CH}-CH_3 \rightarrow$ 2-methyl-3-butanol

D) $CH_3-\underset{\underset{CH_3}{|}}{CH}-\overset{\overset{O}{\|}}{C}-CH_2-CH_3 \rightarrow$ 2-methyl-3-pentanone

Answer:D

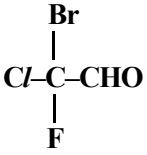
Solution:-

1) $CH_3-CH_2-CH_2-COO-CH_2CH_3$ → Ethyl Butanoate

2) $\overset{4}{C}H_3-\overset{3}{C}H(\overset{1}{C}H_3)-\overset{2}{C}H_2-\overset{1}{C}HO$ → 3-methyl-1-butanal

3) $\overset{1}{C}H_3-\overset{2}{C}H(\overset{1}{O}H)-\overset{3}{C}H(\overset{4}{C}H_3)-\overset{4}{C}H_3$ → 3-methyl-2-butanol.

4) $\overset{1}{C}H_3-\overset{2}{C}H(\overset{1}{C}H_3)-\overset{3}{\overset{\overset{O}{\|}}{C}}-\overset{4}{C}H_2-\overset{5}{C}H_3$ → 2-methyl-3-pentanone.

13. The IUPAC name of the compound is  is **(FA & SA- 2 Marks)**

A) 2-Bromo-2-chloro-2-fluoroethanal
B) 1-Bromo-1-chloro-2-fluoroethanal
C) 2-Fluoro-2-chloro-2-bromoethanal
D) 2-Fluoro-2-chloro-2-bromoethanal

Answer:A

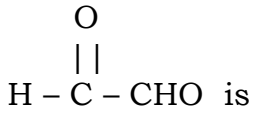
Solution:

The aldehyde carbon is C-1, the substituted carbon is C-2 carrying Br, Cl and F.

Alphabetical order of substituents: bromo, chloro, fluoro."

2-Bromo-2-chloro-2-fluoroethanal

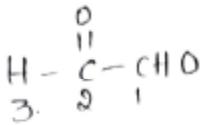
14. The correct IUPAC name of

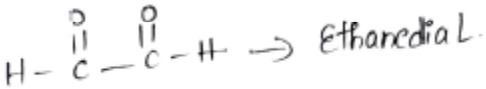


A) Formyl methanal
B) 1,2-Ethanedione
C) 2-Oxoethanal
D) Ethanedial

Answer:D

Solution:

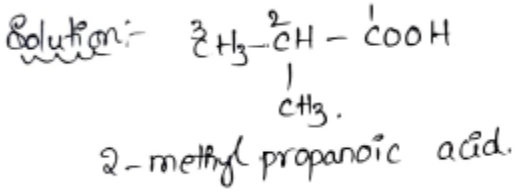




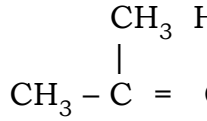
15. The IUPAC name of $(CH_3)_2$ CH–COOH is

A) 2- propanoic acid
B) Isobutanoic acid
C) 2-Methylpropanoic acid
D) 2-Methylbutanoic acid

Answer:C



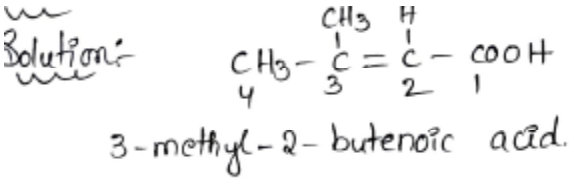
16. The IUPAC name of the formula **(FA & SA- 5 Marks/8 Marks)**



is

A) 2- Methyl-2-butenoic acid
B) 3- Methyl-3- butenoic acid
C) 3- Methyl -2-butenoic acid
D) 2-Methyl-3- butenoic acid

Answer:C

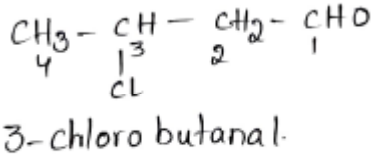


17. IUPAC name of CH_3 –CHC*l*–CH_2–CHO is

A) 2-chloro-4-butanol
B) 3-chloro butane
C) 2-chloro-4-butanal
D) 3-chlorobutanal

Answer:D

Solution:

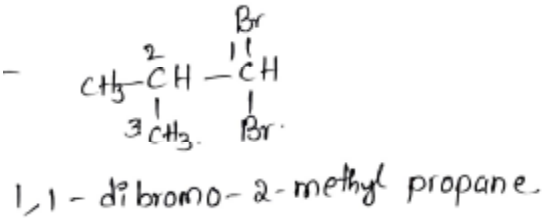


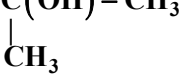
18. IUPAC name of $(CH_3)_2CH–CHBr_2$ is

A) 1,1-dibromo -2-methyl propane
B) 2-methyl-3-Bromo propane
C) iso propyl Bromide
D) 3° butyl bromide

Answer:A

Solution:



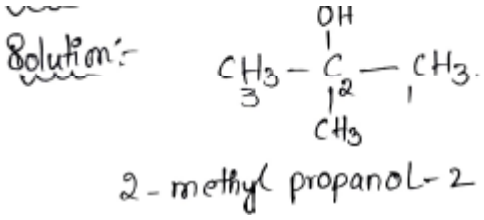
19. IUPAC name of 

A) sec- butyl alcohol
B) pri-butyl alcohol
C) 2-methylpropanal

D) 2-methylpropanol-2

Answer:D

Solution:

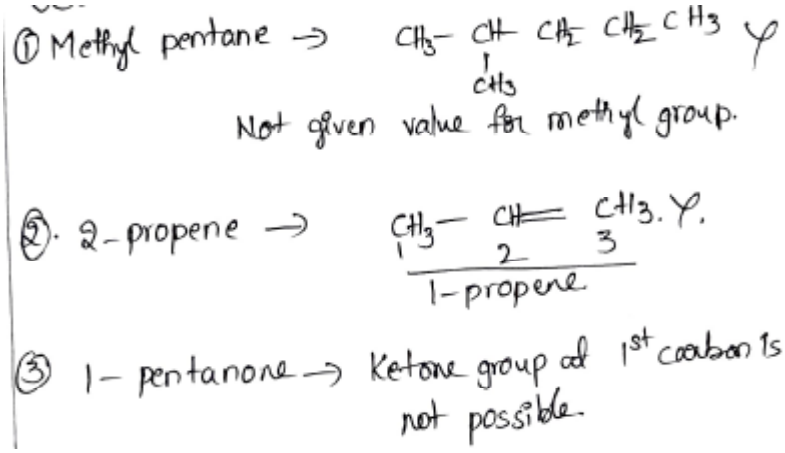


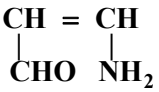
20. Among the following which one represents the correct name of the compound ?

A) methyl pentane B) 2 – propene C) 1 – pentanone D) none

Answer:D

Solution:



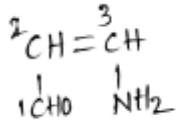
21. The IUPAC name of 

A) 1-Amino prop-2-enal B) 3-Amino prop -2-enal

C) 1-Amino-2-formyl ethene D) 3-Amino-1-oxoprop-2-ene

Answer:B

Solution:



3-amino prop-2-enal.

JEE ADVANCED LEVEL QUESTIONS

Multicorrect Answer Type

22. Which of the following is/are NOT the correct IUPAC suffixes for amines, ethers, and acyl chlorides respectively?

A) -amine, -oxy-, -oyl chloride B) -amine, -ether, -oyl chloride
C) -amino, -oxy-, -chloride D) -amine, -ether, -chlorocarbonyl

Answer:B,C,D

Solution:Correct IUPAC usage:
Amines use suffix –amine (when principal group)
Ethers NEVER use a suffix → always use prefix –alkoxy
Acyl chlorides use –oyl chloride

23. Which of the following is/are NOT the correct IUPAC suffixes for acid anhydrides, thiols, and nitro compounds respectively?
A) -oic anhydride, -thiol, -nitro B) -anhydride, -thiol, -nitro
C) -oyl anhydride, -thiol, -nitro D) -oic anhydride, -thio, -nitro

Answer:A,B,C,D

Solution:Correct IUPAC usage:
Acid anhydrides: suffix –oic anhydride
Thiols: suffix –thiol
Nitro group uses prefix, NOT suffix → nitro

Assertion and Reason Type:

A) Both the assertion and reason are true, and the reason is the correct explanation of the assertion.
B) Both the assertion and reason are true, but the reason is not the correct explanation of the assertion.
C) The assertion is true, but the reason is false.
D) Both the assertion and reason are false.

24. **Assertion :** The IUPAC name of $CH_3–CH_2–CHO$ is propanal.
Reason : It contains an aldehyde functional group at the terminal carbon

Answer:A

Solution:$CH_3–CH_2–CHO$ → 3-carbon chain with –CHO at carbon-1 →propanal.
Aldehyde group is always at a terminal carbon, so the reason is correct.

25. **Assertion :** The IUPAC name of $HOCH_2–CH_2–COOH$ is 3-hydroxypropanoic acid.
Reason : The compound contains a carboxylic acid as the principal functional group and a hydroxyl group as a substituent

Answer:A

Solution:$HOCH_2–CH_2–COOH$ →numbering starts from COOH
Carbon numbers:
1 = COOH
2 = CH_2
3 = CH_2OH
Substituent at carbon 3 = OH → 3-hydroxypropanoic acid

Comprehension Type:

Selecting the Parent Chain

The chain must contain:

The principal functional group (highest priority).
The maximum number of multiple bonds (double/triple).
It does not always have to be the longest carbon chain if a shorter one includes the key functional group and multiple bonds.

26. Which chain should be selected as the parent chain in a compound containing both a –COOH group and a double bond?
A) The longest continuous carbon chain, even if it does not contain the –COOH group
B) The chain that contains the –COOH group and the maximum number of multiple bonds
C) Any chain with the highest number of carbon atoms, ignoring functional groups
D) The shortest chain that contains a substituent

Answer:B

Solution:When a compound contains a carboxylic acid group (–COOH),
the parent chain must contain the –COOH group, and
among all such possible chains, choose the one with the maximum number of multiple bonds.

27. For the compound CH_3–CH=CH–CH_2–COOH, which carbon chain is selected as the parent chain?
A) CH_3–CH=CH–CH_2–COOH (contains –COOH and C=C)
B) CH_3–CH=CH–CH_2 (ignores –COOH)
C) CH=CH–CH_2–COOH (ignores terminal CH_3)
D) CH_3–CH_2–CH_2–COOH (ignores double bond

Answer:A

Solution:Choose the chain that:
Contains –COOH (highest priority)
Contains the C=C double bond if possible
Is the longest possible

Matrix Matching Type:

28.

(Functional Group)	**(Prefix Used)**
A) -COOH-COOH	1. Chloroformyl-
B) -COCl-COCl	2. Carbamoyl-
C) -CN-CN	3. Carboxy-
D) -$CONH_2$-$CONH_2$	4.Cyano-
	5. Amido-

Answer:A-3,B-1,C-4,D-2,5

Solution:

A) -COOH-COOH	3. Carboxy-
B) -COCl-COCl	1. Chloroformyl-
C) -CN-CN	4.Cyano-
D) -$CONH_2$-$CONH_2$	2. Carbamoyl-, 5. Amido-

KEY

				TEACHING TASK					
1	2	3	4	5	6	7	8	9	10
A	A	B	A	A	A	A	C	A	D
11	12	13	14	15	16	17	18	19	20
D	C	B	C	C	B	A	A,B,C,D	B,C	A
21	22	23	24						
D	B	A	A-1, B-2, C-3, D-4						
				LEARNERS TASK					
			CONCEPTUAL UNDERSTANDING QUESTIONS (CQU'S)						
1	2	3	4	5	6	7	8	9	10
A	D	C	C	D	D	A	D	D	B
			JEE MAINS&ADVANCED LEVEL QUESTIONS						
11	12	13	14	15	16	17	18	19	20
C	D	A	D	C	C	D	A	D	D
21	22	23	24	25	26	27	28		
B	B,C,D	A,B,C,D	A	A	B	A	A-3,B-1,C-4,D-2,5		