GPAT 2027-28

ORGANIC CHEMISTRY

CLASS- 13

TIME- 8 : 30 P.M

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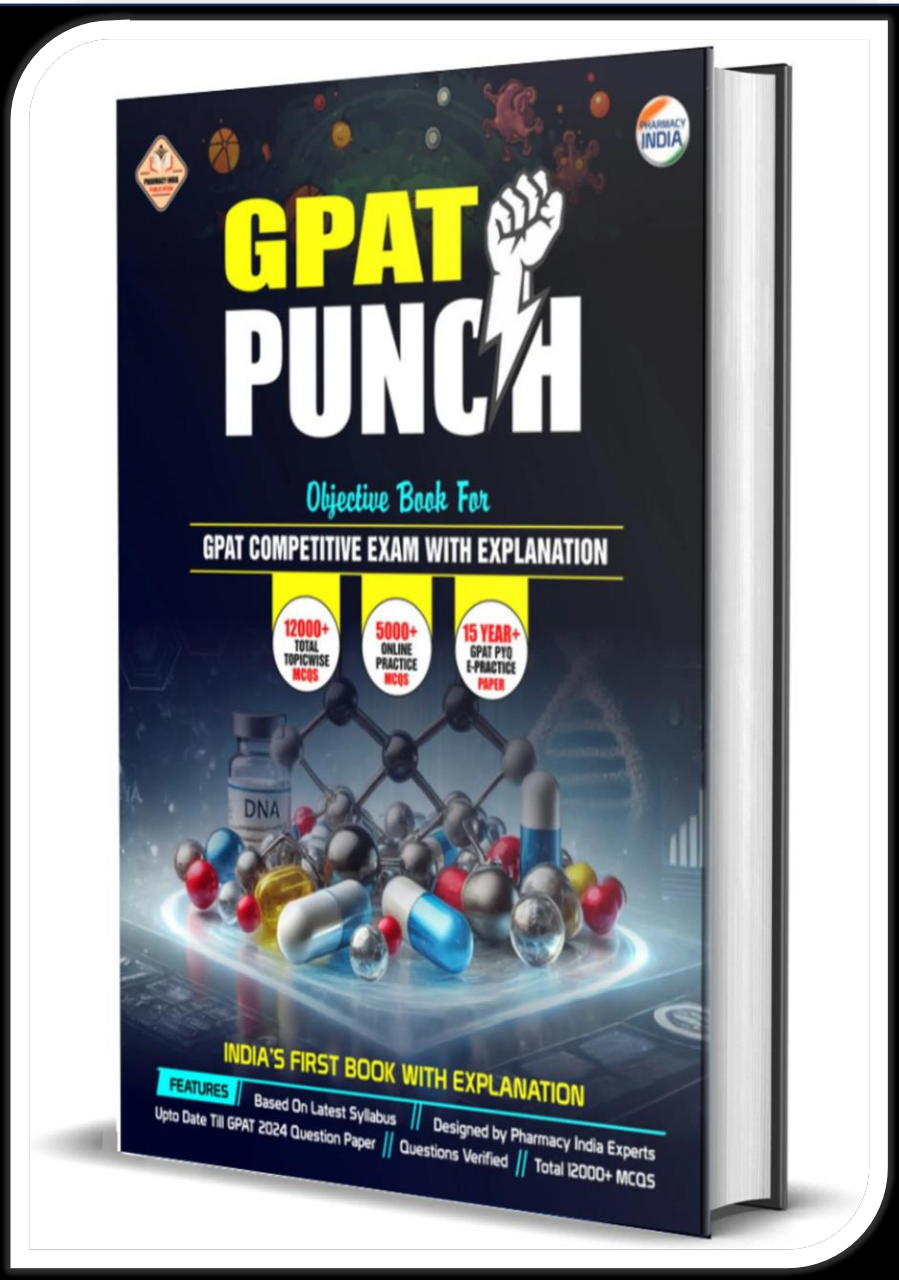

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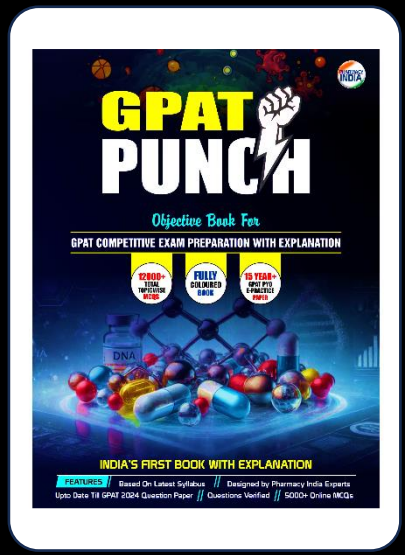
01. **The IUPAC name of tartaric acid is: [GPAT -2024]**

(a) 2, 3-dihydroxybutane-1, 4-dioic acid

(b) 2, 3-dihydroxy-4-butanoic acid

(C) 1, 3-dihydroxybutane-1, 4-dioic acid

(d) 2, 2-dihydroxy-4-butanoic acid



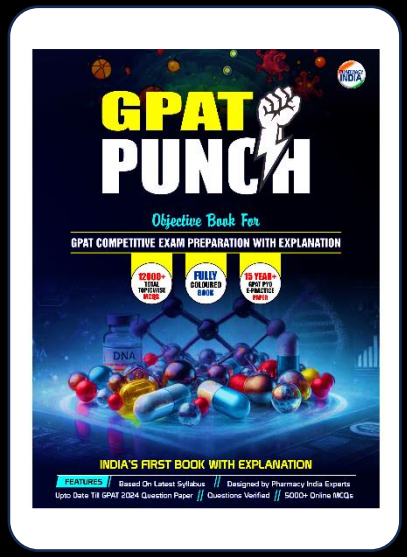
01. **The IUPAC name of tartaric acid is: [GPAT -2024]**

(a) 2, 3-dihydroxybutane-1, 4-dioic acid

(b) 2, 3-dihydroxy-4-butanoic acid

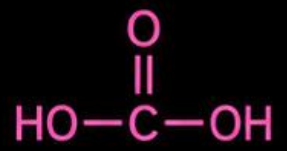
(C) 1, 3-dihydroxybutane-1, 4-dioic acid

(d) 2, 2-dihydroxy-4-butanoic acid

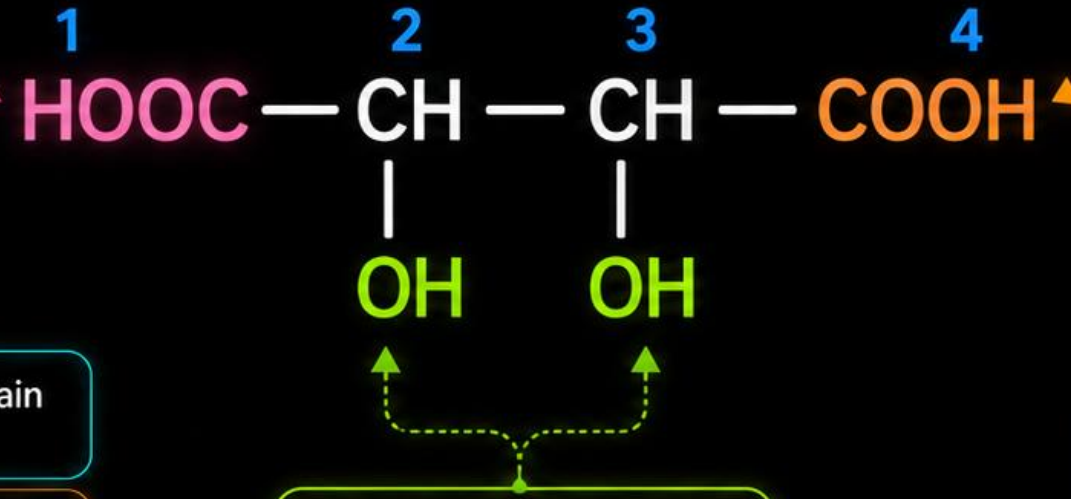


TARTARIC ACID NOMENCLATURE

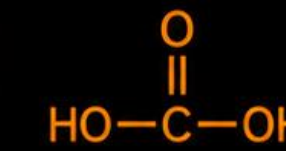
CARBOXYLIC ACID GROUP



(–COOH)

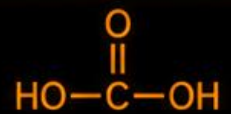


CARBOXYLIC ACID GROUP



(–COOH)

HYDROXY GROUPS
(–OH)
at C-2 and C-3

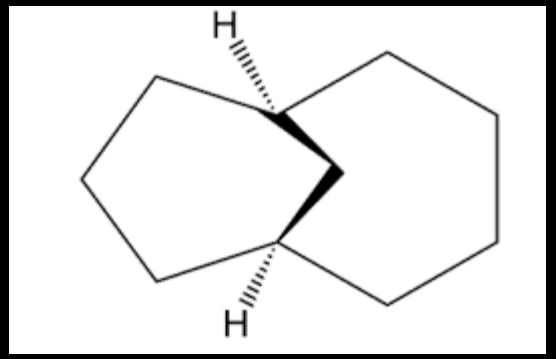
1.  4-carbon parent chain → butane
2.  Two terminal –COOH groups → dioic acid (or butanedioic acid)
3. OH Hydroxy groups at C-2 and C-3 → 2,3-dihydroxy
4.  Combine all parts following IUPAC rules

COLOR KEY

- Carboxylic acid groups
- Parent chain ends
- Carbon numbering
- Hydroxy groups
- Key takeaways
- IUPAC focus

TAKEAWAY: Systematic name: **2,3-dihydroxybutane-1,4-dioic acid**

02. **Correct Nomenclature for the following bridged bicyclic ring system is [GPAT-2018]**

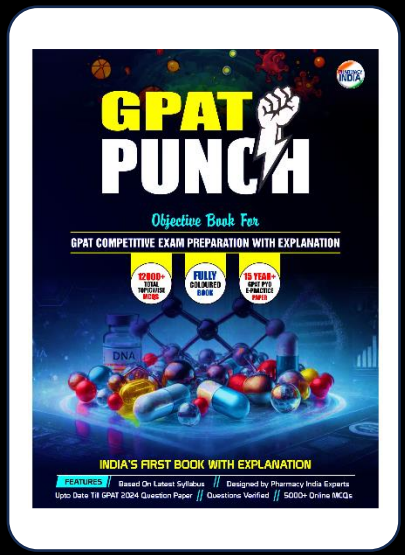


(a) Bicyclo 4.4.0 decane

(b) Bicyclo 4.3.0 decane

(c) Bicyclo 4.3.1 decane

(d) Bicyclo 4.4.1 decane



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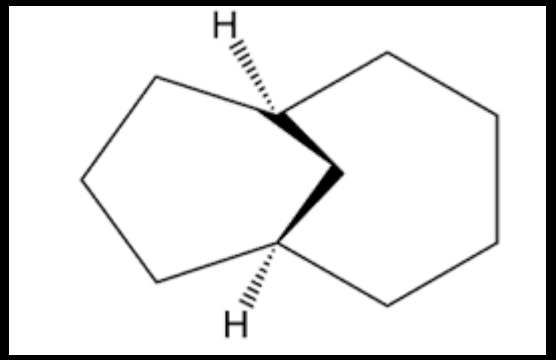

(a) Bicyclo 4.4.0 decane

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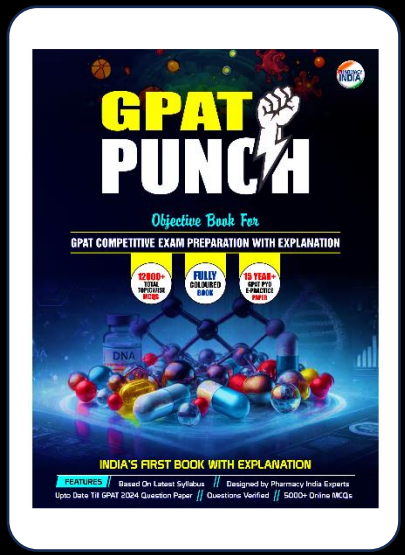
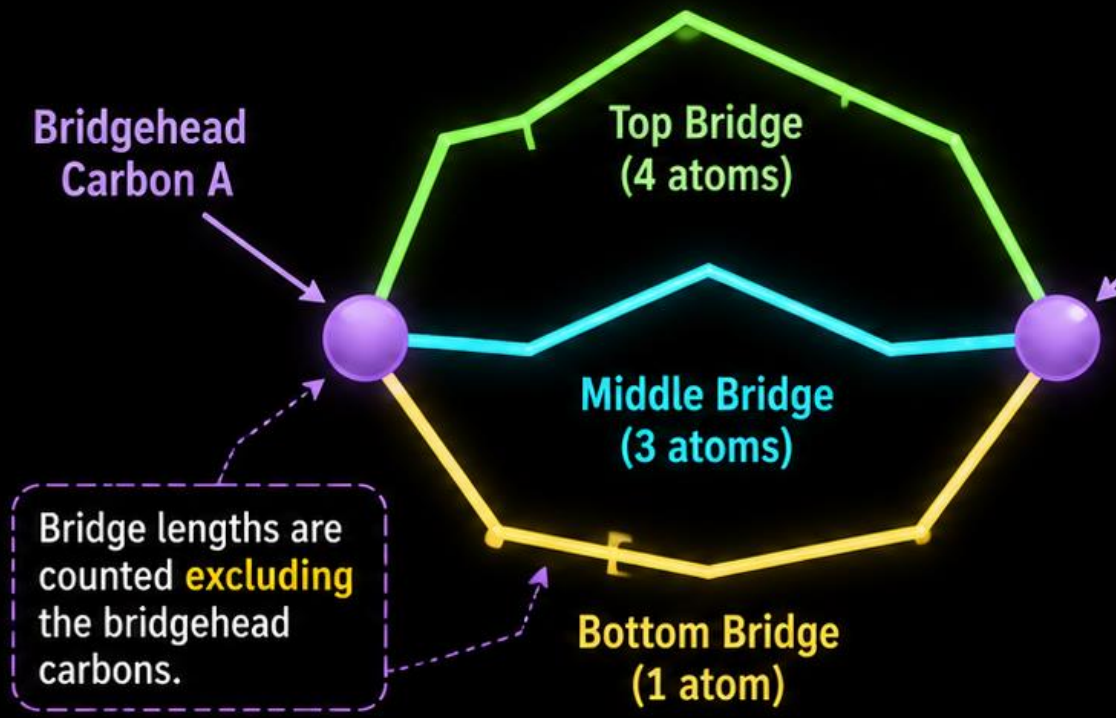


BRIDGED BICYCLIC NAMING

BRIDGED BICYCLIC SYSTEM



1. Identify the 2 bridgehead carbons
2. Count atoms in the 3 bridges excluding bridgeheads
3. Bridge lengths = 4, 3, and 1
4. Total carbons = 4 + 3 + 1 + 2 bridgeheads = 10

TAKEAWAY: Name pattern: **bicyclo[4.3.1]decane**

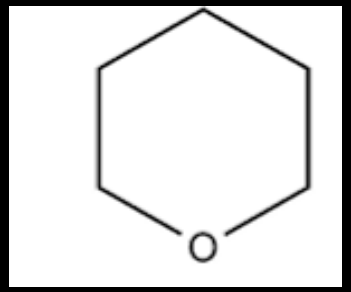
03. **Which functional group is present in the molecule shown below [GPAT-2017]**

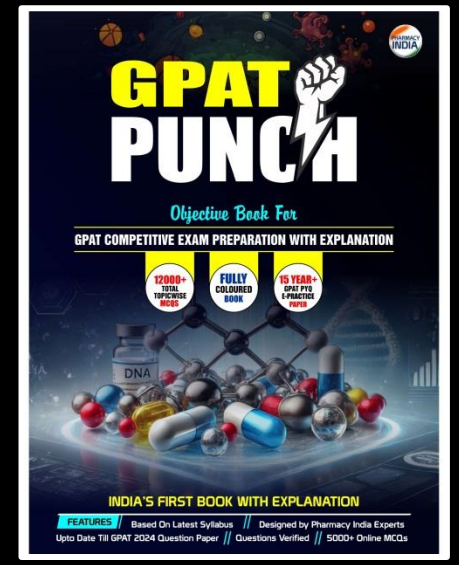
(a) Amide

(b) Alcohol

(c) Ester

(d) Ether





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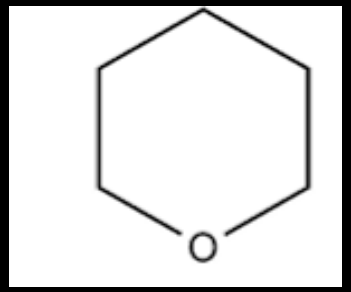

(a) Amide

(b) Alcohol

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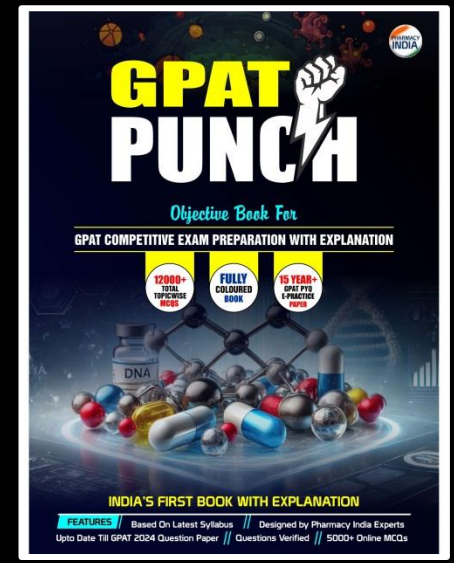
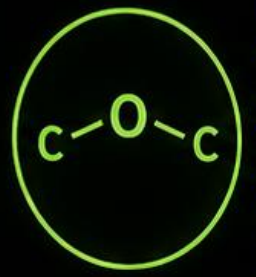
(d) Ether



ETHER FUNCTIONAL GROUP



1. OXYGEN LINKAGE

Oxygen is single-bonded to two carbon atoms.

2. NOT AN ALCOHOL

No –OH group is present, so it is not an alcohol.

CYCLIC ETHER (TETRAHYDROPYRAN)

Six-membered ring with one oxygen atom

3. NOT AN ESTER OR AMIDE

No carbonyl group is present, so it is not an ester or amide.

4. CYCLIC ETHER

This ring is a cyclic ether.

TAKEAWAY: Functional group identified: **ether**

04. **The IUPAC name of the compound (CH3)2 CHCH2Cl**

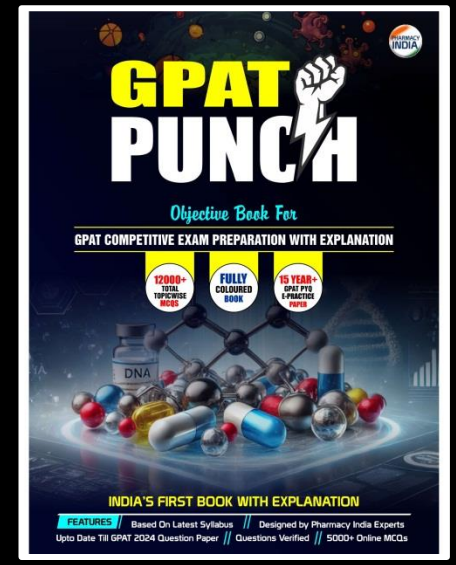
[GPAT-2014]

(a) 2-methyl-3-chloropropane

(b) 1-chloro-3-methyl butane

(c) 1-chloropentane

(d) 2-methyl-4-chlorobutane



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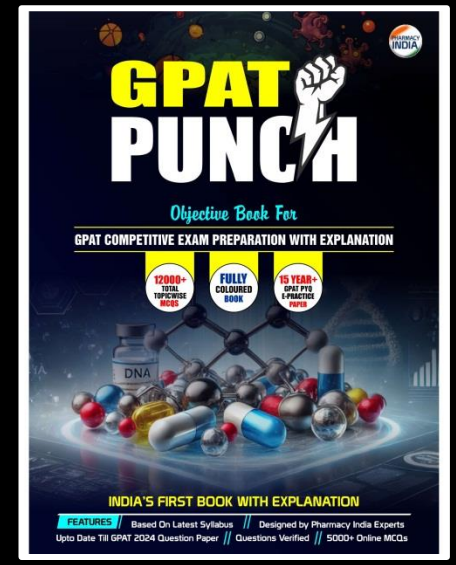


NAMING OF $(CH_3)_2CHCH_2Cl$

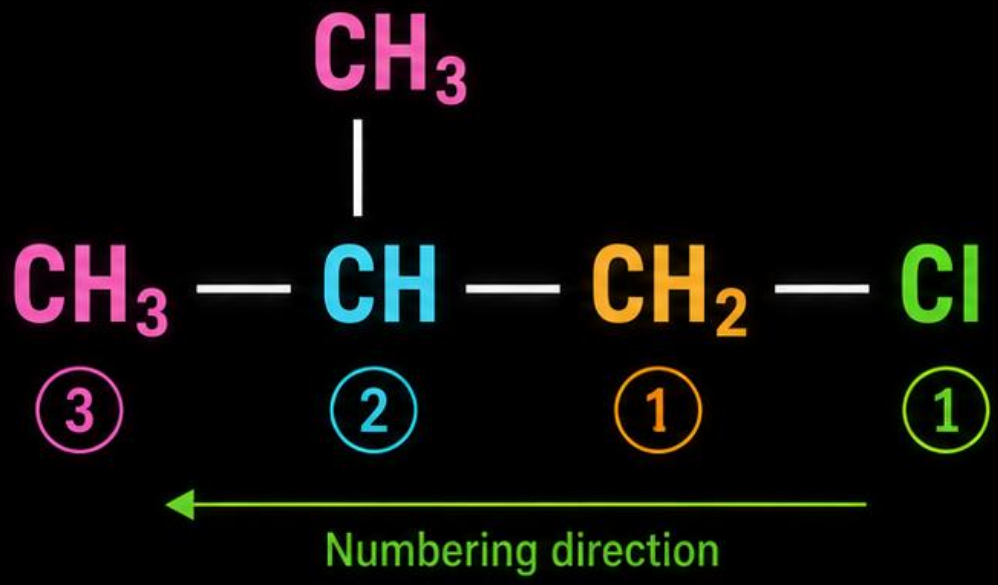
01 Longest chain has 3 carbons → propane

02 Number from the chlorine end for lowest locants

03 Chloro substituent at C-1

04 Methyl substituent at C-2

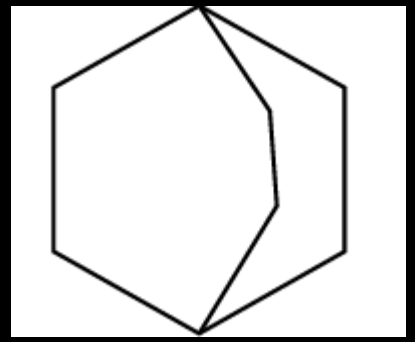
STRUCTURE & NUMBERING



TAKEAWAY | Systematic name: **1-chloro-2-methylpropane**

05. **What is the IUPAC name of the following compound**

[GPAT-2014]

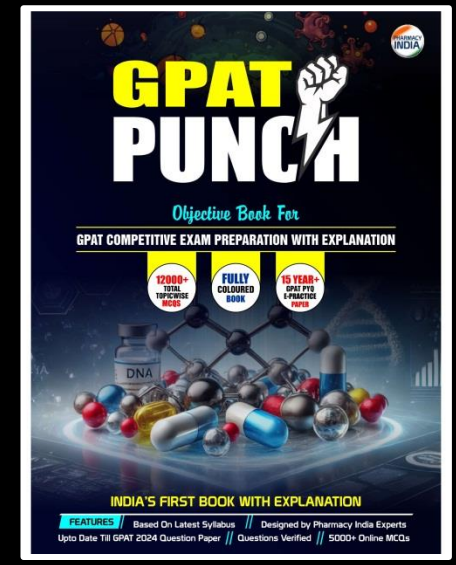


(a) Bicyclo [2.2.2] octane

(b) Tricyclo [2.2.2] octane

(c) Bicyclo [2.2.0] octane

(d) Bicyclo [2.2.1] heptane



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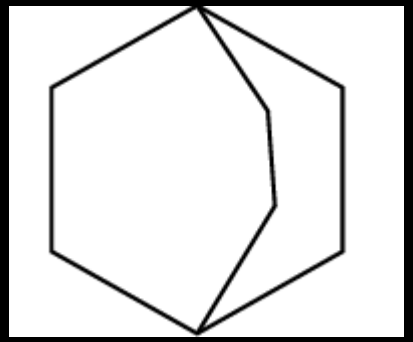


(a) Bicyclo [2.2.2] octane

(b) Tricyclo [2.2.2] octane

(c) Bicyclo [2.2.0] octane

(d) Bicyclo [2.2.1] heptane

BICYCLIC SYSTEM NAMING

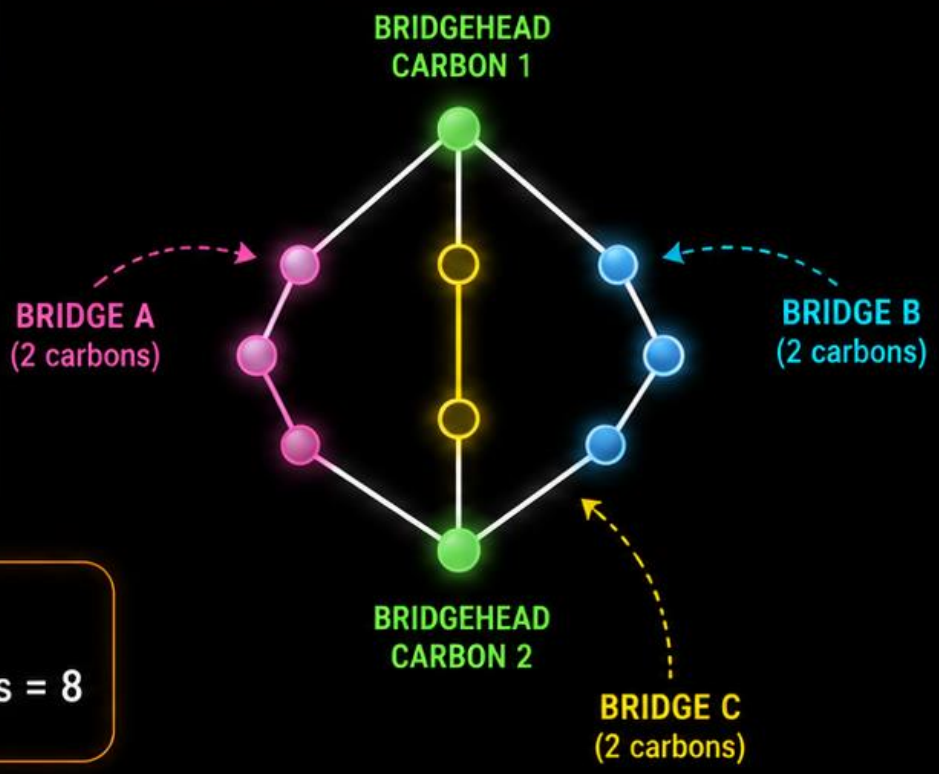
bicyclo[2.2.2]octane

1 Two bridgehead carbons are present

2 Three bridges each contain 2 carbons

3 Bridge count is 2, 2, and 2

4 Total carbons = 2 + 2 + 2 + 2 bridgeheads = 8



KEY FEATURES

- Two bridgehead carbons
- Three bridges of equal length
- Bridge count 2, 2, and 2
- Total carbons = 8 (octane)

TAKEAWAY: Name pattern: **bicyclo[2.2.2]octane**

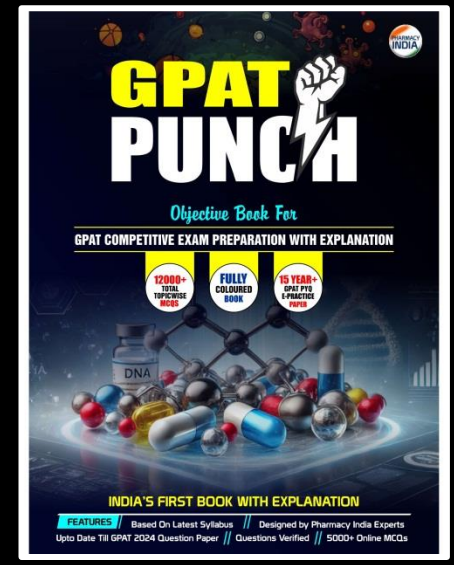
06. What is the IUPAC name of the compound having the structural formula [GPAT-2013]

(a) 3-Amino-2-hydroxypropanoic acid

(b) 2-Amino-propan-3-ol-1-oic acid

(c) Amino hydroxy propanoic acid

(d) 2-Amino-3-hydroxypropanoic acid



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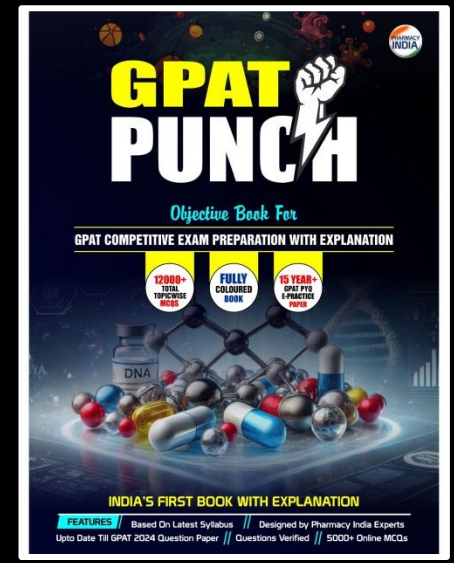
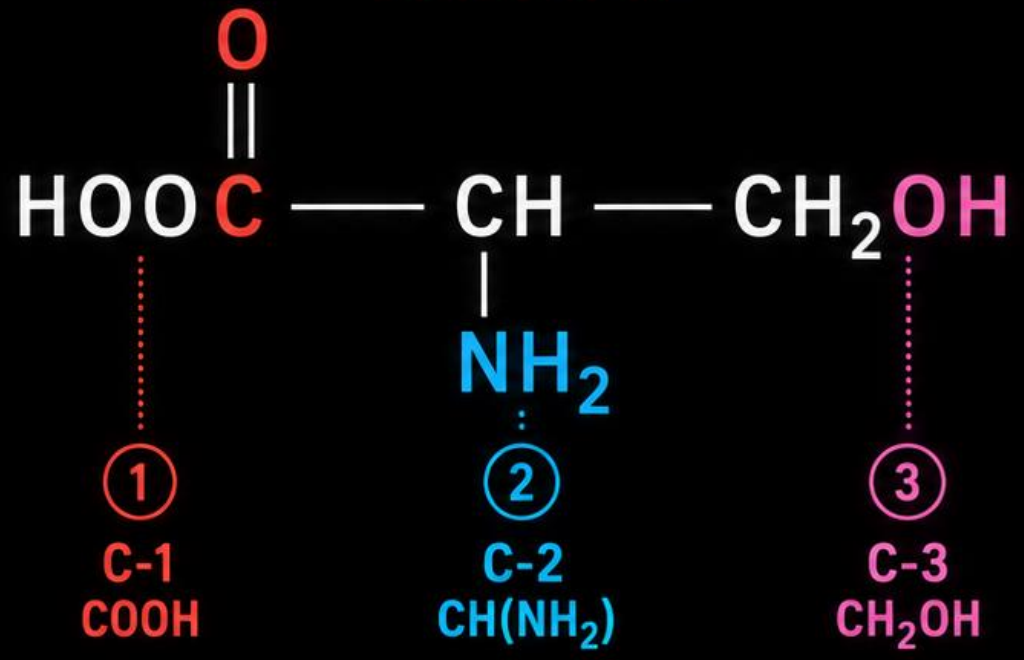


AMINO HYDROXY ACID NAMING

STRUCTURE



EXPLANATION

1. Parent chain → propanoic acid
2. Carboxyl carbon is always C-1
3. NH_2 — Amino group is at C-2
4. OH — Hydroxy group is at C-3

TAKEAWAY ⋯⋯➤ Systematic name: **2-amino-3-hydroxypropanoic acid**

Naming priority: Carboxylic acid (highest) > Amino > Hydroxy

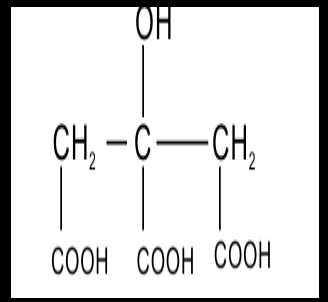
07. **The name(s) of the following compound is:**

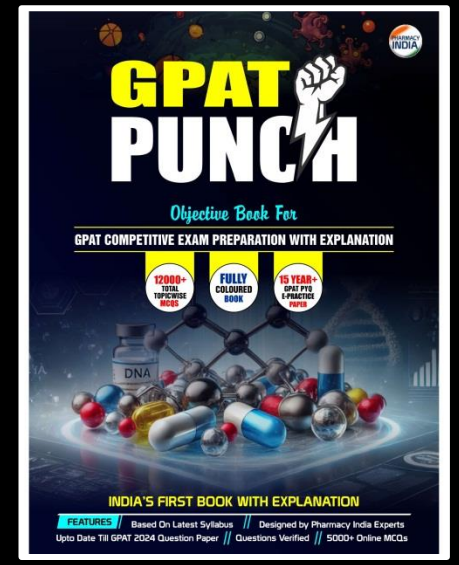
(a) 2-hydroxypropane-1,2,3-tricarboxylic acid

(b) 3-carboxy-3-hydroxy-1,5-pentanedioic acid

(c) citric acid

(d) all of the above





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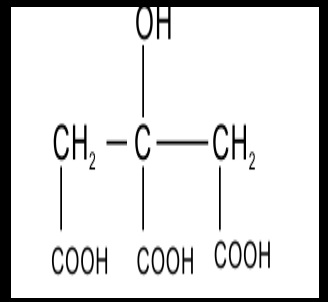
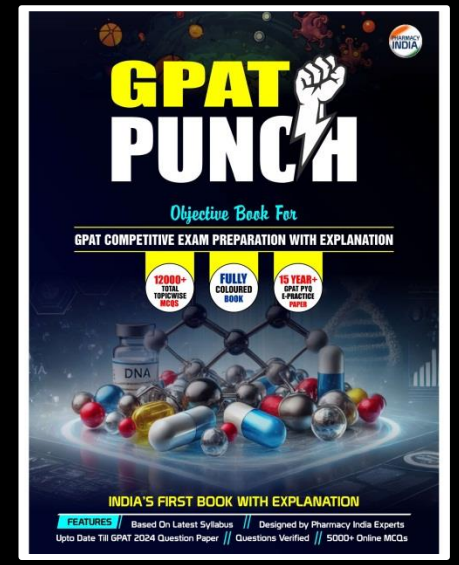
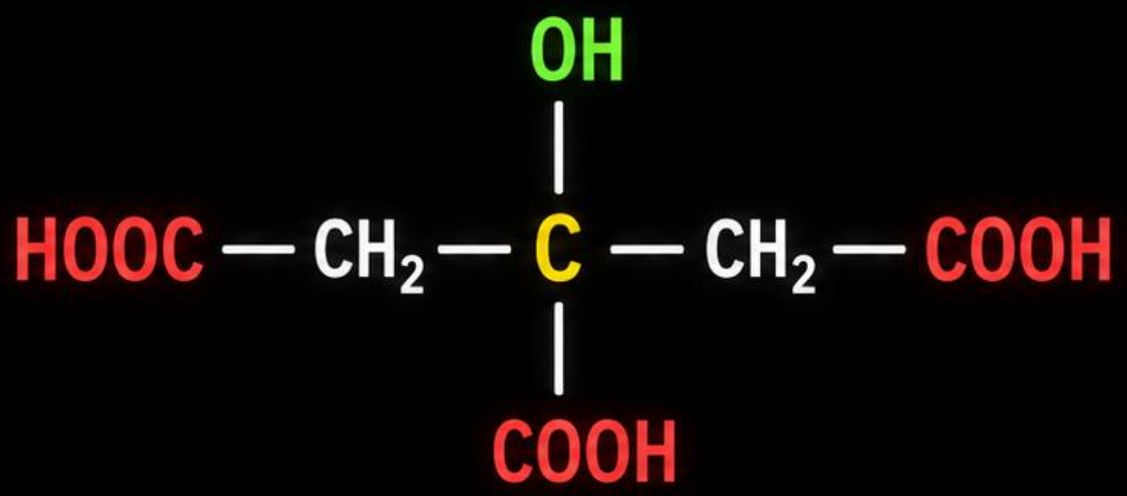




CITRIC ACID NAMING

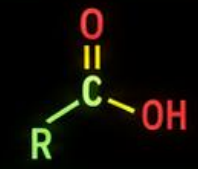
LEGEND

–COOH	Carboxylic acid group
–OH	Hydroxy group
—	Carbon skeleton
C	Central tertiary carbon



HOOC–CH$_2$–C(OH)(COOH)–CH$_2$–COOH

1. This molecule contains 3 carboxylic acid groups and 1 hydroxy group



2. One accepted systematic form is 2-hydroxypropane-1,2,3-tricarboxylic acid

3. Another valid equivalent name is 3-carboxy-3-hydroxypentanedioic acid

4. Common name: citric acid

All three names refer to the same compound

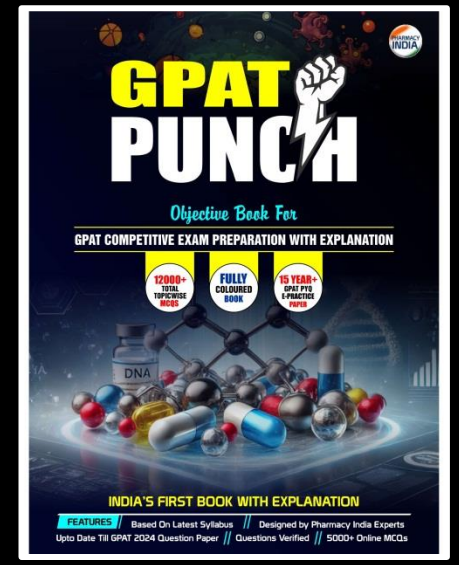
08. **The structure of 4-methylpent-2-en-1-ol is:**

(a) $(CH_3)_2$ C=CHCH_2 CH_2 OH

(b) $(CH_3)_2$ CHCH=CHCH_2 OH

(c) CH_3 CH_2 CH=CHCH_2 OH

(d) CH_3 CHOHCH=C$(CH_3)_2$



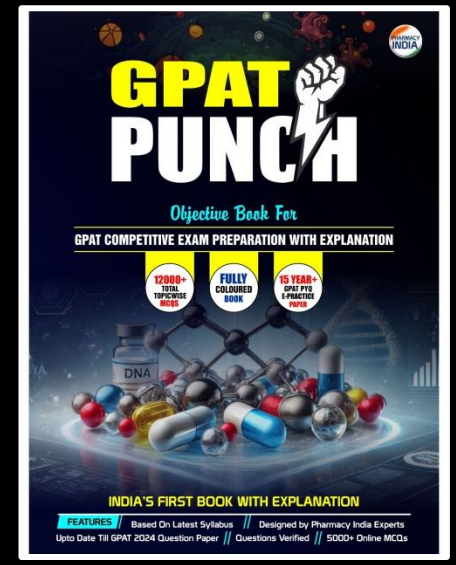
08. **The structure of 4-methylpent-2-en-1-ol is:**

(a) $(CH_3)_2$ C=CHCH_2 CH_2 OH

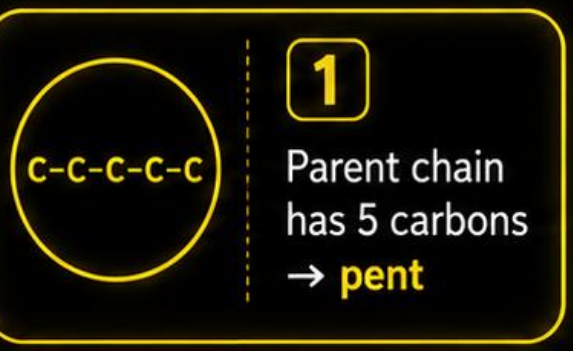
(b) $(CH_3)_2$ CHCH=CHCH_2 OH

(c) CH_3 CH_2 CH=CHCH_2 OH

(d) CH_3 CHOHCH=C$(CH_3)_2$

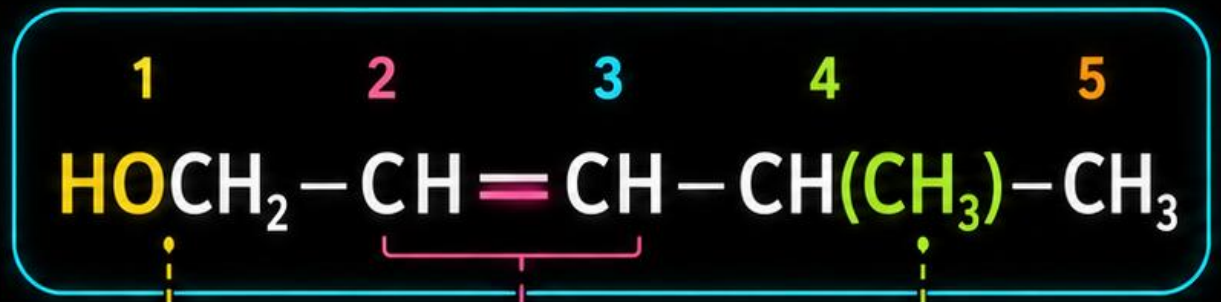


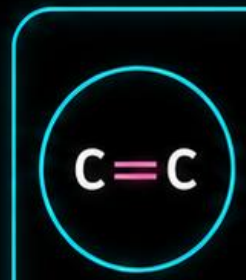
4-METHYLPENT-2-EN-1-OL



1

Parent chain has 5 carbons → **pent**



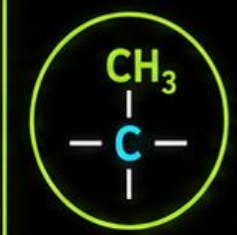


3

Double bond lies between C-2 and C-3 → **2-en**

2

OH gets highest priority and is at **C-1**



4

Methyl substituent is at **C-4**

TAKEAWAY: Structure matches **4-methylpent-2-en-1-ol**

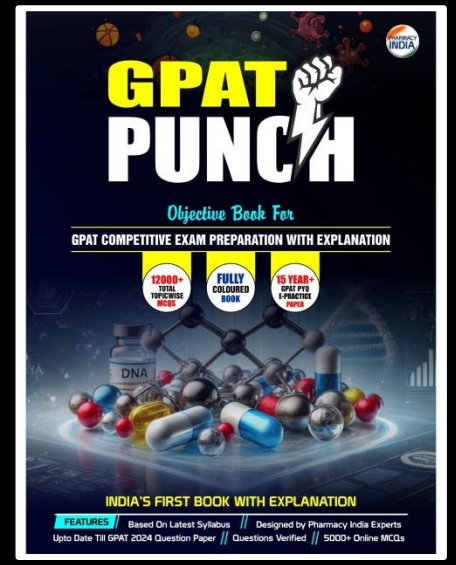
09. **The IUPAC name of Cl3CCH2CHO is:**

(a) chloral

(b) 3,3,3-trichloropropanal

(c) 1,1,1-trichloropropanal

(d) 2,2,2-trichloropropanal



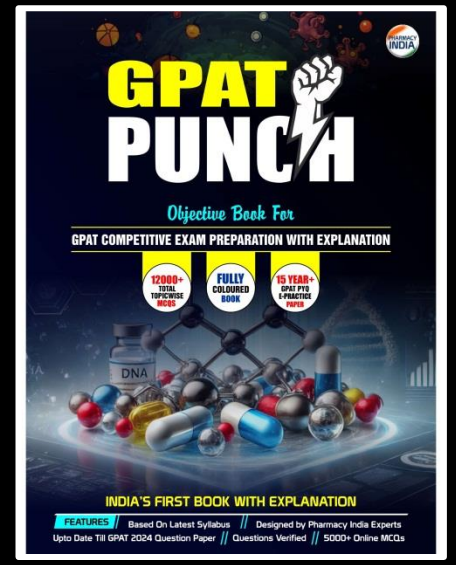
09. **The IUPAC name of Cl3CCH2CHO is:**

(a) chloral

(b) 3,3,3-trichloropropanal

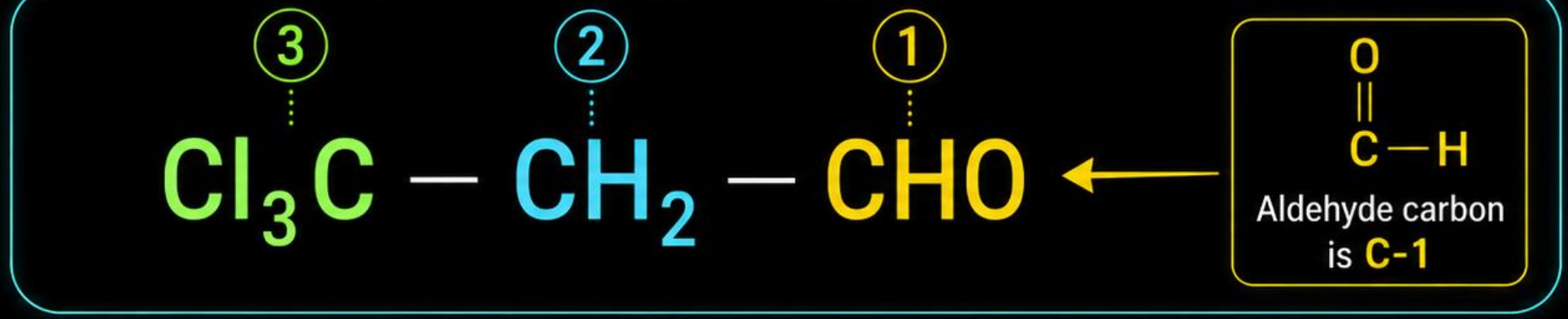
(c) 1,1,1-trichloropropanal

(d) 2,2,2-trichloropropanal



PHARMACY INDIA

NAMING OF Cl_3CCH_2CHO



1

Aldehyde is the principal functional group → suffix **-al**

2

Parent chain has 3 carbons → **propanal**

3

The carbon at position **3** carries three chlorine atoms

4

This gives the substituent pattern **3,3,3-trichloro**

Systematic name: 3,3,3-trichloropropanal

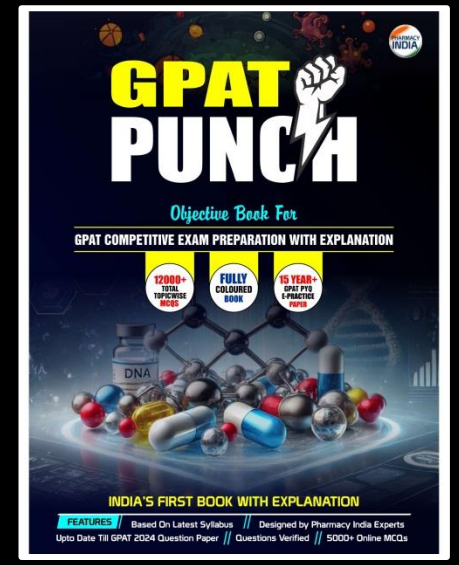
10. **The formula of propanenitrile is:**

(a) CH3 CN

(b) C2 H5 CN

(c) C3 H7 CN

(d) C2 H5 NC



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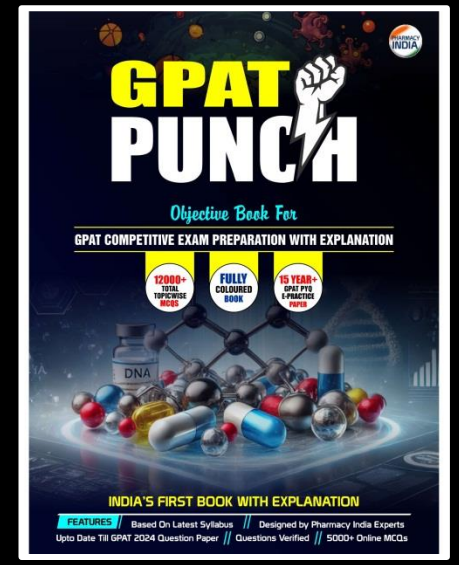
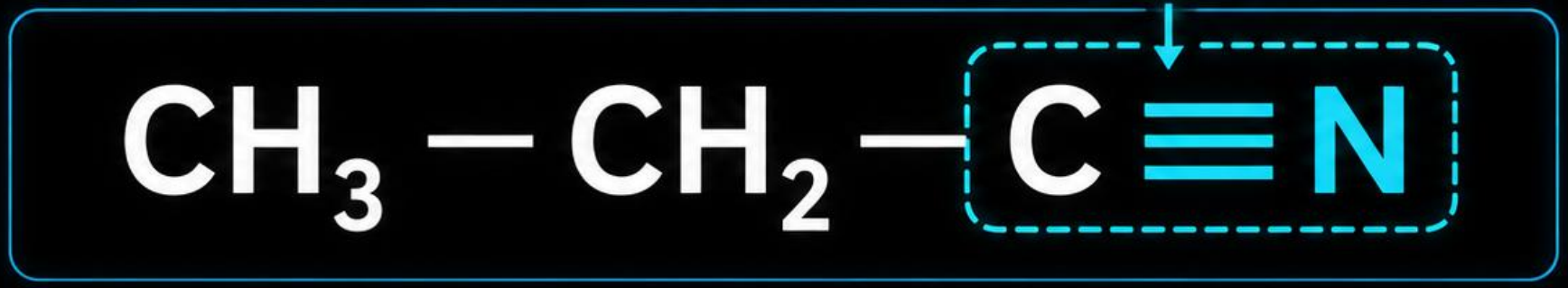


PROPANENITRILE FORMULA

NITRILE GROUP



1. The nitrile carbon is counted in the parent chain

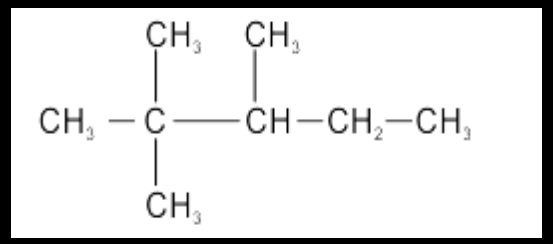
2. Total carbon atoms = 3 → propane base

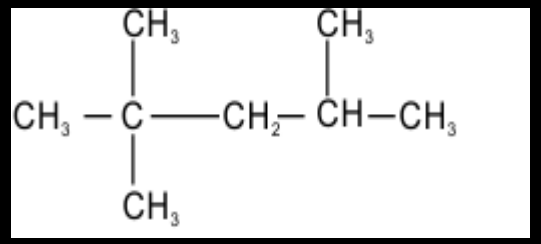
3. Terminal functional group is –C≡N → nitrile

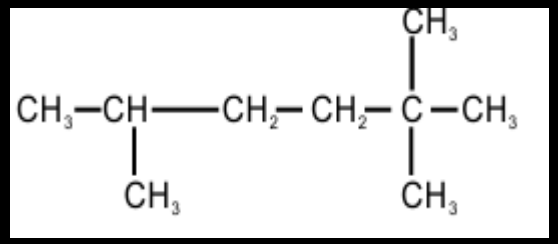
4. Molecular formula is C_3H_5N

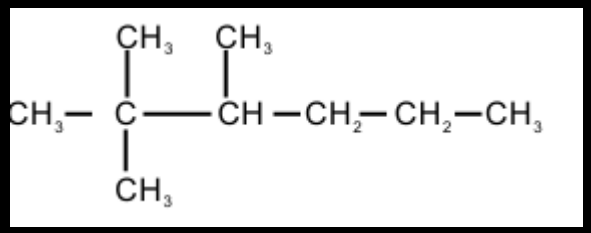
TAKEAWAY: Structural formula: CH_3CH_2CN (or C_2H_5CN)

11. Which compound is 2,2,3-trimethylhexane?

(a) 

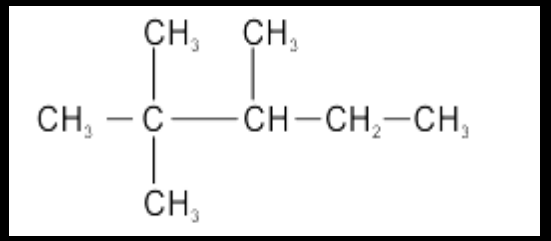
(b) 

(c) 

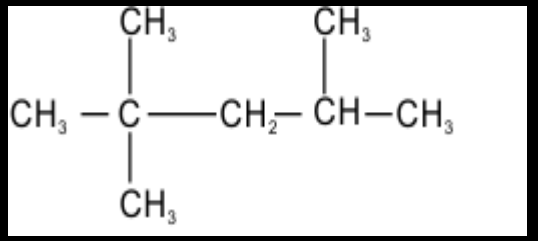
(d) 

11. Which compound is 2,2,3-trimethylhexane?

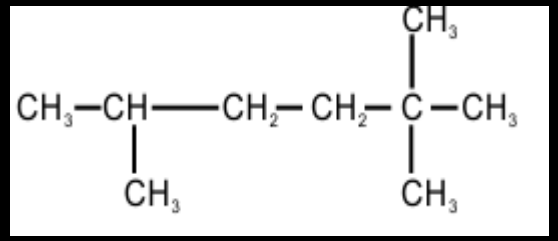
(a)



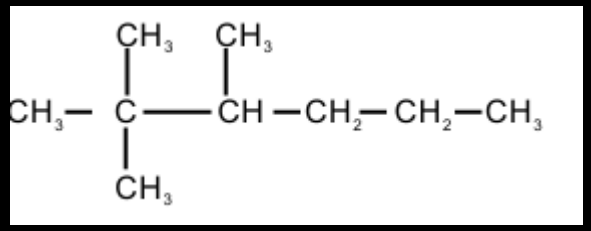
(b)



(c)



(d)



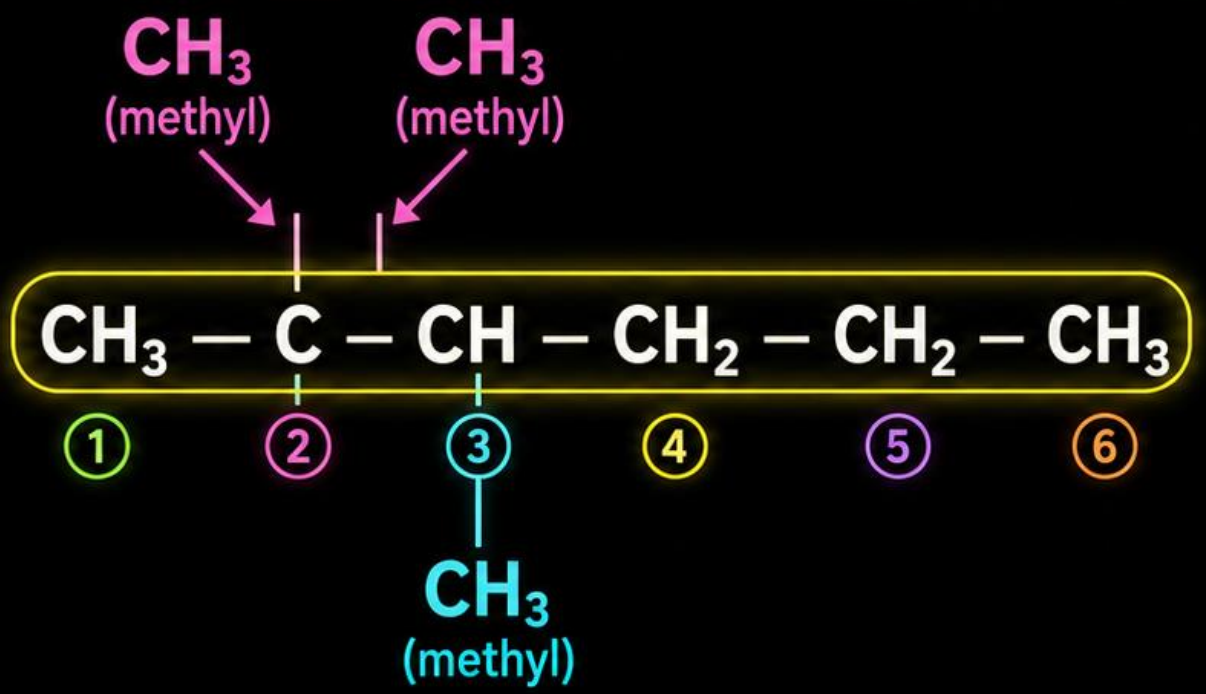
NAMING LOGIC FOR 2,2,3-TRIMETHYLHEXANE

1. Longest continuous chain = hexane (6 carbons)

2. Two methyl groups are attached to C-2

3. One methyl group is attached to C-3

4. Hence the name becomes 2,2,3-trimethylhexane

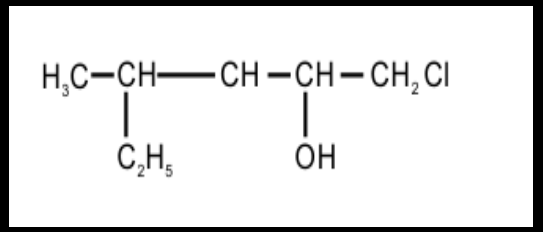


COLOR KEY

- Parent chain (hexane)
- Methyl at C-2 (first)
- Methyl at C-2 (second)
- Methyl at C-3
- Numbering (1 → 6)
- Chain continuation
- Terminal methyl

Rule: choose the longest chain first, then assign lowest locants.

12. **The IUPAC name of**

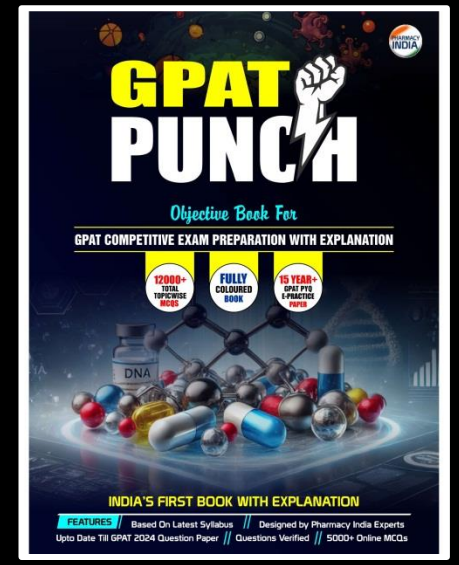


(a) 1-chloro-4-methylhexan-2-ol

(b)1-chloro-4-methylhexan-2-al

(c) 1-chloro-4-ethylpentan-2-ol

(d) 1-chloro-2-hydroxy-4-methylhexane



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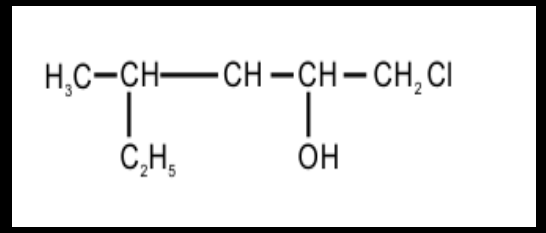

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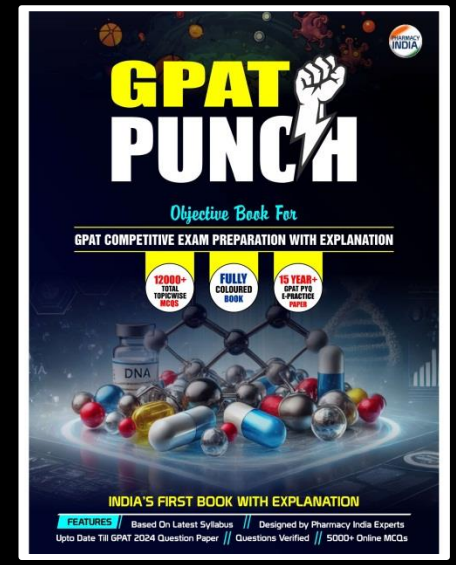
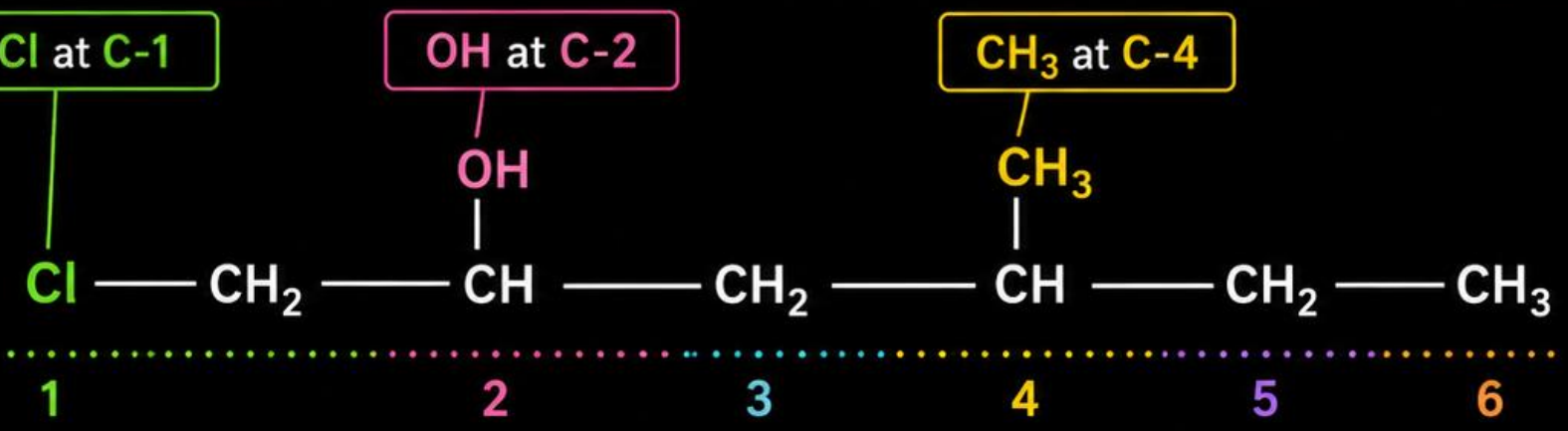
(b)1-chloro-4-methylhexan-2-al

(c) 1-chloro-4-ethylpentan-2-ol

(d) 1-chloro-2-hydroxy-4-methylhexane



NAMING LOGIC FOR 1-CHLORO-4-METHYLHEXAN-2-OL



☆ Numbering is chosen so that the –OH group gets the lowest locant (2, not 5).

NOTE

Priority: alcohol suffix (-ol) is chosen before simple substituents.

1 Parent chain containing the OH group has **6 carbons → hexan-**

2 Alcohol is the principal group, so numbering gives OH the **lowest locant**

3 Substituents are **chloro** at **C-1** and **methyl** at **C-4**

4 Complete name becomes **1-chloro-4-methylhexan-2-ol**

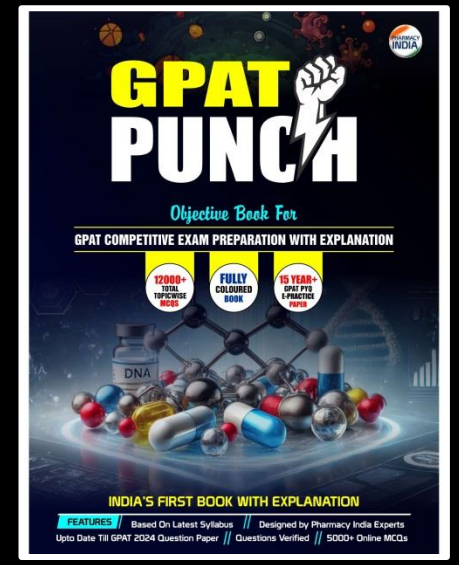
13. **Which one of the following IUPAC names is incorrect?**

(a) Ethanoic acid

(b) Ethanal

(c) Pent-3-ene

(d) 3-Methyl-pentan-2-ol



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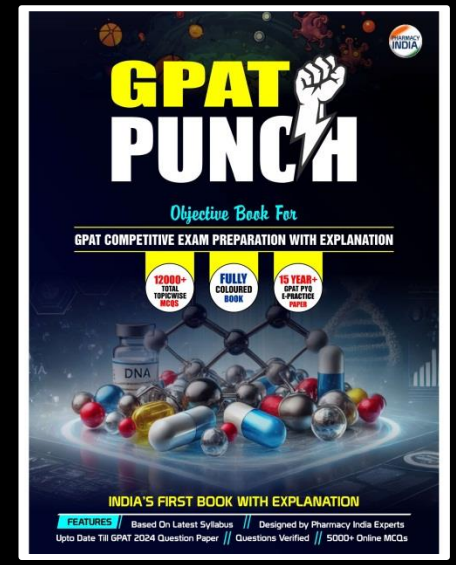


Why ‘pent-3-ene’ is NOT acceptable IUPAC naming

1. In alkenes, the double bond must get the lowest possible locant
2. A 5-carbon chain gives the parent name pentene
3. Numbering from the correct end places the double bond at C-2
4. So the acceptable name is pent-2-ene, which makes pent-3-ene incorrect

Five-carbon alkene chain

$$H_3C - CH_2 - CH = CH - CH_3$$

Numbering from left end

$$\overset{1}{H_3C} - \overset{2}{CH_2} - \overset{3}{CH} = \overset{4}{CH} - \overset{5}{CH_3}$$

Double bond starts at C-2 → LOCANT = 2 (LOWEST)

Numbering from right end

$$\overset{5}{H_3C} - \overset{4}{CH_2} - \overset{3}{CH} = \overset{2}{CH} - \overset{1}{CH_3}$$

Double bond starts at C-3 → LOCANT = 3 (HIGHER)

TIP

Lowest locant rule is essential in unsaturated compounds.

Therefore, pent-2-ene is the correct IUPAC name and pent-3-ene is not acceptable.

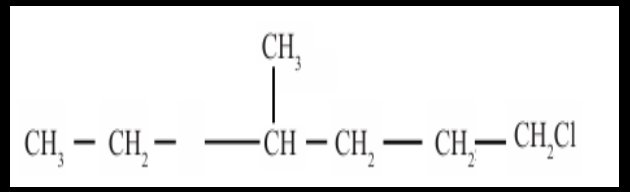
14. **The correct IUPAC name for**

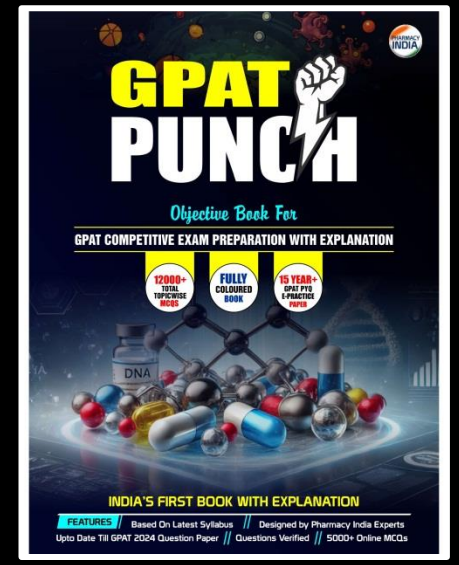
(a) 2-ethoxy-5-chloropentane

(b) 1-chloro-4-ethoxy-4-methyl butane

(c) 1-chloro-4-ethoxy pentane

(d) ethyl-1-chloropentyl ethe





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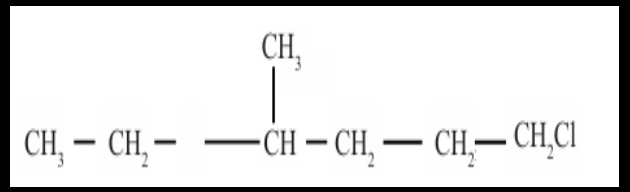
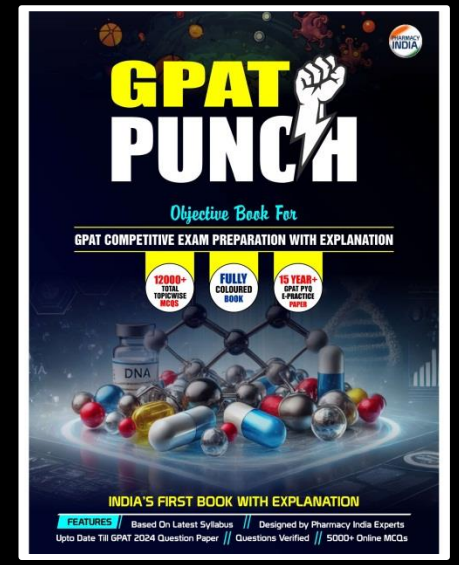




NAMING LOGIC FOR 2-ETHOXY-5-CHLOROPENTANE

PARENT CHAIN

Choose the longest continuous carbon chain as the parent. Here, it is **PENTANE**.

ETHOXY GROUP

—OR

An ethoxy group ($-O-CH_2CH_3$) is an **alkoxy** substituent.

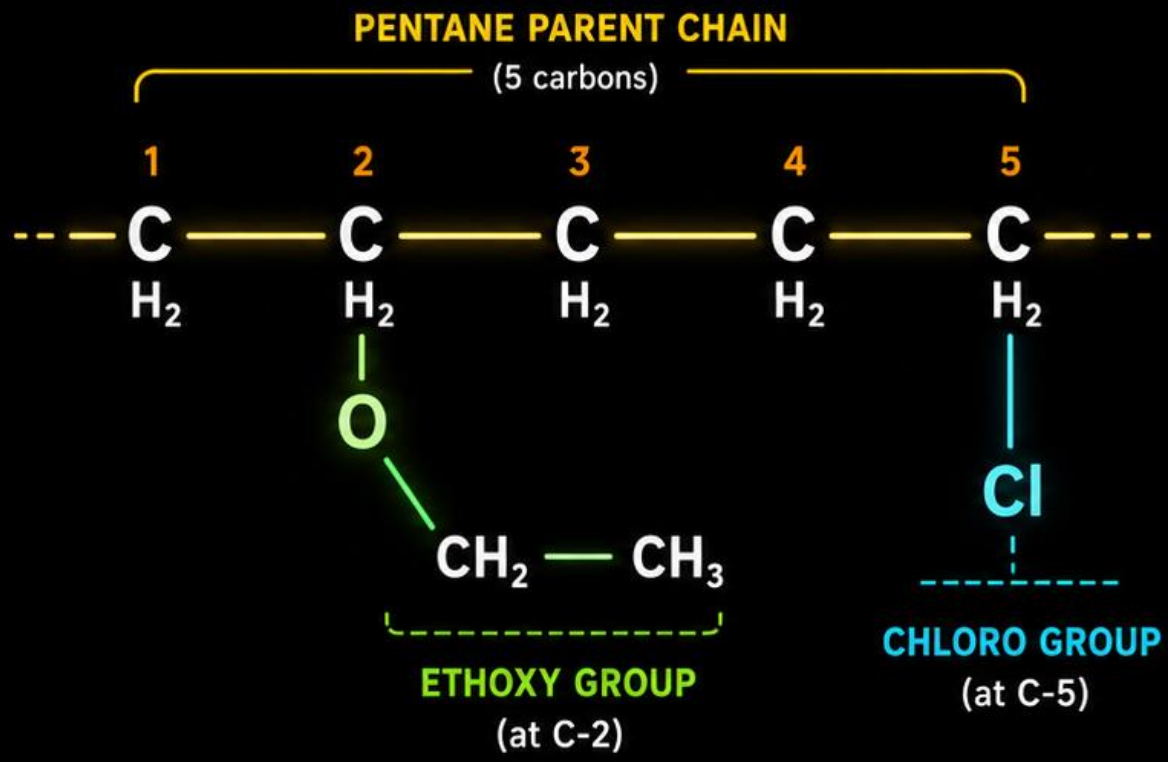
CHLORO GROUP

Cl

A **chloro** substituent ($-Cl$) is present at the terminal carbon.

NAMING RULE

List substituents with their locants in ascending order (alphabetical if needed).



KEY POINTS

1. The longest carbon chain selected as parent is **pentane.**
2. An **ethoxy** group is present as an alkoxy substituent.
3. A **chloro** substituent is present at the terminal carbon.
4. Combining locants and substituents gives **2-ethoxy-5-chloropentane.**

FINAL NAME

2-ETHOXY-5-CHLOROPENTANE

TIP

Ethers are often named as alkoxy substituents on the parent chain.

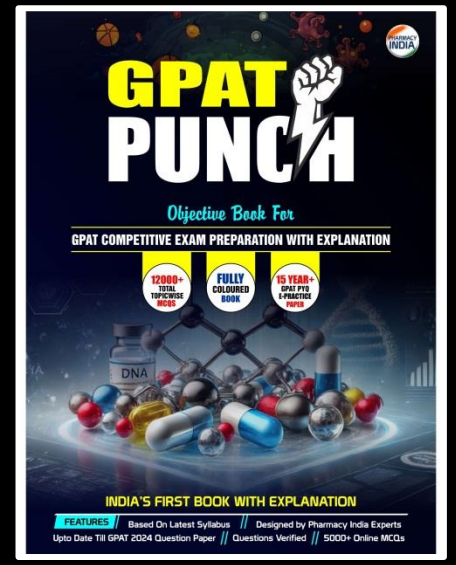
15. **The IUPAC name of the compound CH3CONHBr is**

(a) 1-bromoacetamide

(b) ethanoyl bromide

(c) N-bromoethanamide

(d) none of these



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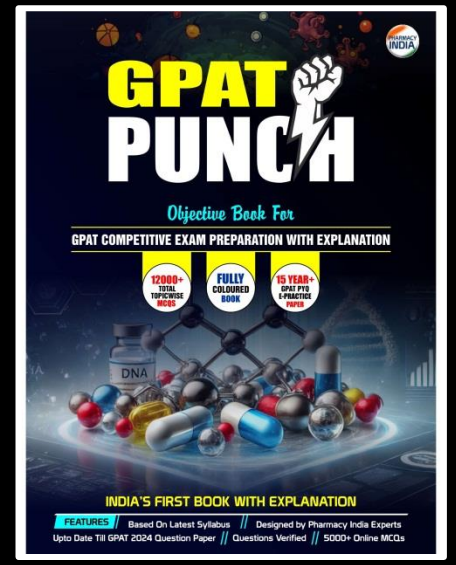


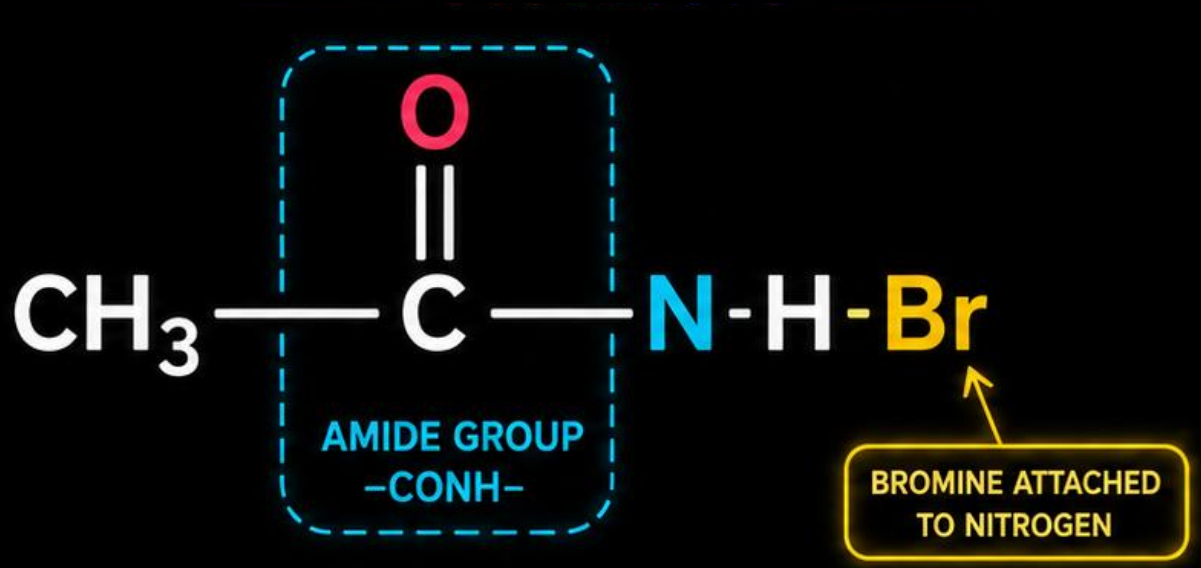
NAMING LOGIC

1. IDENTIFY
the parent functional group

2. LOCATE
the substituent and its position

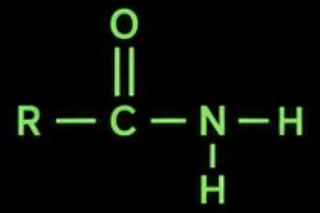
3. APPLY
the correct naming rule

4. WRITE
the final IUPAC name



- The parent amide is **ethanamide**
- Bromine is bonded to the amide **nitrogen**, not to the carbon chain
- Substitution on **nitrogen** is written with the prefix **N-**
- Therefore the compound is named **N-bromoethanamide**

AMIDE BASICS



Amides have the functional group
$-CONH_2$ / $-CONHR$ / $-CONR_2$

PREFIX FOR N-SUBSTTUTION

N-

used when a group is attached to the amide nitrogen

Always check whether substitution is on carbon or on nitrogen in amides.

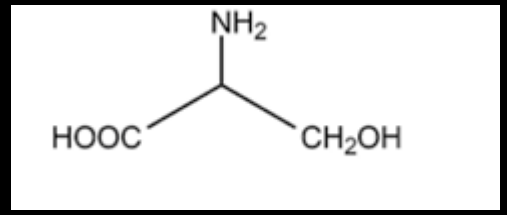
16. **The IUPAC name of the following compound is:**

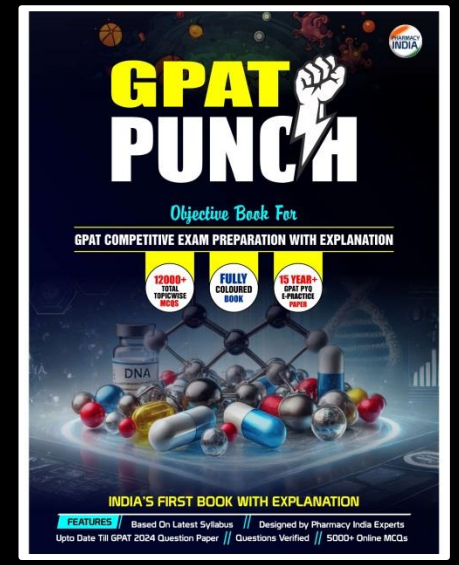
(a) 3-amino-2-hydroxy propanoic acid

(b) 2-amino-propan-3-ol-1-oic acid

(c) 2-amino-3-hydroxy propanoic acid

(d) Amino hydroxy propanoic acid





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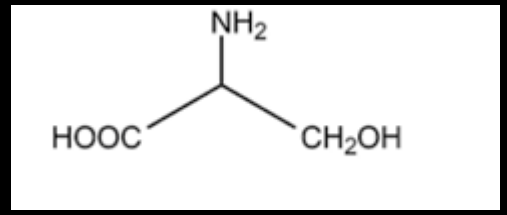
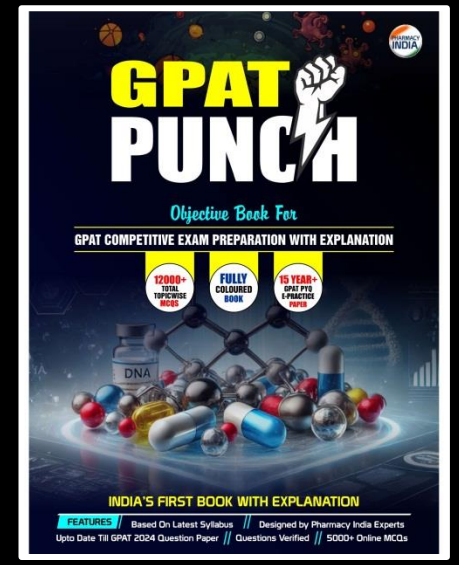
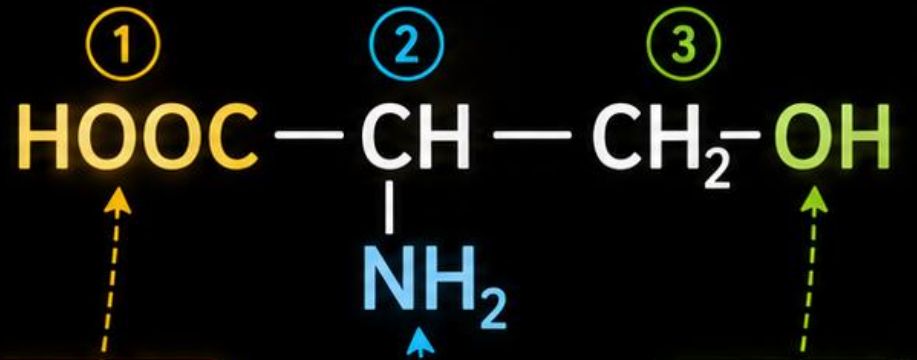




NAMING LOGIC FOR 2-AMINO-3-HYDROXYPROPANOIC ACID

1. Carboxylic acid has highest priority, so the parent is propanoic acid
2. The carbonyl carbon of COOH is C-1
3. $-NH_2$ $-OH$ — NH_2 is present at C-2 and OH is present at C-3
4. Hence the name becomes 2-amino-3-hydroxypropanoic acid

STRUCTURE & NUMBERING



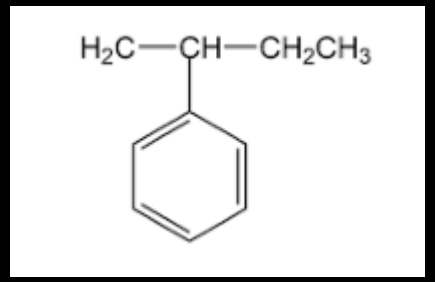
- Carboxylic acid (Highest priority)
- NH_2 Amino group (Substituent)
- OH Hydroxyl group (Substituent)

QUICK RECAP

- Parent chain: 3 carbons → propanoic acid
- Numbering starts from COOH carbon (C-1)
- 2 NH_2 at C-2 (amino)
- 3 OH at C-3 (hydroxy)

TIP | Priority order decides both suffix and numbering.

17. **The IUPAC name of the compound**

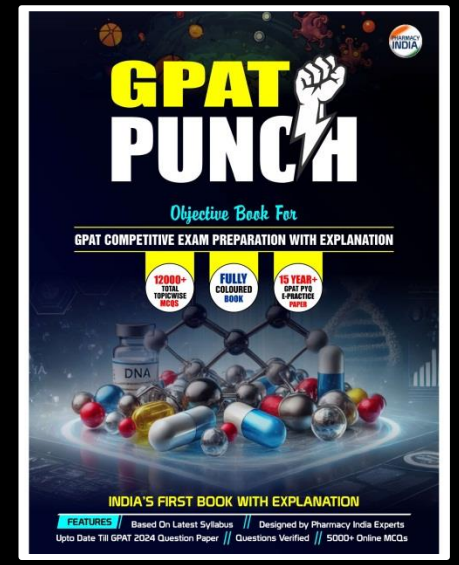


(a) 3-phenylbutane

(b) 3-cyclohexylbutane

(c) 2-cyclohexylbutane

(d) 2-phenylbutane



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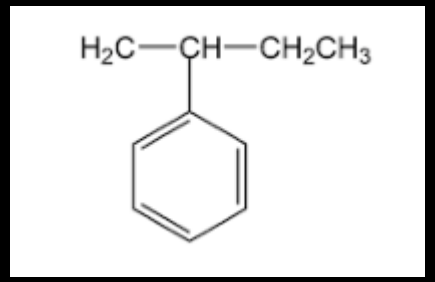

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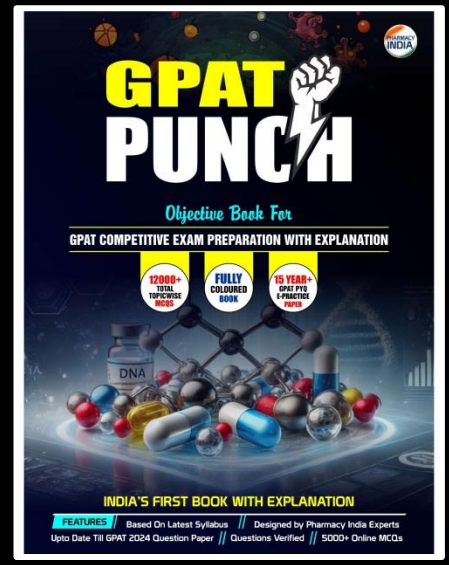


NAMING LOGIC FOR 2-PHENYLBUTANE

1. IDENTIFY PARENT CHAIN

Choose the longest continuous open chain.
→ **Butane** (4 carbons)

2. IDENTIFY SUBSTITUENT

The benzene ring attached to the chain is a **phenyl** group ($-C_6H_5$).

BUTANE PARENT CHAIN

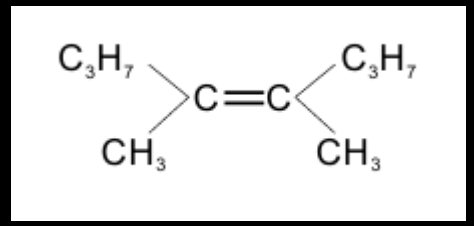
$CH_3 — CH — CH_2 — CH_3$

→ **PHENYL SUBSTITUENT** ($-C_6H_5$)

1. The open-chain parent is **butane**.
2. The aromatic ring acts as a **phenyl** substituent.
3. Attachment occurs on **carbon-2** of the butane chain.
4. Therefore the name is **2-phenylbutane**.

NOTE: A benzene ring attached as a substituent is called **phenyl**, not **cyclohexyl**.

18. **The IUPAC name of the compound**

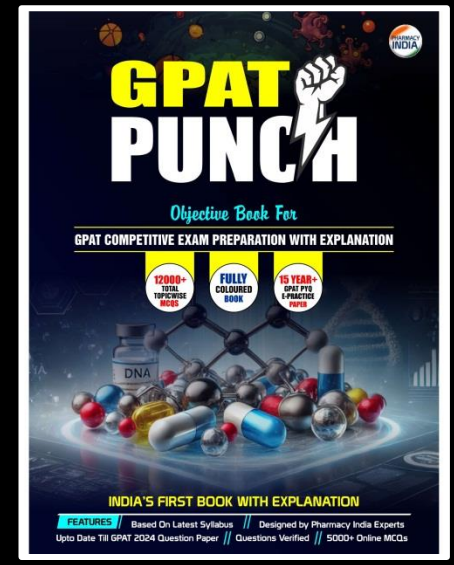


(a) 4,5-dimethyloct-4-ene

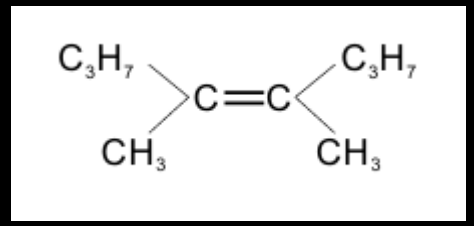
(b) 2,3-dipropylbut-2-ene

(c) 4-methyl-5-propylhex-4-ene

(d) None of the above



18. **The IUPAC name of the compound**

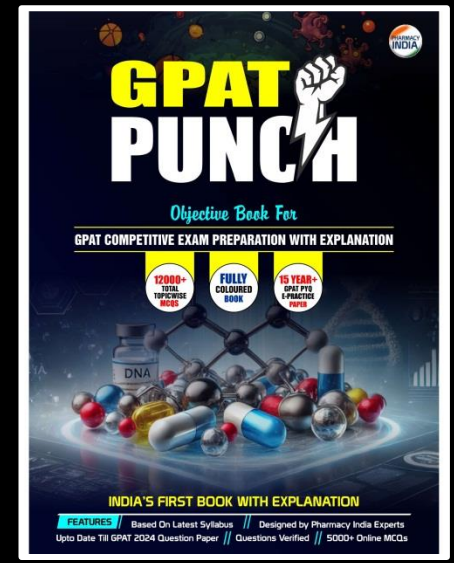


(a) 4,5-dimethyloct-4-ene

(b) 2,3-dipropylbut-2-ene

(c) 4-methyl-5-propylhex-4-ene

(d) None of the above



NAMING LOGIC FOR 4,5-DIMETHYLOCT-4-ENE

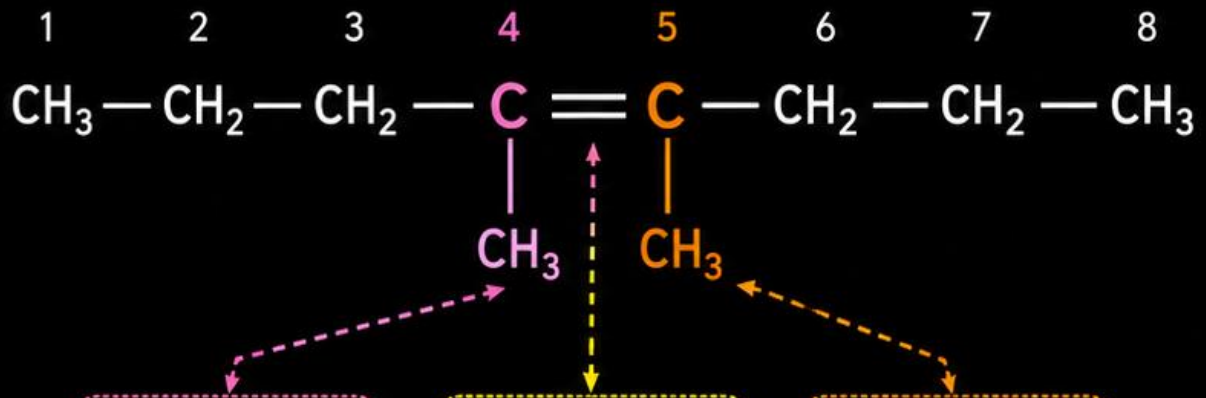
1. Choose the longest chain containing the double bond → **8 carbons**

2. This gives the parent name **oct-4-ene**

3. One methyl group is attached to **C-4** and one to **C-5**

4. So the full name becomes **4,5-dimethyloct-4-ene**

STRUCTURE & NUMBERING



- **DOUBLE BOND** between C-4 and C-5
- **METHYL GROUP** at C-4 (Substituent)
- **METHYL GROUP** at C-5 (Substituent)

IUPAC NAME: 4,5-dimethyloct-4-ene

NAMING SUMMARY

- Double bond at position 4
- Methyl group at position 4
- Methyl group at position 5
- Parent chain has 8 carbons
- Parent name **oct-4-ene**

TIP | Longest chain rule is preferred over shorter-chain alternative names.

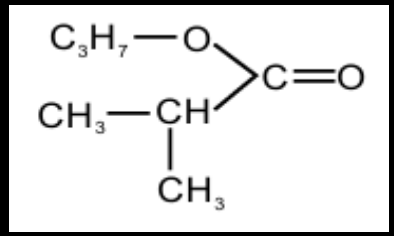
19. The IUPAC name of the given compound is

(a) propionic acetic anhydride

(b) ethanoic propanoic anhydride

(c) aceto ethanoate

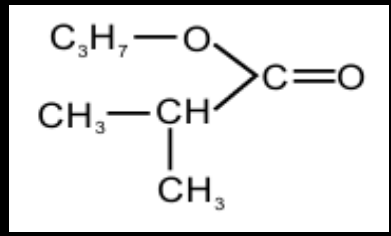
(d) none of the above



19. The IUPAC name of the given compound is

(a) propionic acetic anhydride

(b) ethanoic propanoic anhydride



(c) aceto ethanoate

(d) none of the above

FUNCTIONAL GROUP

Acid Anhydride (RCO–O–COR')

KEY IDEA

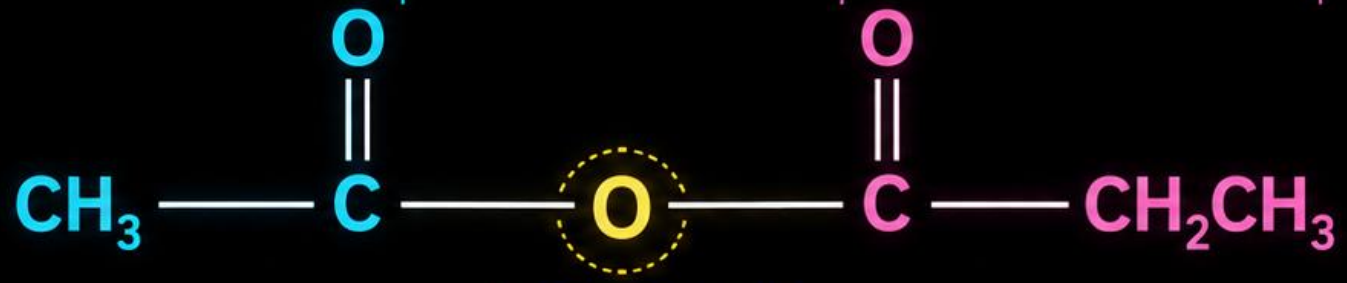
Two acyl groups linked by an oxygen atom.

WHY IT MATTERS

Important in organic synthesis and acylation reactions.

ETHANOYL PART
(from ethanoic acid)

PROPANOYL PART
(from propanoic acid)



ANHYDRIDE LINKAGE
(–O–)

1. This molecule is a **mixed acid anhydride**
2. Its two acyl parts come from **ethanoic acid** and **propanoic acid**
3. Mixed anhydrides are named by writing **both acid names**
4. Thus the name is **ethanoic propanoic anhydride**

NOTE

List **both** acid names, then add the word **anhydride.**

STABLE BUT REACTIVE

More reactive than esters; reacts with nucleophiles.

NAMING LOGIC

Name both acids in the order shown.

EXAM TIP

Identify both acyl parts, then write both acid names before anhydride.

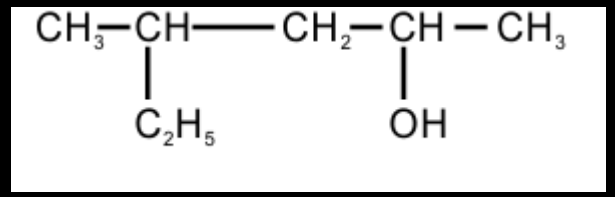
20. The IUPAC name of the compound;

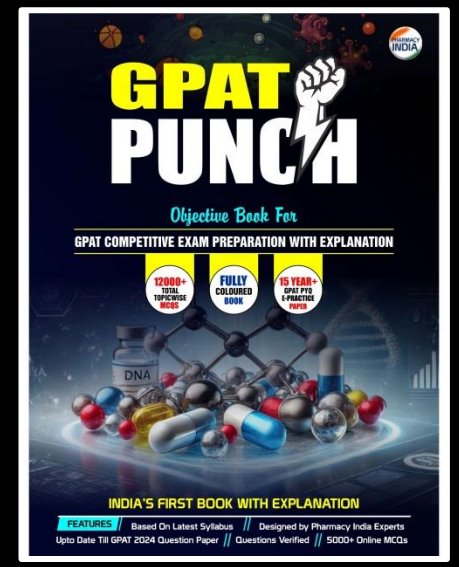
(a) 4-methylhexan-3-ol

(b) 4-methylhexan-2-ol

(c) heptanol

(d) none of these





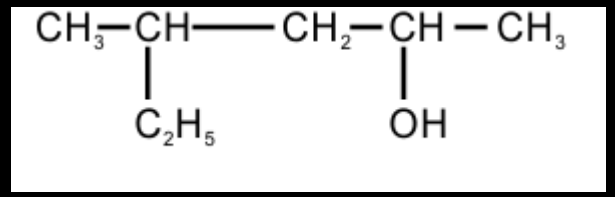
20. **The IUPAC name of the compound;**

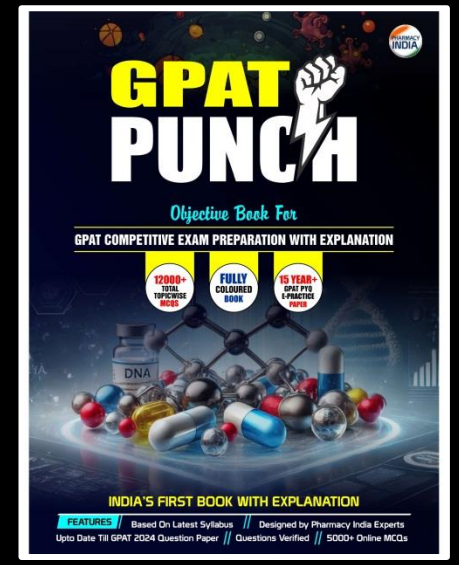
(a) 4-methylhexan-3-ol

(b) 4-methylhexan-2-ol

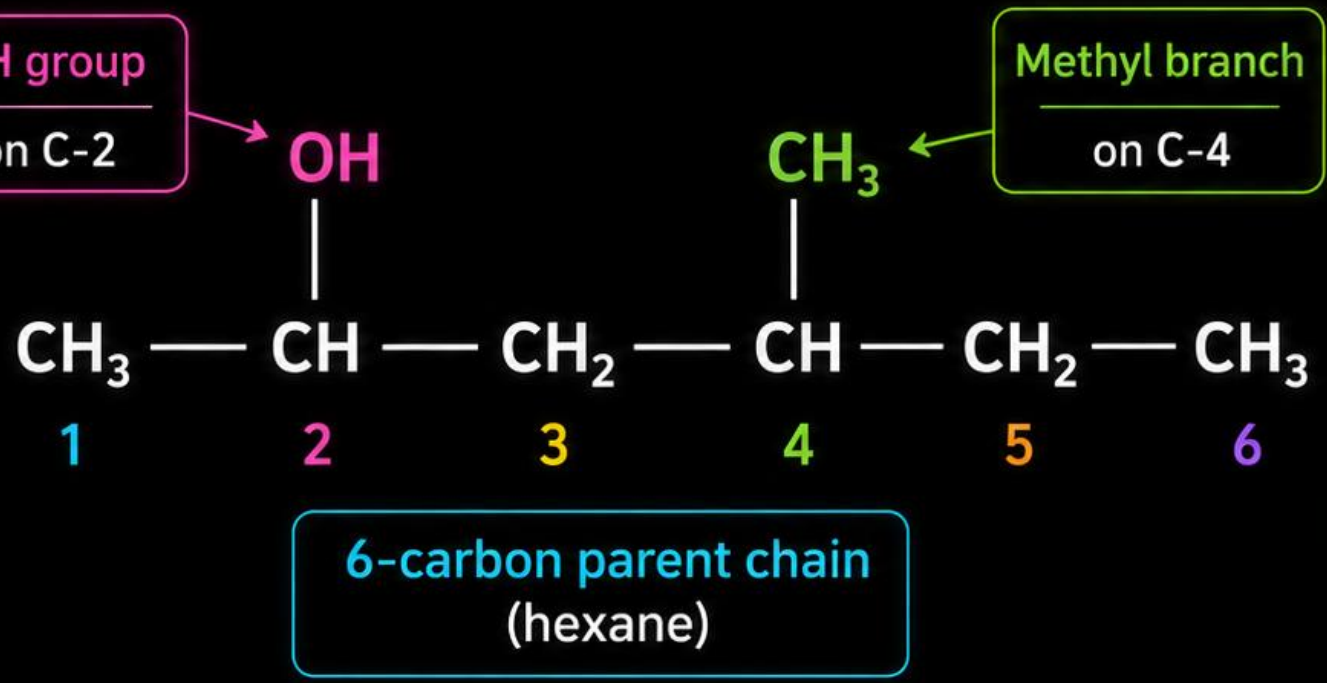
(c) heptanol

(d) none of these





4-methylhexan-2-ol



1. The longest chain containing the alcohol group has **6 carbons → hexan-**
2. Alcohol is the principal functional group, so numbering starts from the **OH** side
3. This places **OH** on **C-2** and the methyl branch on **C-4**
4. Hence the name is **4-methylhexan-2-ol**

TIP: For alcohols, always minimize the locant of the **-OH** group.

21. **The IUPAC name thefollowing;CH3C(CH3)2CH2CH=CH2 is:**

(a) 2, 2-dimethylpent-4-ene

(b) 4, 4-dimethylpent-1-ene

(c) 1,1,1-trimethylbut-3-ene

(d) 4, 4, 4-trimethylbut-1-ene

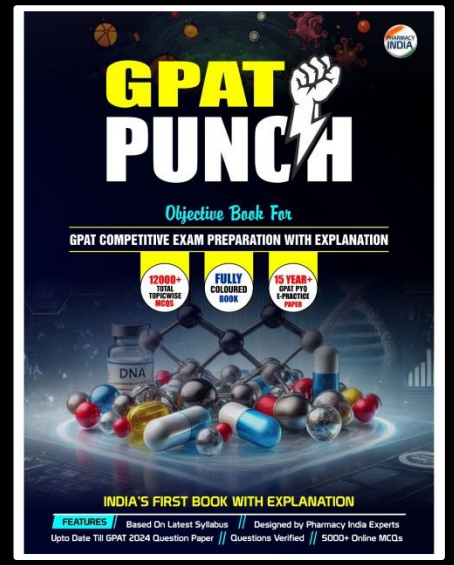
21. The IUPAC name thefollowing;CH3C(CH3)2CH2CH=CH2 is:

(a) 2, 2-dimethylpent-4-ene

(b) 4, 4-dimethylpent-1-ene

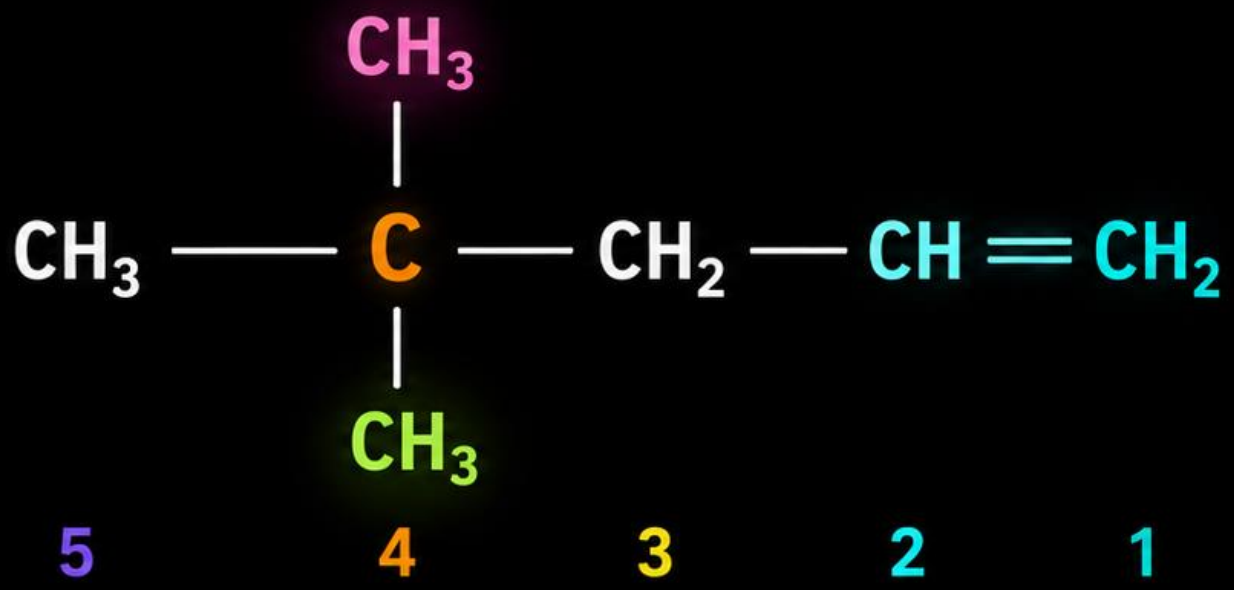
(c) 1,1,1-trimethylbut-3-ene

(d) 4, 4, 4-trimethylbut-1-ene



BRANCHED ALKENE NAMING

$$CH_3C(CH_3)_2CH_2CH=CH_2$$



1. Choose the longest chain that contains the double bond.

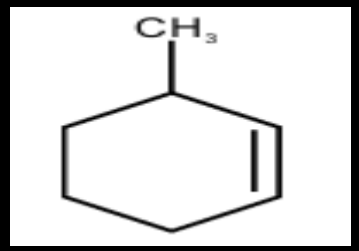
2. Number from the alkene end so C=C gets the lowest locant.

3. The parent chain contains 5 carbons.

4. Two methyl substituents are attached to carbon 4.

KEY RULE | Unsaturation gets priority in numbering.

22. The IUPAC name of given structure is

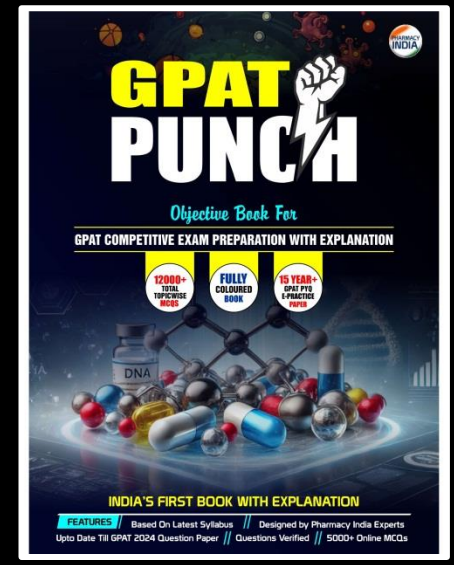


(a) 3-methyl cyclohexene

(b) 1-methyl cyclohex-2-ene

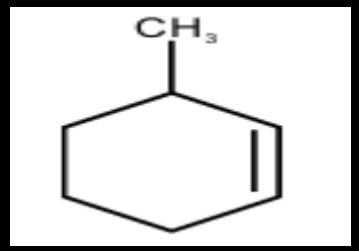
(c) 6-methyl cyclohexene

(d) 1-methyl cyclohex-5-ene



22. **The IUPAC name of given structure is**

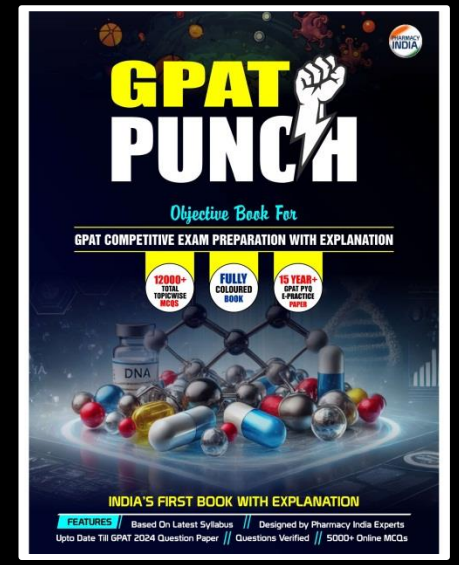
(a) 3-methyl cyclohexene



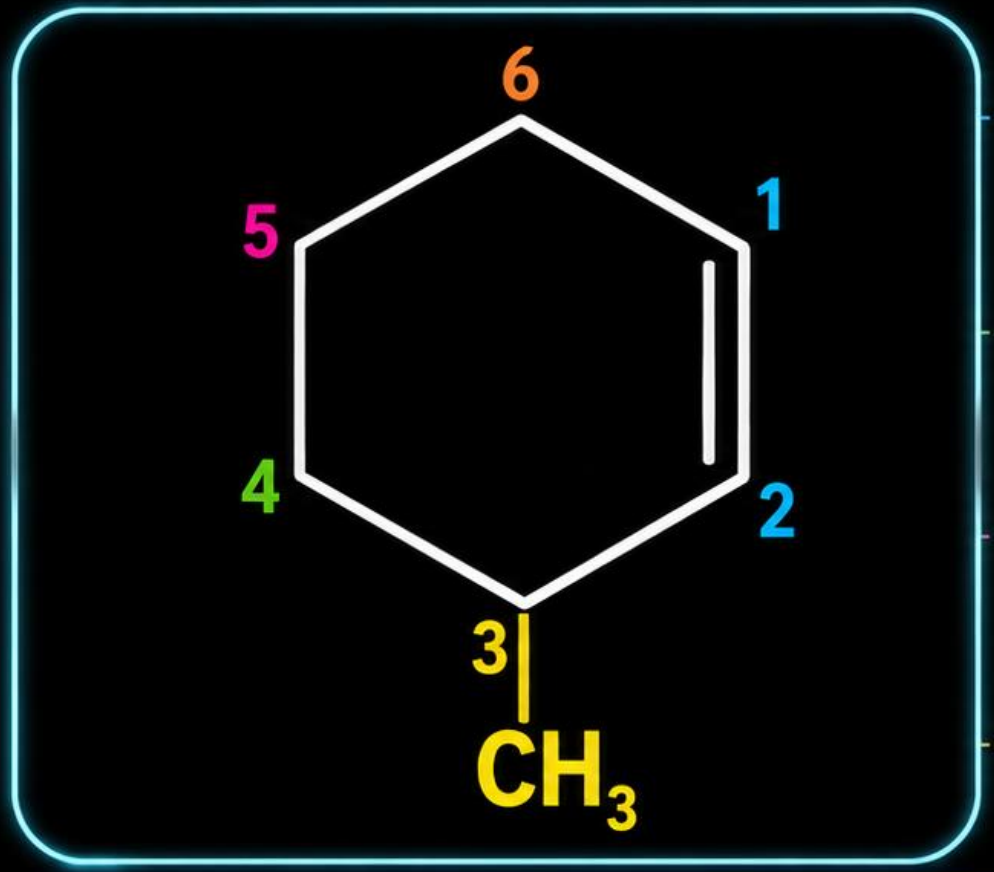
(b) 1-methyl cyclohex-2-ene

(c) 6-methyl cyclohexene

(d) 1-methyl cyclohex-5-ene



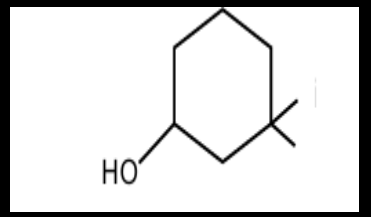
• CYCLOALKENE NUMBERING



1. In cycloalkenes, the double bond is assigned positions 1 and 2.
2. Start numbering at a double-bond carbon.
3. Choose the direction giving the substituent the lowest locant.
4. Here the methyl group falls on carbon 3.

KEY RULE: For cycloalkenes: C=C = 1,2 by default.

23. **The IUPAC name of the given compound is**

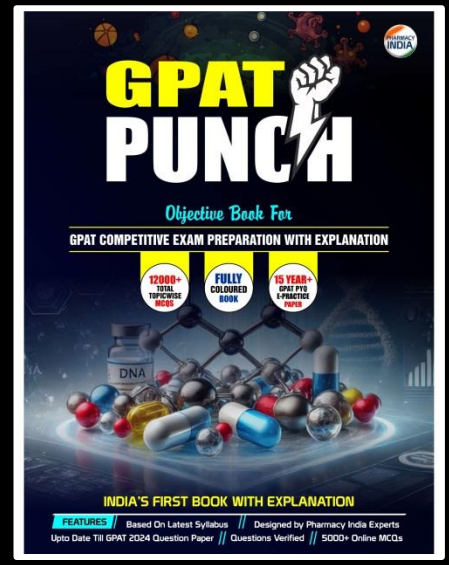


(a) 3,3-dimethyl-1-hydroxy cyclohexane

(b) 1,1-dimethyl-3-hydroxy cyclohexane

(c) 3,3-dimethyl-1-cyclohexanol

(d) 1,1-dimethyl-3-cyclohexanol



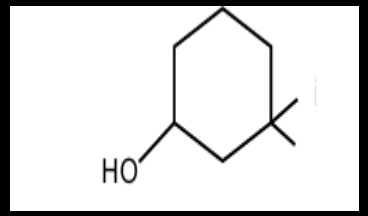
23. **The IUPAC name of the given compound is**

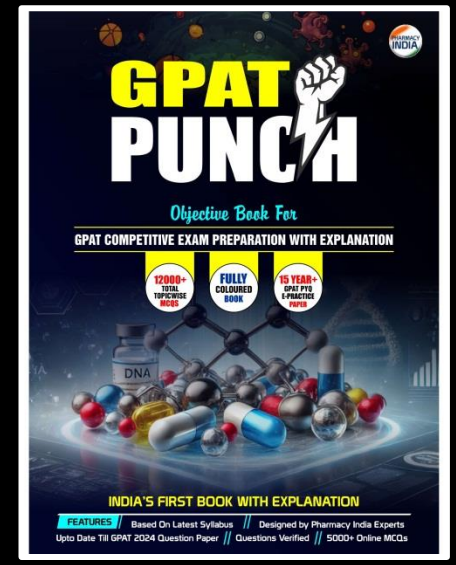
(a) 3,3-dimethyl-1-hydroxy cyclohexane

(b) 1,1-dimethyl-3-hydroxy cyclohexane

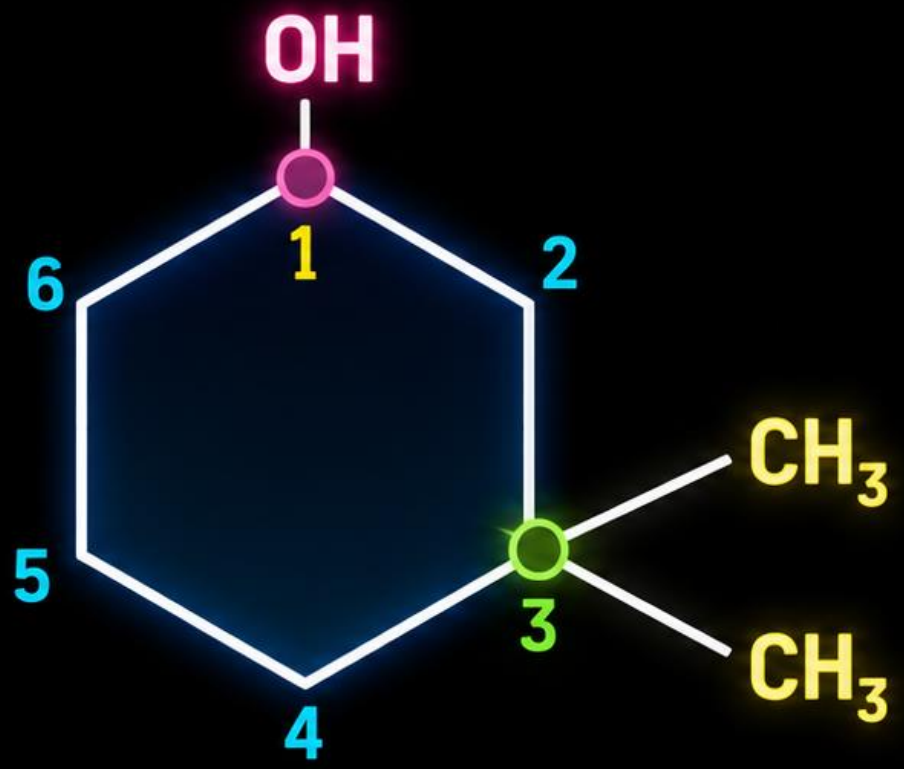
(c) 3,3-dimethyl-1-cyclohexanol

(d) 1,1-dimethyl-3-cyclohexanol





• NAMING CYCLIC ALCOHOLS



1. The hydroxyl group has higher priority and uses the suffix **-ol**.

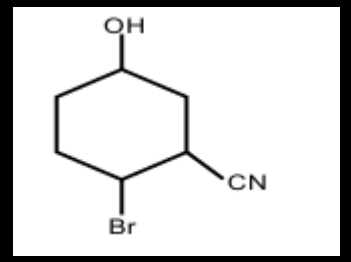
2. The carbon bearing –OH is numbered as carbon **1**.

3. Number the ring to give substituents the lowest locants.

4. Both methyl groups are on carbon **3**.

KEY RULE: Functional group suffix decides the parent numbering.

24. The IUPAC name of the following compound is:

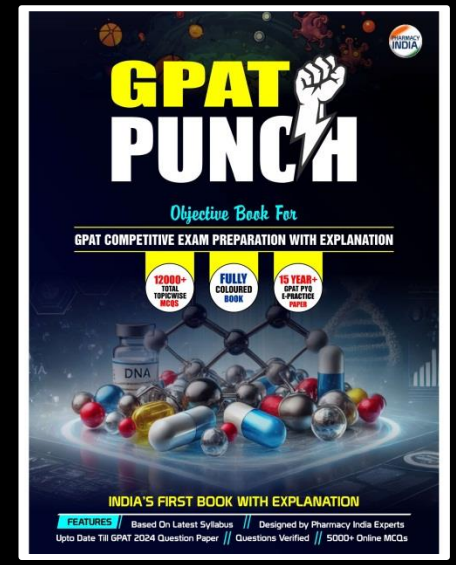


(a) 4-bromo-3-cyanophenol

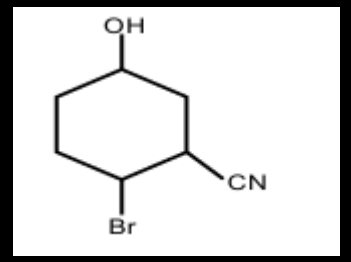
(b) 2-bromo-5-hydroxy benzonitrile

(c) 2-cyano-4-hydroxy bromobenzene

(d) 6-bromo-3-hydroxy benzonitrile



24. **The IUPAC name of the following compound is:**

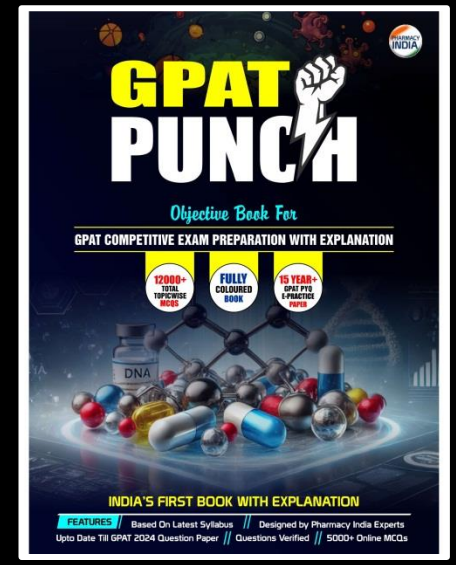


(a) 4-bromo-3-cyanophenol

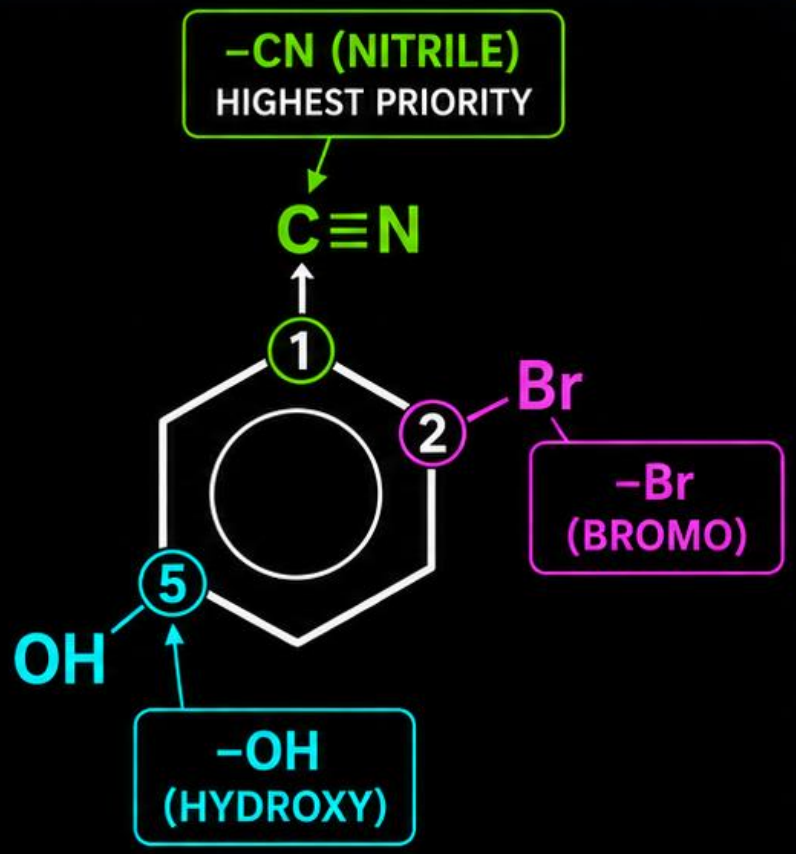
(b) 2-bromo-5-hydroxy benzonitrile

(c) 2-cyano-4-hydroxy bromobenzene

(d) 6-bromo-3-hydroxy benzonitrile



PRIORITY IN AROMATIC NITRILES



1. The nitrile group has highest priority, so the parent is benzonitrile.
2. The ring carbon attached to –CN is carbon 1.
3. Choose the direction that gives the lowest locants.
4. Bromo is at 2 and hydroxy is at 5.
5. Prefixes are written in alphabetical order.

KEY RULE | Highest priority group defines the parent name.

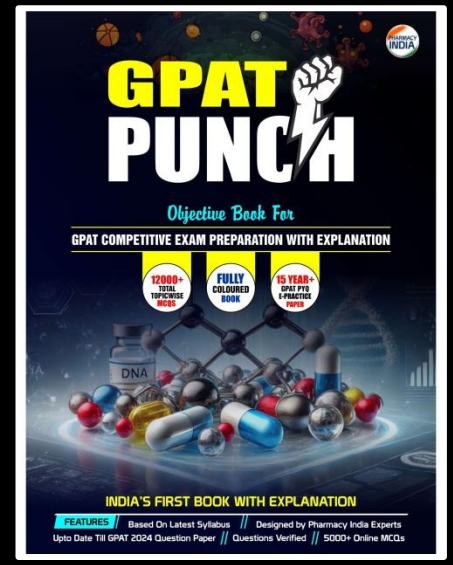
25. **The compound which contains all the four 1°, 2°, 3° and 4° carbon atom is:**

(a) 2,3-dimethylpentane

(b) 3-chloro-2,3-dimethylpentane

(c) 2,3,4-trimethylpentane

(d) 3,3-dimethylpentane



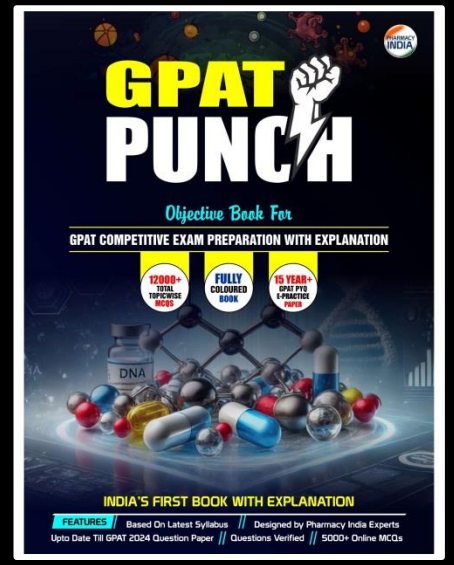
25. **The compound which contains all the four 1°, 2°, 3° and 4° carbon atom is:**

(a) 2,3-dimethylpentane

(b) 3-chloro-2,3-dimethylpentane

(c) 2,3,4-trimethylpentane

(d) 3,3-dimethylpentane



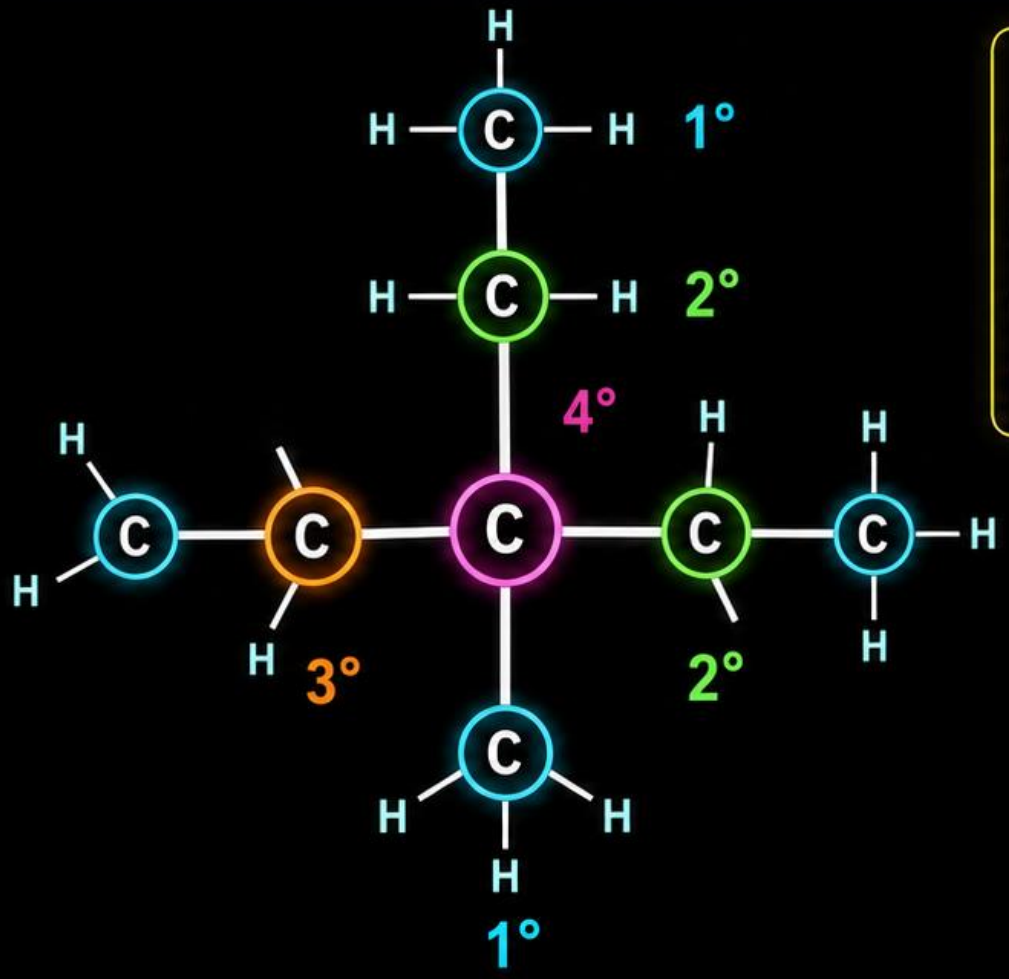
• 1°, 2°, 3° and 4° Carbon Atoms

1 Carbon degree depends on the number of directly attached carbon atoms.

2 1° = one carbon,
2° = two carbons,
3° = three carbons,
4° = four carbons.

3 Count only carbon–carbon attachments while classifying.

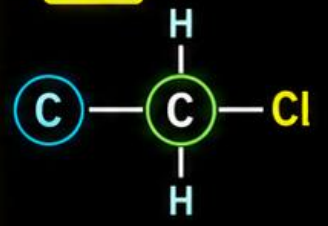
4 Heteroatoms such as Cl do not increase carbon degree.



LEGEND: CARBON DEGREE

- 1° Carbon : Attached to one carbon
- 2° Carbon : Attached to two carbons
- 3° Carbon : Attached to three carbons
- 4° Carbon : Attached to four carbons

NOTE

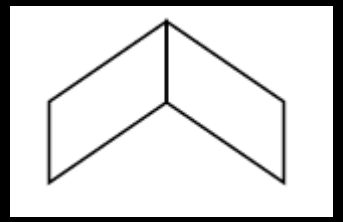


This carbon is 2° (attached to two carbons).

Cl is a heteroatom and does not affect the degree.

KEY RULE: Always classify each carbon before choosing the structure.

26. The IUPAC name of the following compound is:



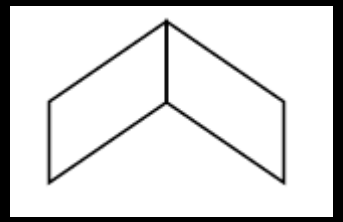
(a) bicyclo [2.2.0] octane

(b) bicyclo [0.2.2] hexane

(c) bicyclo [2.1.1] hexane

(d) bicyclo [2.2.0] hexane

26. **The IUPAC name of the following compound is:**



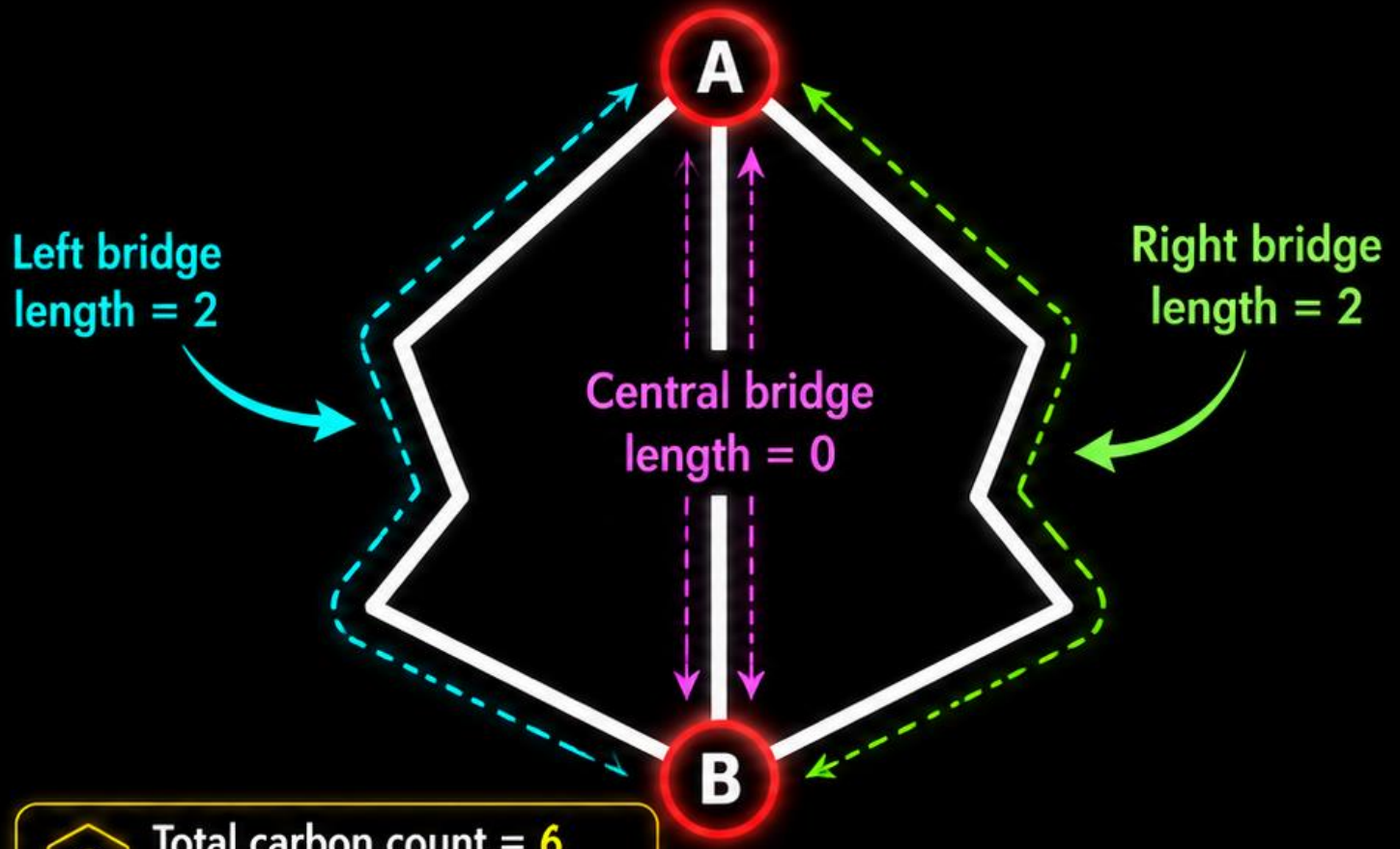
(a) bicyclo [2.2.0] octane

(b) bicyclo [0.2.2] hexane

(c) bicyclo [2.1.1] hexane

(d) bicyclo [2.2.0] hexane

BICYCLIC RING NOMENCLATURE

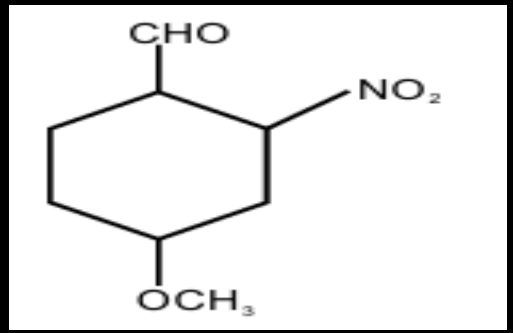


C Total carbon count = 6
(4 in the rings + 2 bridgeheads)

1. First identify the two bridgehead carbons.
2. Count the three bridges excluding the bridgeheads.
3. Write the bridge lengths in descending order.
4. Total carbons = bridge counts + the 2 bridgeheads.

★ **KEY RULE:** Bicyclo[a.b.c] = three bridge lengths between the same bridgeheads.

27. **The correct IUPAC name of the compound**



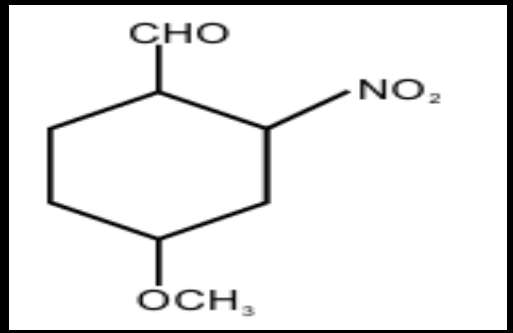
(a) 2-formyl-5-methoxynitrobenzene

(b) 4-formyl-3-nitroanisole

(c) 4-methoxy-2-nitrobenzaldehyde

(d) 4-methoxy-6-nitrobenzaldehyde

27. **The correct IUPAC name of the compound**

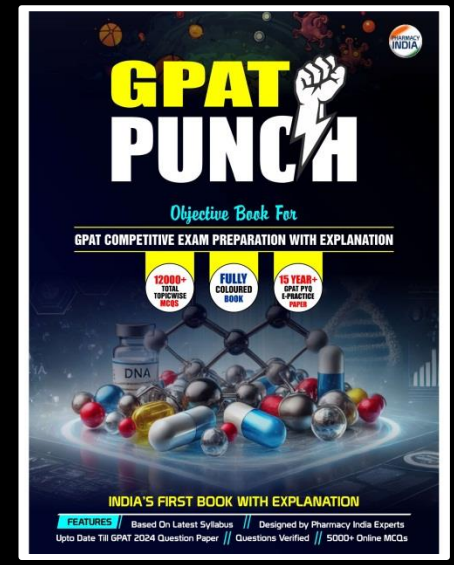


(a) 2-formyl-5-methoxynitrobenzene

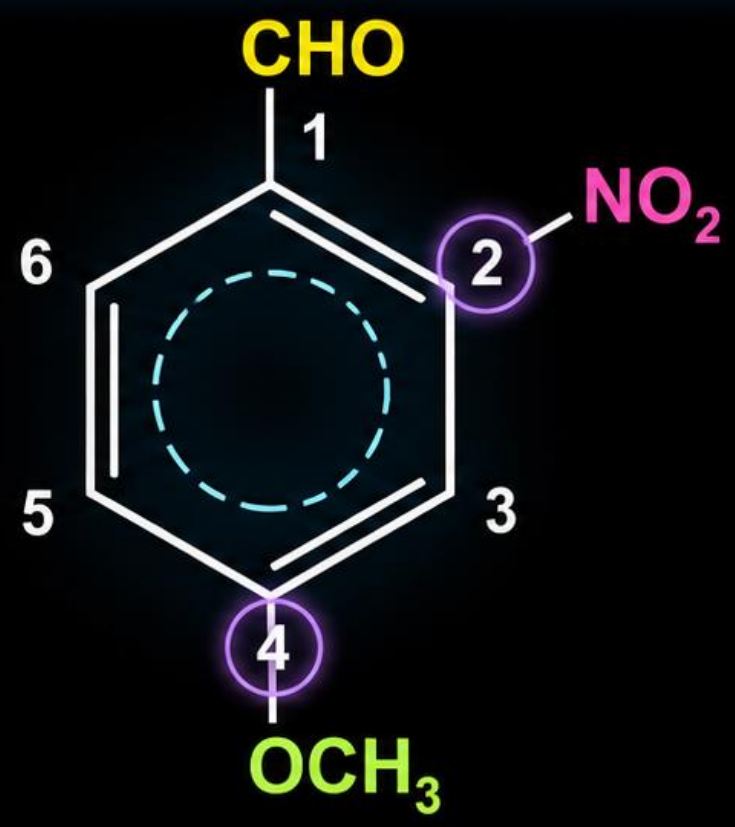
(b) 4-formyl-3-nitroanisole

(c) 4-methoxy-2-nitrobenzaldehyde

(d) 4-methoxy-6-nitrobenzaldehyde



• NAMING SUBSTITUTED BENZALDEHYDES



1. The aldehyde group has highest priority, so the parent is benzaldehyde.

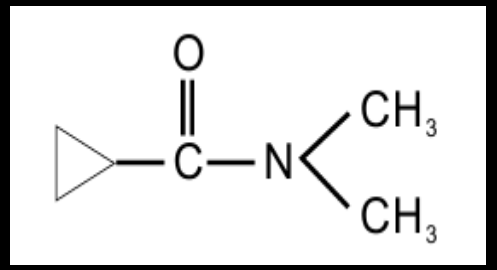
2. The formyl carbon defines position 1 on the ring.

3. Nitro is ortho and methoxy is para to the aldehyde group.

4. Use the lowest locants and list prefixes alphabetically.

KEY RULE: Priority + lowest locants together decide the final name.

28. **The IUPAC name of the given compound is**

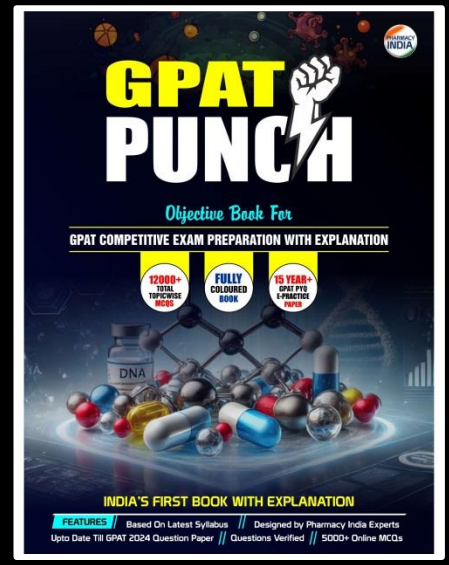


(a) cyclopropionamide

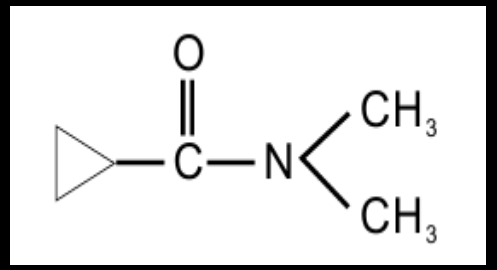
(b) N-methyl cyclopropanamide

(c) N,N-dimethyl cyclopropane carboxamide

(d) None of the above



28. **The IUPAC name of the given compound is**



(a) cyclopropionamide

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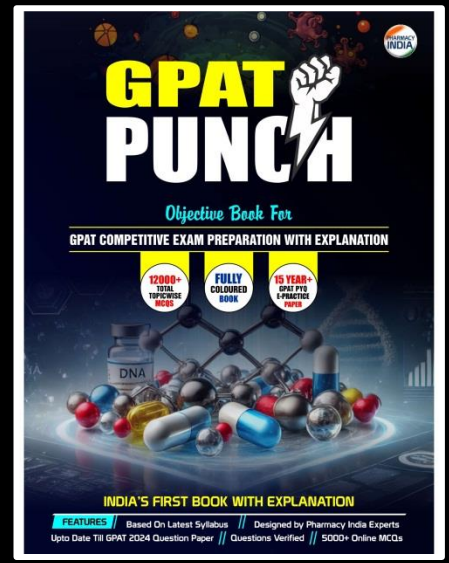
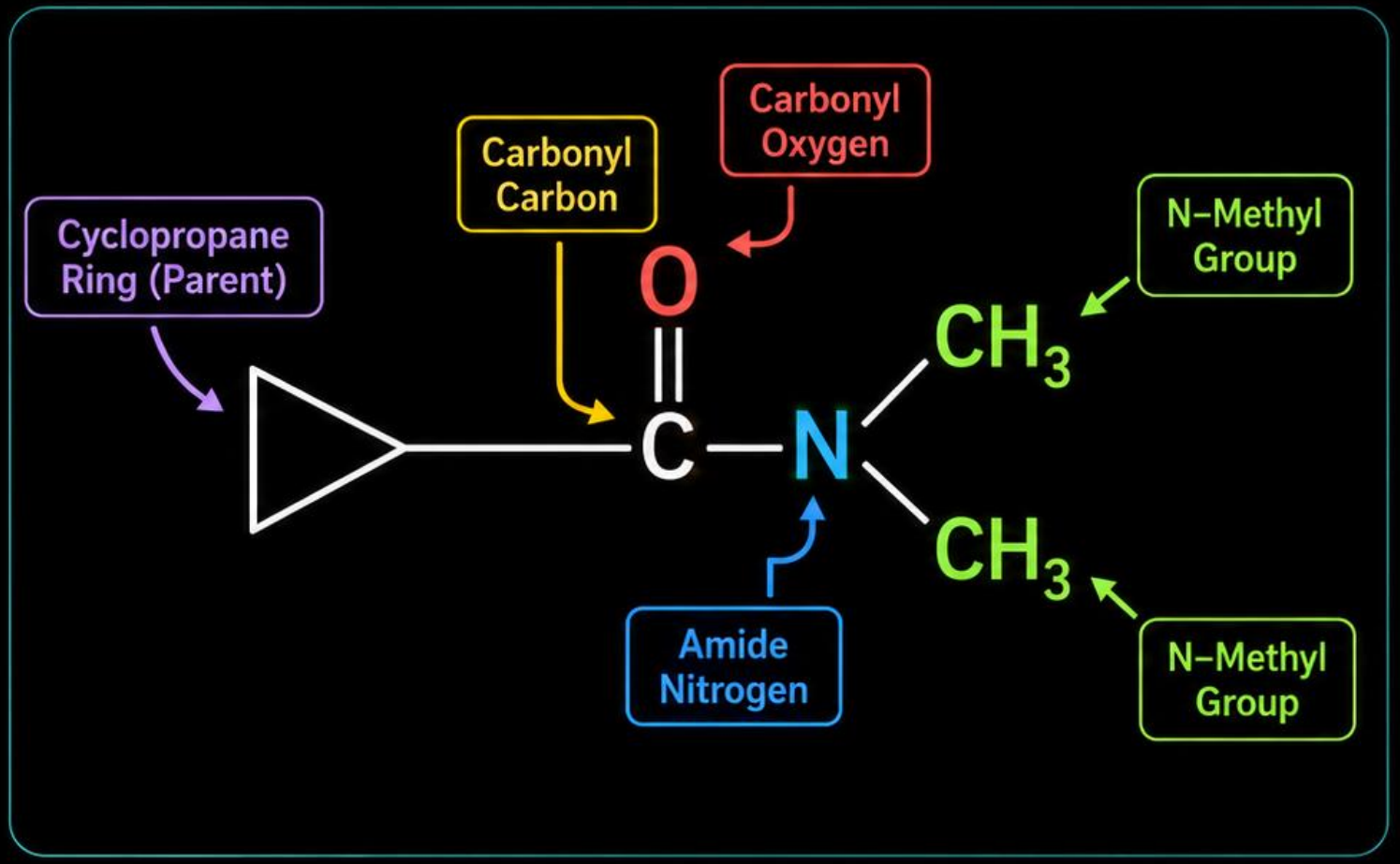
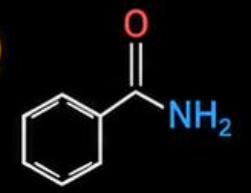
(d) None of the above



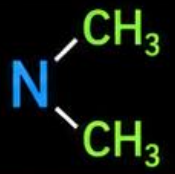
• CARBOXAMIDE VS AMIDE NAMING



1. 

The amide carbonyl is outside the ring, so the suffix is **carboxamide.**

2. 
The ring parent is **cyclopropanecarboxamide.**

3. 

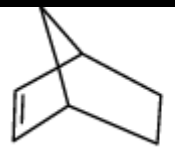
The nitrogen atom bears **two methyl substituents.**

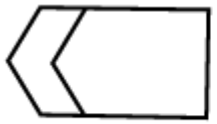
4. 

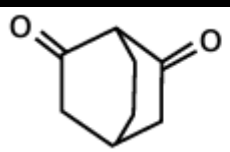
N-substituents are written with the prefix **N.**

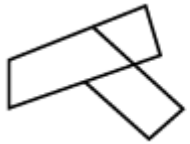
KEY RULE Exocyclic amide on a ring → use **carboxamide.**

29. Which name is incorrect?

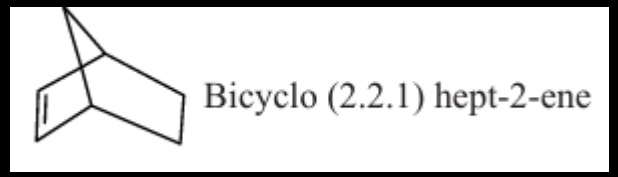
(a)  Bicyclo (2.2.1) hept-2-ene

(b)  Bicyclo (3.2.1) octane

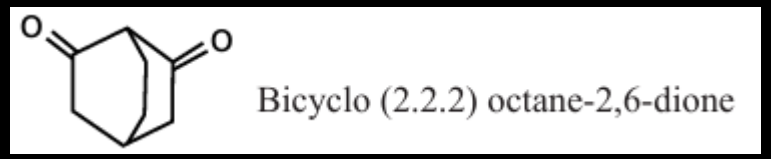
(c)  Bicyclo (2.2.2) octane-2,6-dione

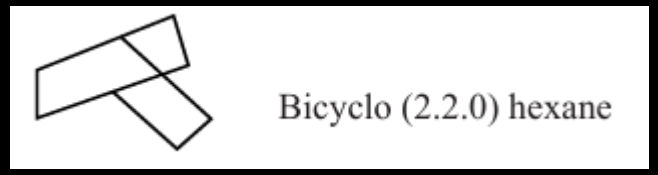
(d)  Bicyclo (2.2.0) hexane

29. Which name is incorrect?

(a) 

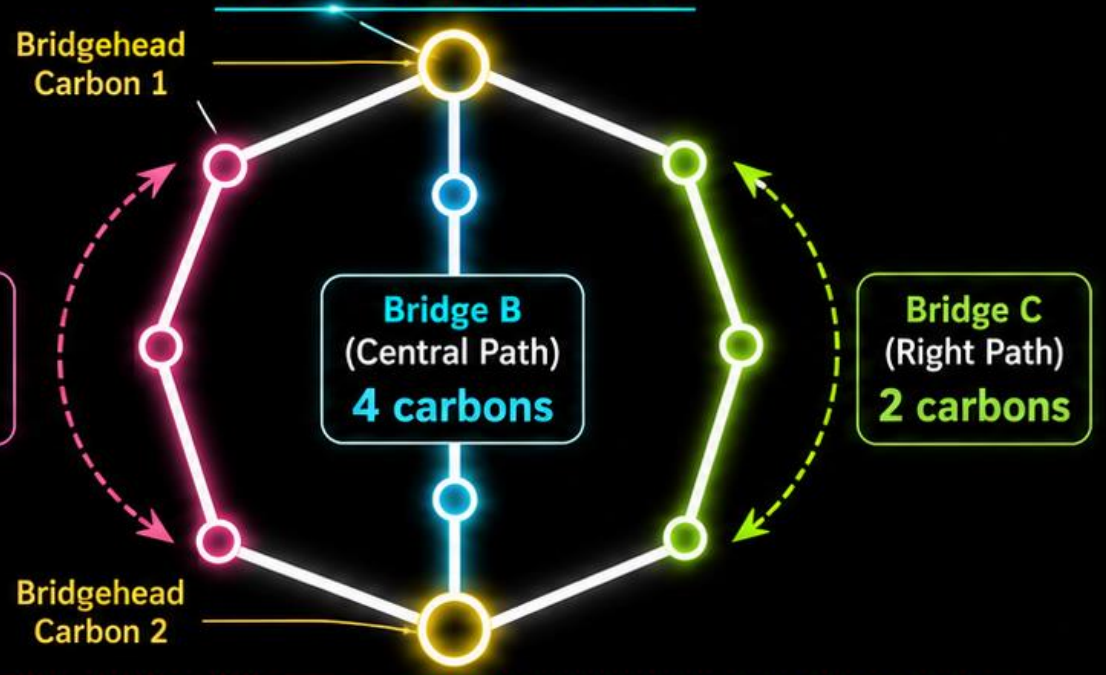
(b) 

(c) 

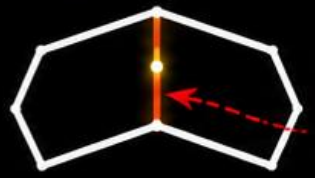
(d) 

CHECKING BICYCLIC NAMES

BICYCLIC FRAMEWORK



Incorrect! Counting a shared edge as extra bridge carbons gives a **wrong** count.



The shared (fused) bond is **NOT** an extra bridge.

1. Locate the two **bridgehead carbons** first.
2. Count the **three bridges** between the same bridgeheads.
3. Do not miscount **shared edges** or **fused bonds** as extra bridge carbons.
4. Write bridge numbers in **descending order** before the parent name.

KEY RULE: A **wrong bridge count** gives a **wrong bicyclic name.**

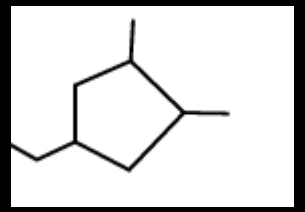
30. **Select the correct IUPAC name of the following compoun**

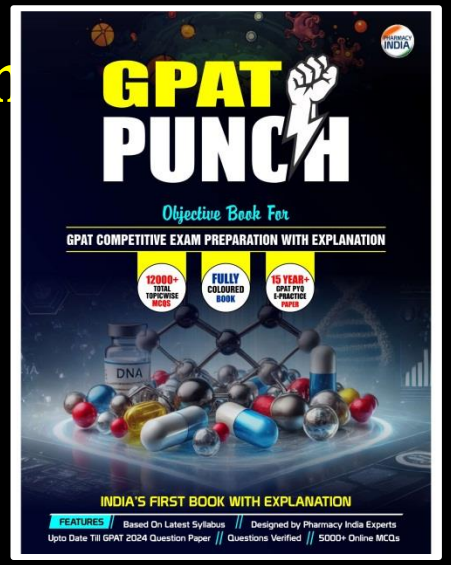
(a) 3-ethyl-1,5-dimethylcyclopentane

(b) 1-ethyl-3,4-dimethylcyclopentane

(c) 4-ethyl-1,2-dimethylcyclopentane

(d) 2-ethyl-4,5-dimethylcyclopentane





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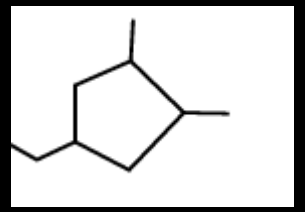


(a) 3-ethyl-1,5-dimethylcyclopentane

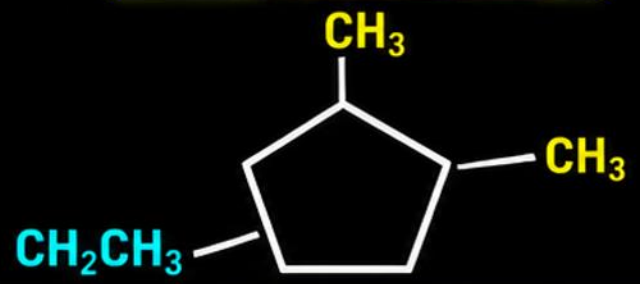
(b) 1-ethyl-3,4-dimethylcyclopentane

(c) 4-ethyl-1,2-dimethylcyclopentane

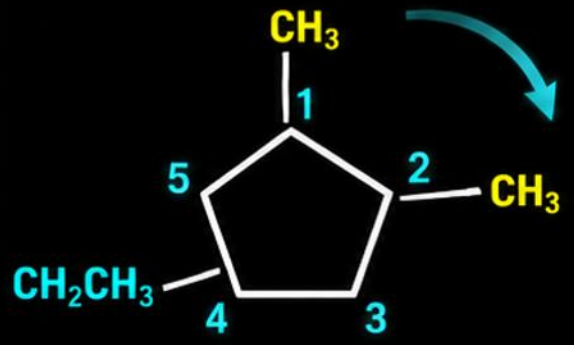
(d) 2-ethyl-4,5-dimethylcyclopentane

NUMBERING SUBSTITUTED CYCLOALKANES

Example Structure



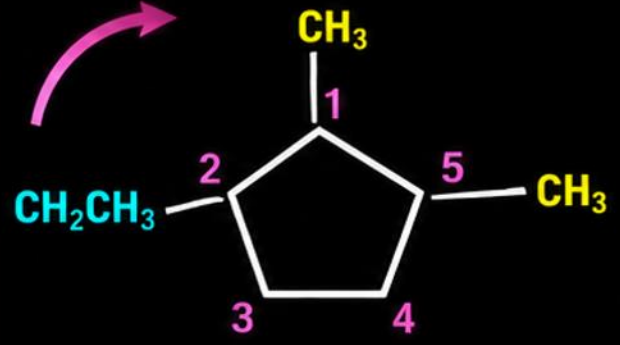
DIRECTION 1 (Clockwise)



Locant set: **1,2,4**

VS

DIRECTION 2 (Counterclockwise)



Locant set: **1,2,5**

Correct locant set: 1,2,4

1. For substituted cycloalkanes, choose the numbering with the **lowest set of locants.**
2. Compare both numbering directions before naming.
3. The preferred locant set here is **1,2,4.**
4. Substituent names are written **alphabetically** in the final name.

KEY RULE: **Lowest set** of locants outranks a convenient numbering start.

31. **The IUPAC name of the given compound is**

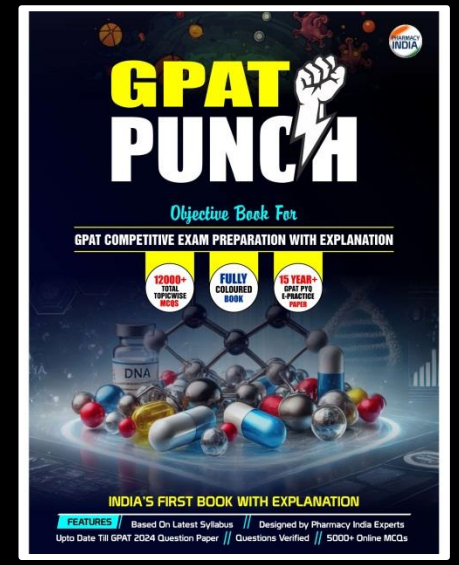
CH2=C=CH-CH3

a) but-2,3-diene

b) but-1,2-diene

c) but-1-ene-2-yne

d) conjugated butadiene



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CH2=C=CH-CH3

a) but-2,3-diene

b) but-1,2-diene

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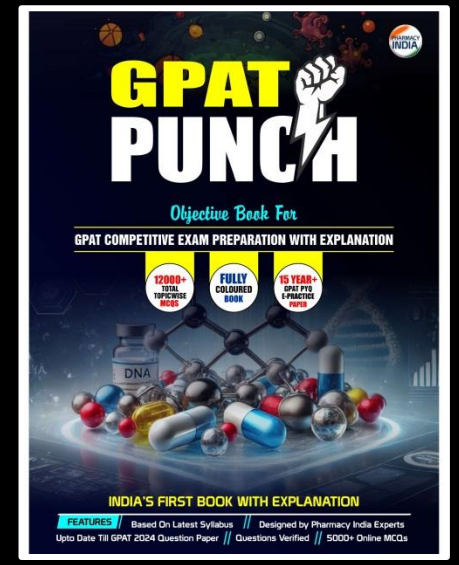
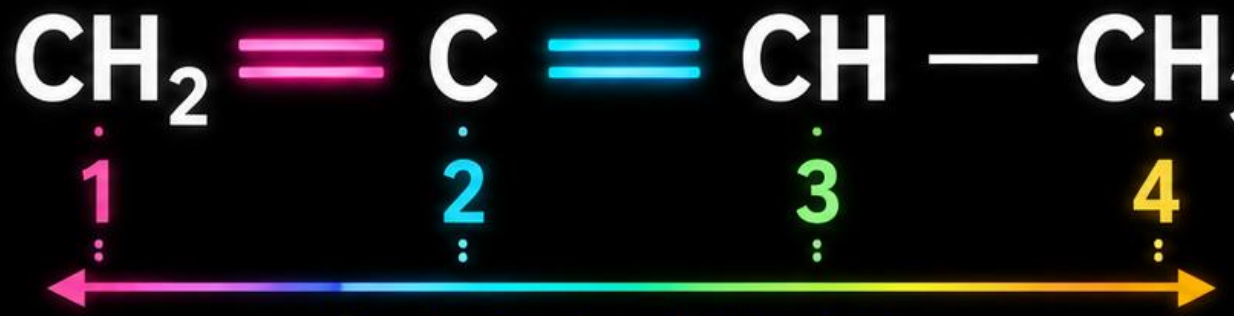
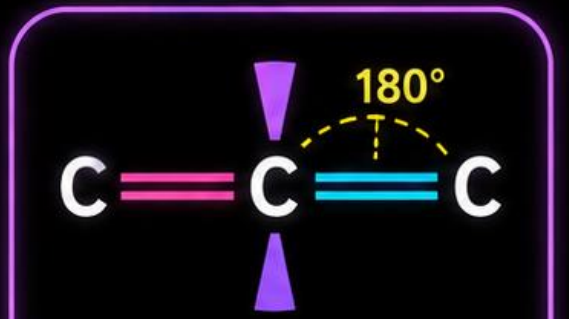
d) conjugated butadiene

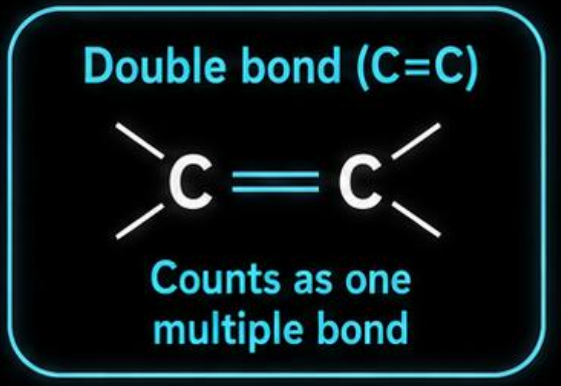


Naming a Cumulated Diene





1. Longest chain has **4** carbons → root = **but-**.
2. Two C=C bonds are present → suffix = **diene**.
3. Number from the end giving the **lowest locants**.
4. Double bonds occur at **C-1** and **C-2**.



IUPAC name: but-1,2-diene

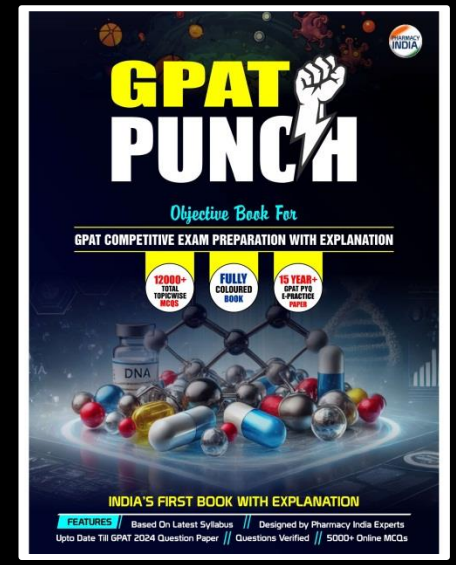
32. **The correct structure of 4-bromo-3-methyl but-1-ene is**

a) Br_CH=C (CH3)2

b) CH2 = CH- CH(CH3)__CH2 Br

c) CH2 =C(CH3) CH2 CH2Br

d) CH3__C(CH3) = CHCH2 ___Br



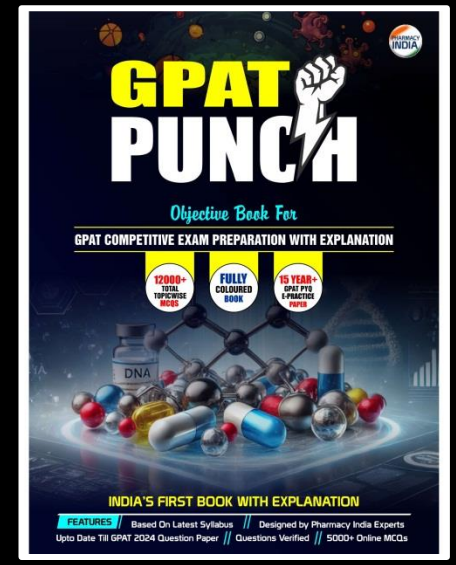
32. **The correct structure of 4-bromo-3-methyl but-1-ene is**

a) Br_CH=C (CH3)2

b) CH2 = CH- CH(CH3)__CH2 Br

c) CH2 =C(CH3) CH2 CH2Br

d) CH3__C(CH3) = CHCH2 ___Br



Naming a Haloalkene

Numbering starts from the double-bond end.

1. Parent chain has 4 carbons → root = but-.
2. Double bond gets the lowest locant → but-1-ene.
3. Methyl substituent is on C-3.
4. Bromo substituent is on C-4.

Alkene C=C — Double bond

Bromo —Br — Halo substituent

Methyl —CH3 — Branch substituent

IUPAC name: 4-bromo-3-methylbut-1-ene

33.

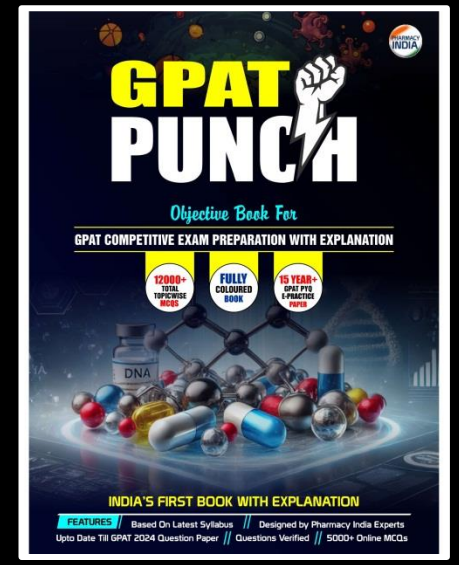
The IUPAC name of the compound is:

a) 1-chloro-1-oxo-2, 3-dimethylpentane

b) 2-ethyl-3-methylbutanoyl chloride

c) 2, 3-dimethylpentanoyl chloride

d) 3, 4-dimethyl pentanoyl chloride



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c) 2, 3-dimethylpentanoyl chloride

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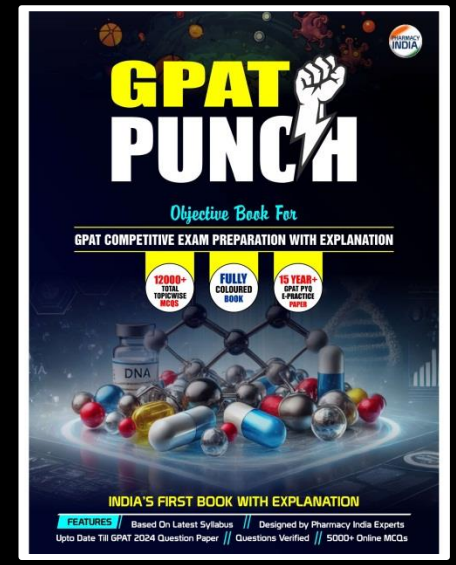
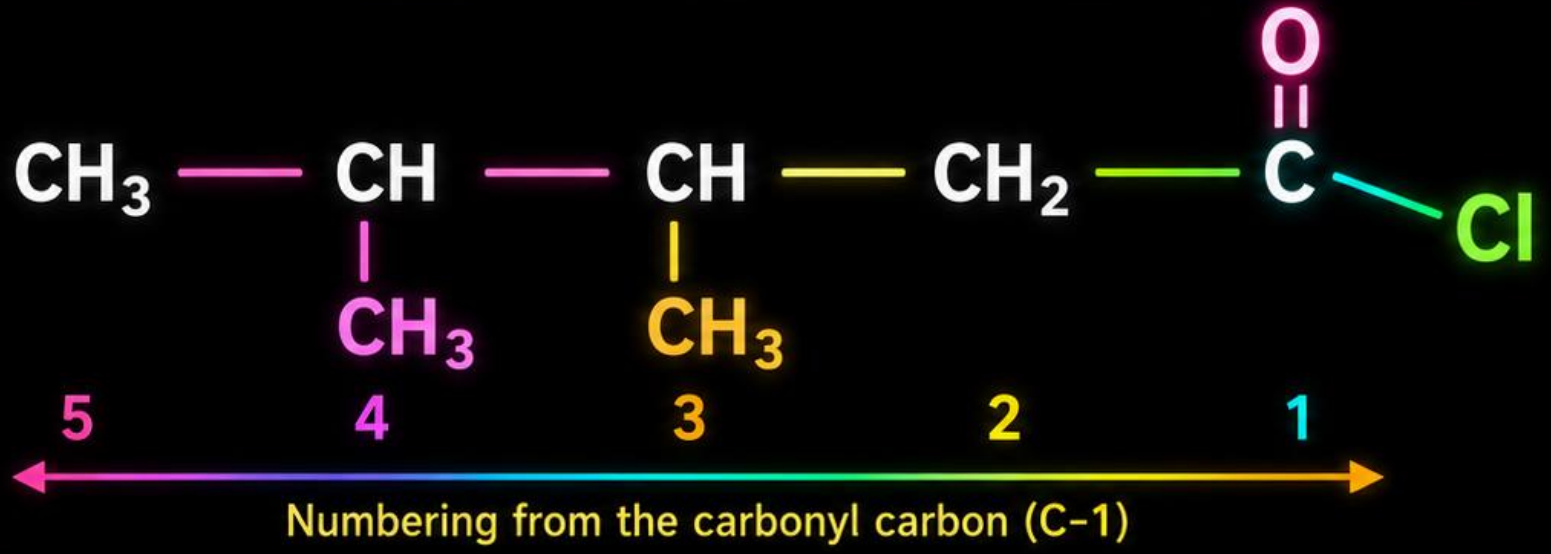


Naming an Acyl Chloride



Carbonyl
C=O of the acid chloride

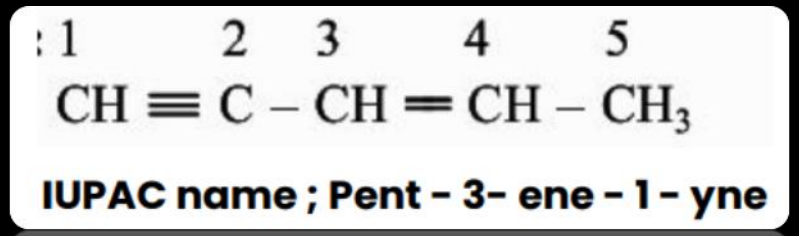
Chloride
Cl– Leaving group in acyl chloride

1. The principal functional group is an **acid chloride**.
2. Carbonyl carbon is included in the parent chain and counted as **C-1**.
3. Longest chain including the acyl carbon has **5** carbons → **pentanoyl chloride**.
4. Two methyl branches are located at **C-2** and **C-3**.

IUPAC name: 2,3-dimethylpentanoyl chloride

34.

The IUPAC name of CH C - CH CH - CH3

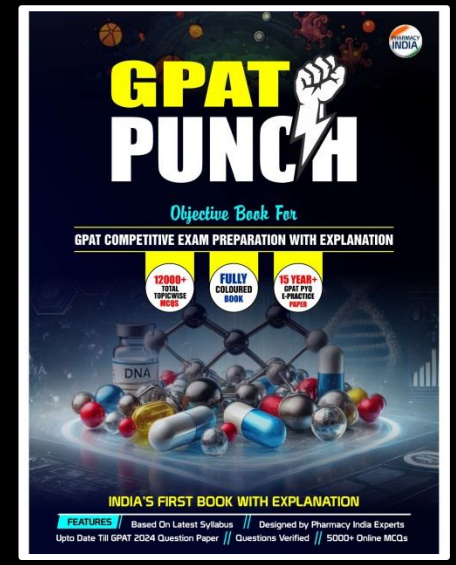


a) pent - 1 - yn - 3 ene

b) pent - 2- en - 4 yne

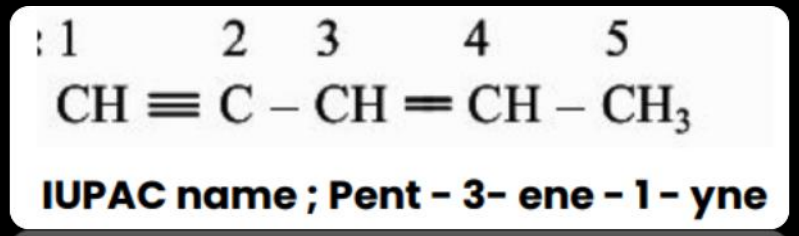
c) pent - 3- en - 1 - yne

d) 3 - en - pent - 1 yne



34.

The IUPAC name of CH C - CH CH - CH3

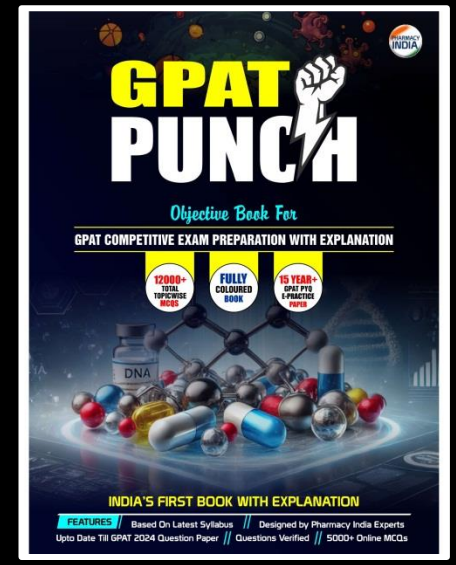


a) pent - 1 - yn - 3 ene

b) pent - 2- en - 4 yne

c) pent - 3- en - 1 - yne

d) 3 - en - pent - 1 yne



Naming an Enyne

1. Parent chain contains 5 carbons → pent-.
2. The molecule contains one double bond and one triple bond.
3. Lowest locants for multiple bonds are 1 and 3.
4. In the final name, "en" is written before "yne".

Both multiple bonds must be considered.

Double bond (C=C)

Counts as one multiple bond

Triple bond (C≡C)

Counts as two multiple bonds

IUPAC name: pent-3-en-1-yne

35.

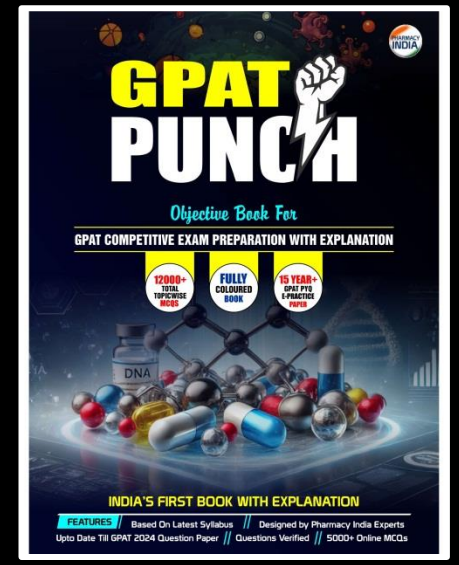
The IUPAC name of C6H5COCl is

a) benzoyl chloride

b) benzene chloro ketone

c) benzene carbonyl chloride

d) chloro phenyl ketone



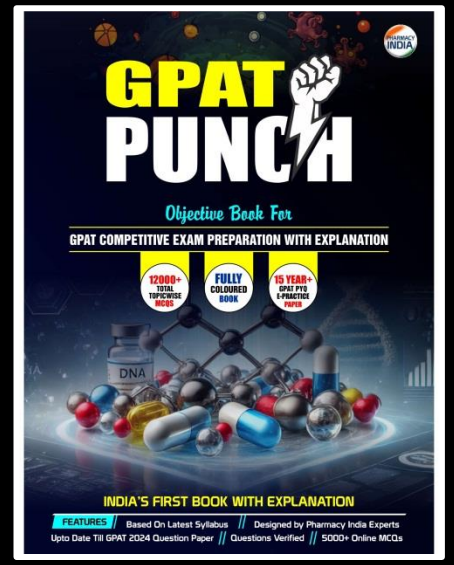
35. **The IUPAC name of C6H5COCl is**

a) benzoyl chloride

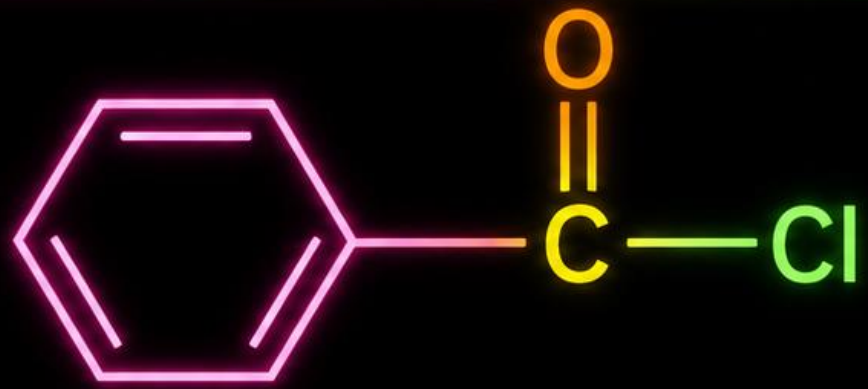
b) benzene chloro ketone

c) benzene carbonyl chloride

d) chloro phenyl ketone



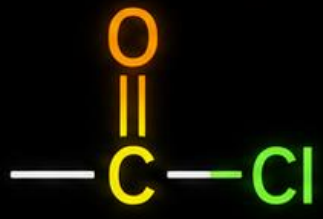
Aromatic Acid Chloride Naming



Aromatic ring

1. The molecule contains an aromatic ring attached to an acyl chloride group.
2. The functional group is written as carbonyl chloride.
3. The systematic name is based on the benzenecarbonyl unit.
4. "Benzoyl chloride" is a widely used retained/common name.

Acid chloride group



IUPAC name: benzenecarbonyl chloride

Retained name: benzoyl chloride

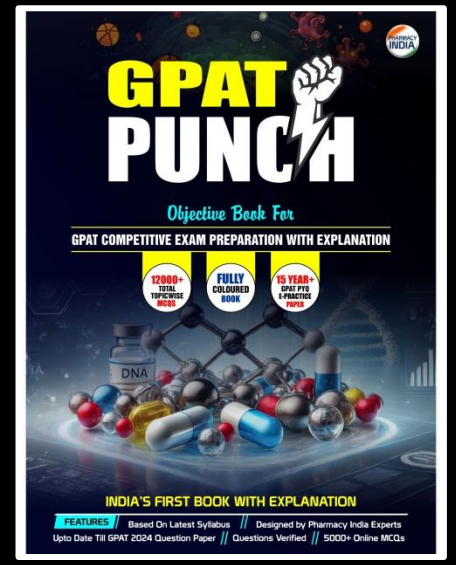
36. **The IUPAC name of the compound, CH3CH2CH=CH-COOH**

a) Pent-3-enoic acid

b) Pent-2-enoic acid

c) Hex-3-enoic acid

d) Hex-1-enoic acid



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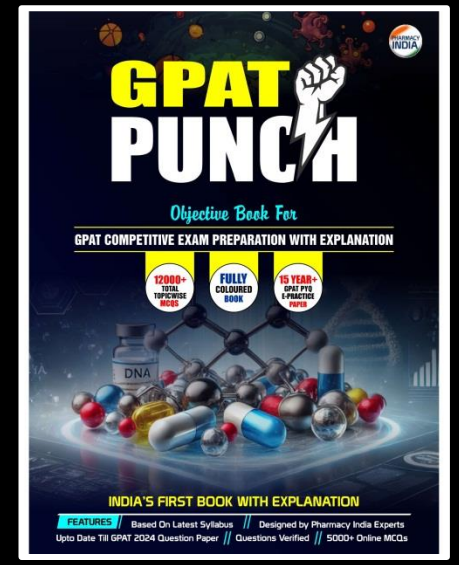
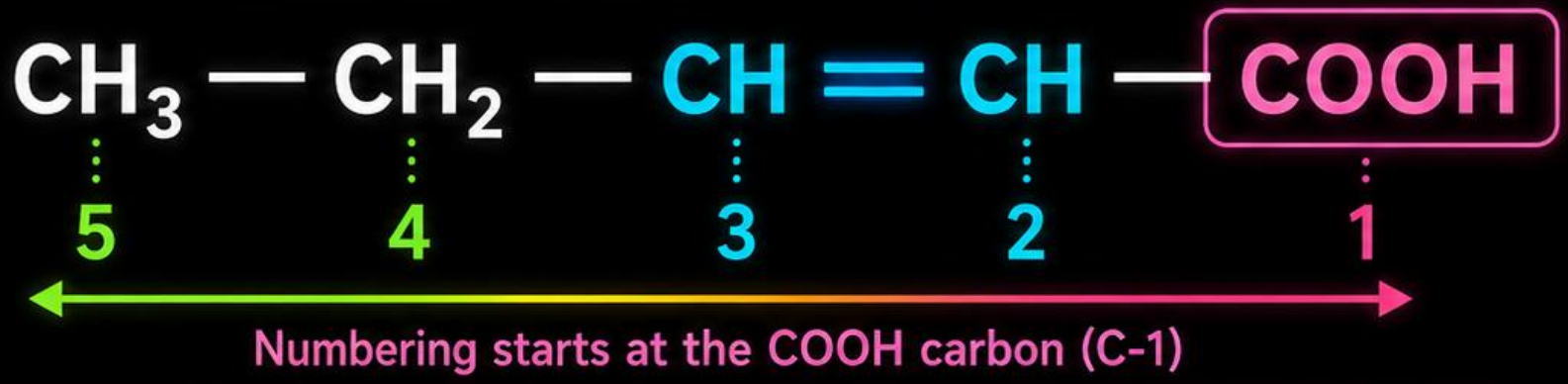
b) Pent-2-enoic acid

c) Hex-3-enoic acid

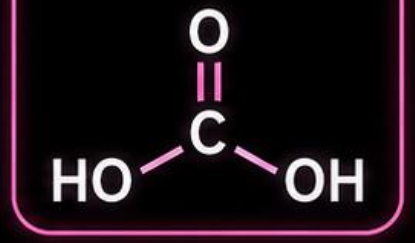
d) Hex-1-enoic acid



Naming an Unsaturated Acid



Carboxylic acid



Alkene

1. Carboxylic acid is the principal functional group, so numbering starts at the COOH carbon.
2. Total chain length is 5 carbons → pentanoic acid framework.
3. The double bond lies between C-2 and C-3.
4. Replace -anoic acid with -enoic acid for one double bond.

IUPAC name: pent-2-enoic acid

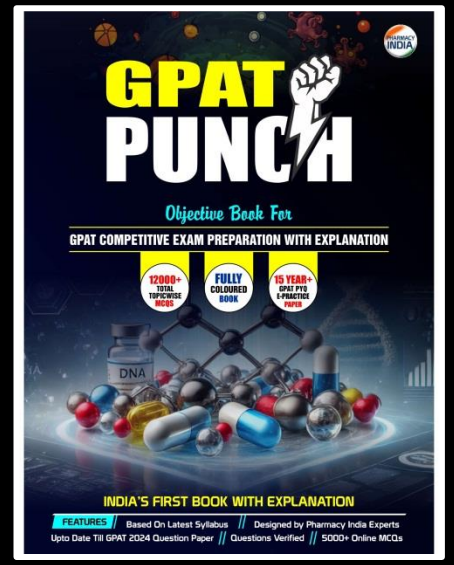
37. The correct decreasing order of priority for the functional groups of organic compounds in the IUPAC system of nomenclature is

a) _COOH , _SO3H , _CONH2 , ___CHO

b) _ SO3 H, __COOH, __CONH2 , ___CHO

c) _CHO , _COOH , _SO3H , __CONH2

d) _COHN2 , _CHO , _SO3H, _COOH



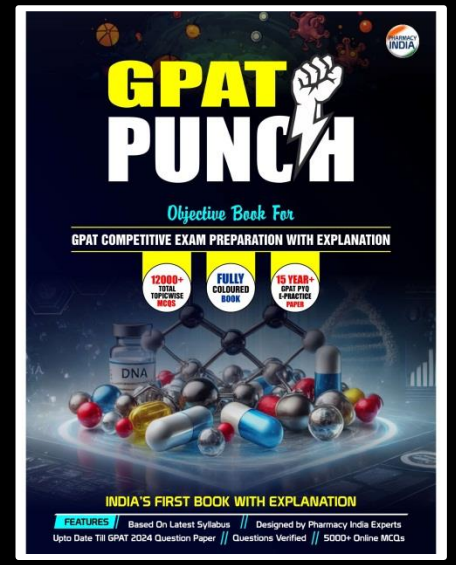
37. The correct decreasing order of priority for the functional groups of organic compounds in the IUPAC system of nomenclature is

a) _COOH , _SO3H , _CONH2 , ___CHO

b) _ SO3 H, ___COOH, ___CONH2 , ____CHO

c) _CHO , _COOH , _SO3H , ___CONH2

d) _COHN2 , _CHO , _SO3H, _COOH



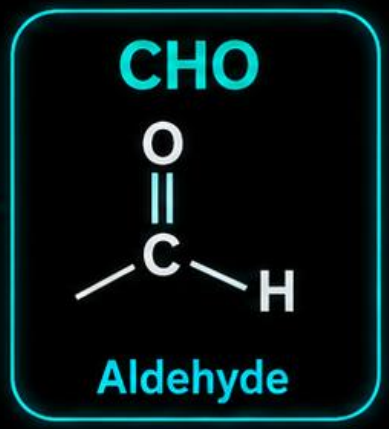
Functional Group Priority

HIGHEST PRIORITY

>

>

>



LOWEST PRIORITY

Decreasing priority

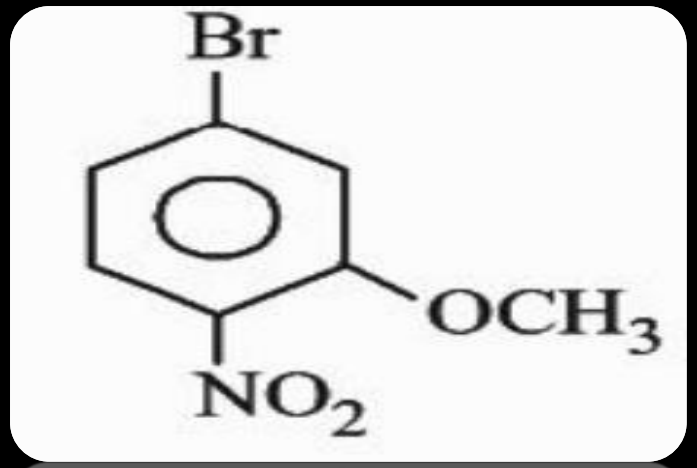
1. Higher-priority groups decide the principal suffix.
2. Carboxylic acid ranks above sulfonic acid.
3. Sulfonic acid ranks above amide.
4. Amide ranks above aldehyde.

MEMORY TIP: Suffix follows the highest-priority group.

Priority order: COOH > SO_3H > $CONH_2$ > CHO

38.

The IUPAC name of the compound is:

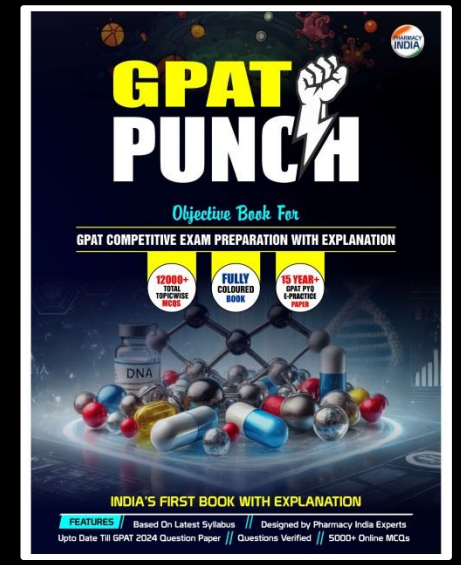


a) 2-methoxy-4-bromonitrobenzene

b) 3-bromo-6-nitro-1-methoxybenzene

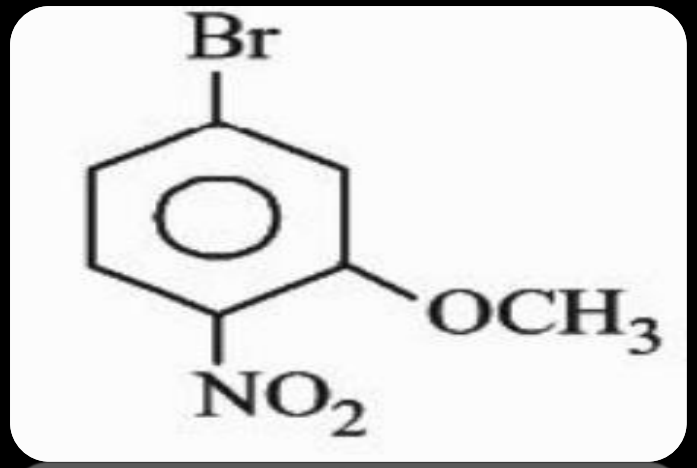
c) 3-methoxy-4-nitrobromobenzene D

d) 5-bromo-2-nitro-1-methoxybenzene



38.

The IUPAC name of the compound is:

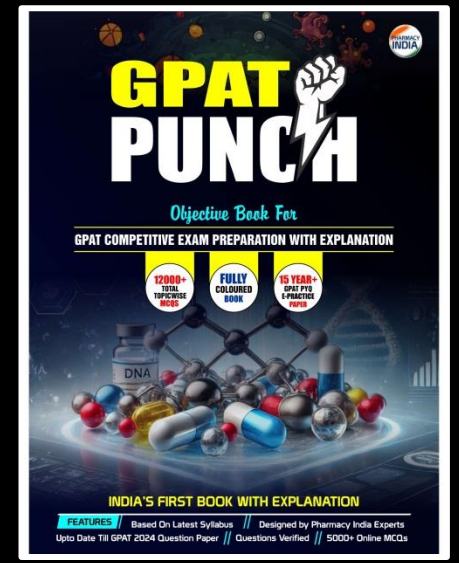


a) 2-methoxy-4-bromonitrobenzene

b) 3-bromo-6-nitro-1-methoxybenzene

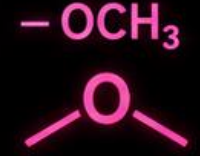
c) 3-methoxy-4-nitrobromobenzene D

d) 5-bromo-2-nitro-1-methoxybenzene



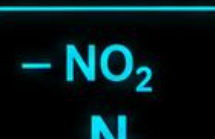
Trisubstituted Benzene Naming

– OCH_3



methoxy

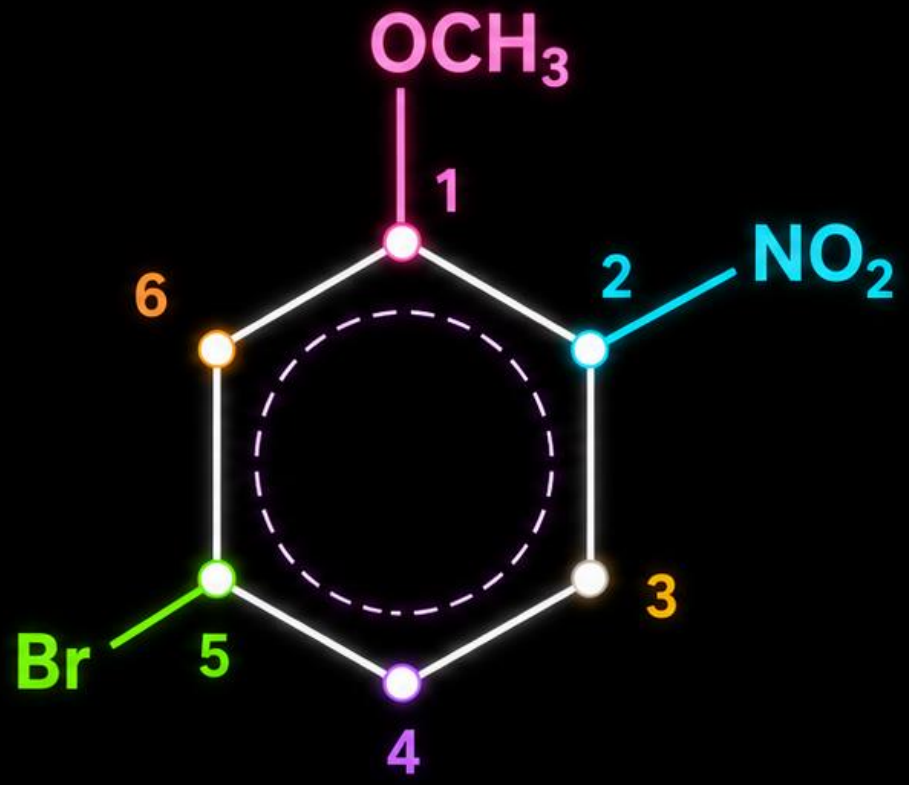
– NO_2



nitro

– Br

bromo



1. Benzene ring is the parent structure.

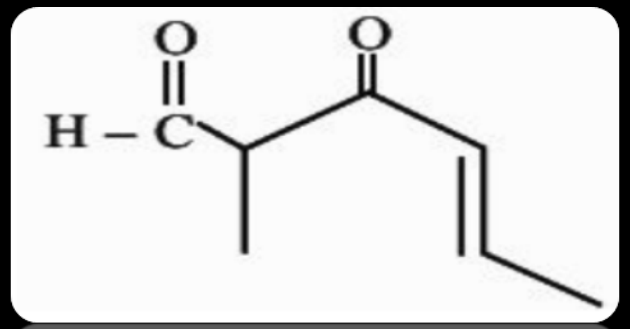
2. Number the ring to give the lowest set of locants: 1,2,5.

3. Substituents present are methoxy, nitro, and bromo. (OCH_3) (NO_2) (Br)

4. The structure corresponds to a 1-methoxy, 2-nitro, 5-bromo substitution pattern.

★ **IUPAC name: 5-bromo-2-nitro-1-methoxybenzene**

39. **The IUPAC name of the compound is:**

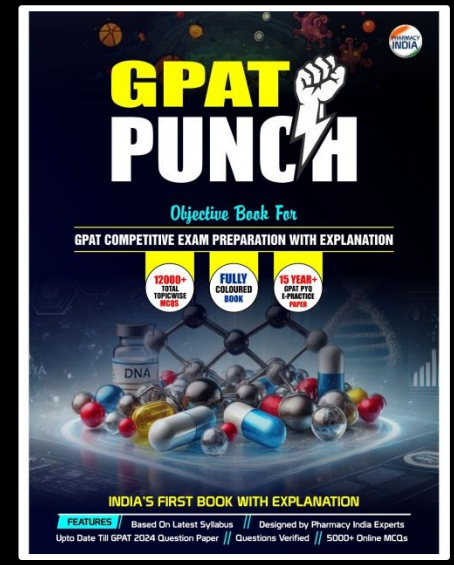


a) 5-formylhex-2-en-3-one

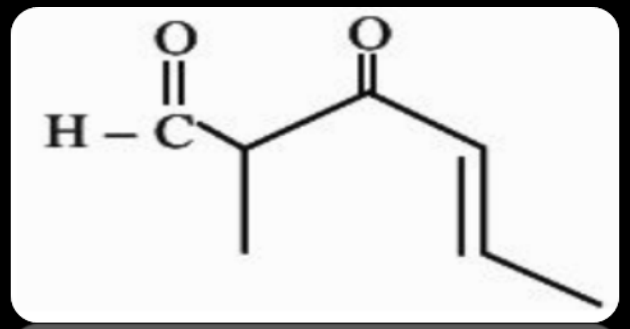
b) 5-methyl-4-oxohex-2-en-5-al

c) 3-keto-2-methylhex-5-enal

d) 3-keto-2-methylhex-4-enal



39. **The IUPAC name of the compound is:**

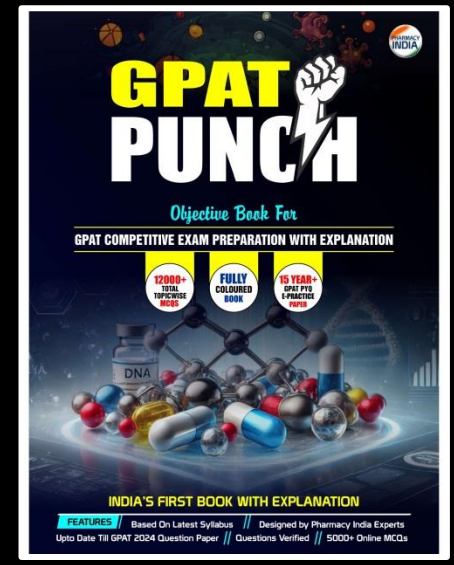


a) 5-formylhex-2-en-3-one

b) 5-methyl-4-oxohex-2-en-5-al

c) 3-keto-2-methylhex-5-enal

d) 3-keto-2-methylhex-4-enal



Naming a Multifunctional Aldehyde

1. Aldehyde is the highest-priority group, so it gives the suffix **-al** and must be **C-1**.
2. The longest chain has **6** carbons → **hex-enal** framework.
3. The internal ketone is named as an **oxo** (or **keto**) substituent at **C-3**.
4. The chain also has a **methyl** group at **C-2** and a **double bond** at **C-4**.

Functional Groups

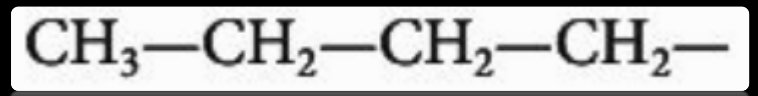
- Aldehyde —CHO
- Oxo (Keto) —CO—
- Alkene C=C

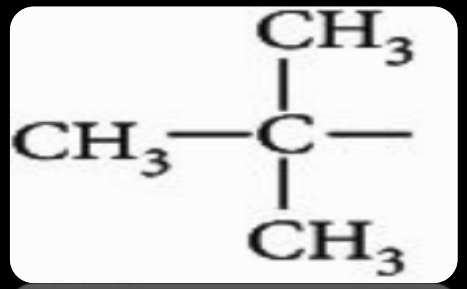
Preferred name: 3-oxo-2-methylhex-4-enal

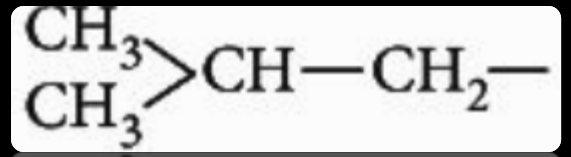
Exam style: 3-keto-2-methylhex-4-enal

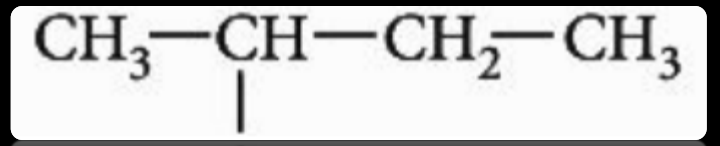
40

The structure of isobutyl group in an organic compound is

a) 

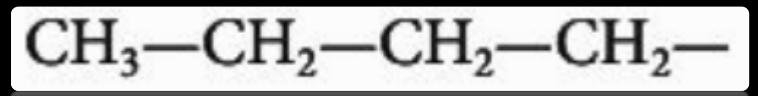
b) 

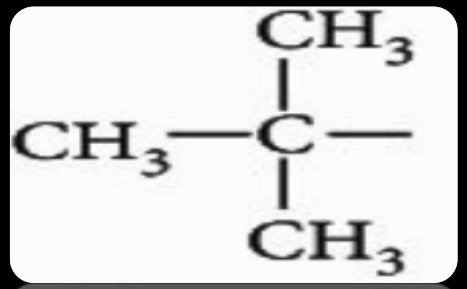
c) 

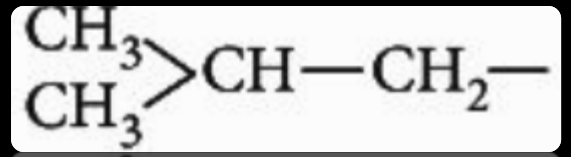
d) 

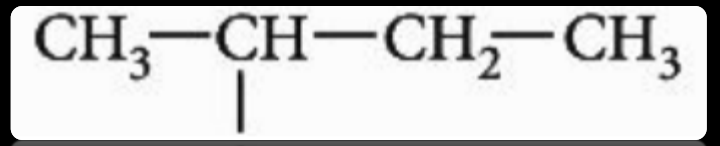
40

The structure of isobutyl group in an organic compound is

a) 

b) 

c) 

d) 

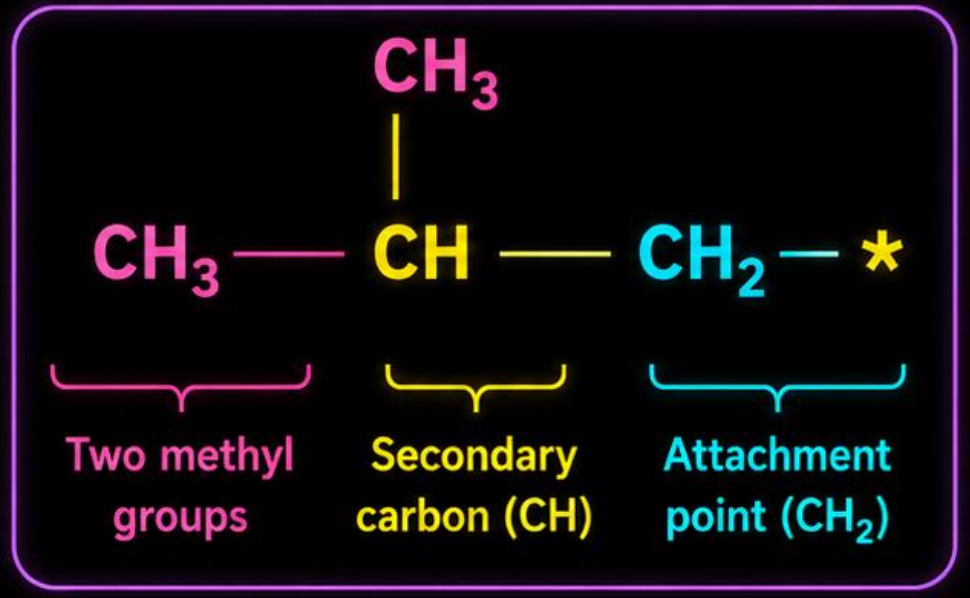
The Isobutyl Group

$$(CH_3)_2CH-CH_2-*$$

Attachment point
(on the CH_2 group)

Same as
2-methylpropyl

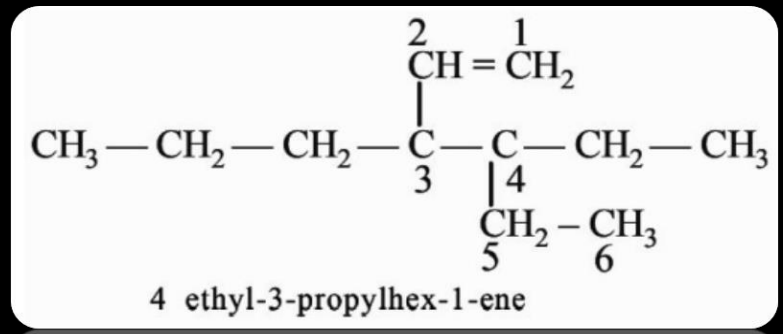
1. Isobutyl is a 4-carbon alkyl substituent.
2. It is obtained from isobutane by removing one H from a terminal CH_2 carbon.
3. The attachment point is on the CH_2 group, not on the branched carbon.
4. Its systematic substituent name is 2-methylpropyl.



Isobutyl group = $(CH_3)_2CH-CH_2-$

Systematic name:
2-methylpropyl

41. **The correct IUPAC name of the compound**

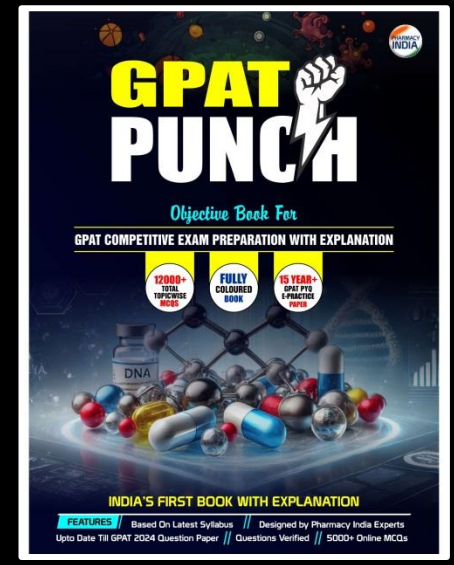


a) 4-ethyl -3- propyl hex -1-ene

b) 3-Ethyl-4-ethenyl heptane

c) 3-Ethyl-4-propyl hex-1-ene

d) 3-(1-ethylpropyl) hex-1-ene



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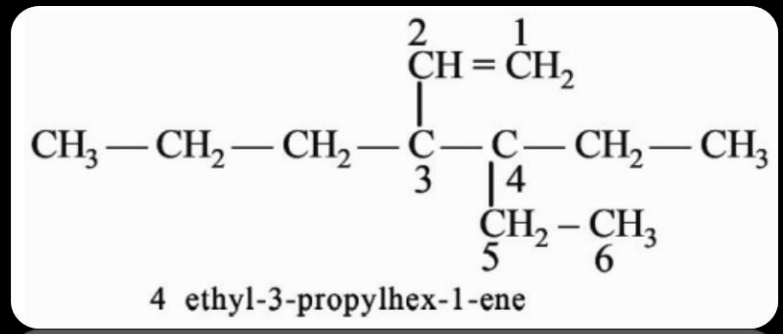
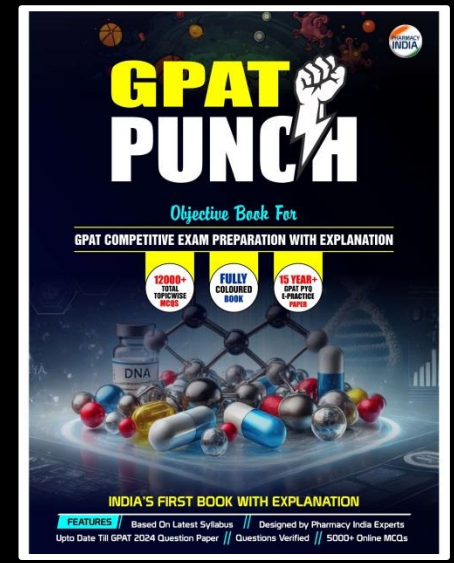


a) 4-ethyl -3- propyl hex -1-ene

b) 3-Ethyl-4-ethenyl heptane

c) 3-Ethyl-4-propyl hex-1-ene

d) 3-(1-ethylpropyl) hex-1-ene



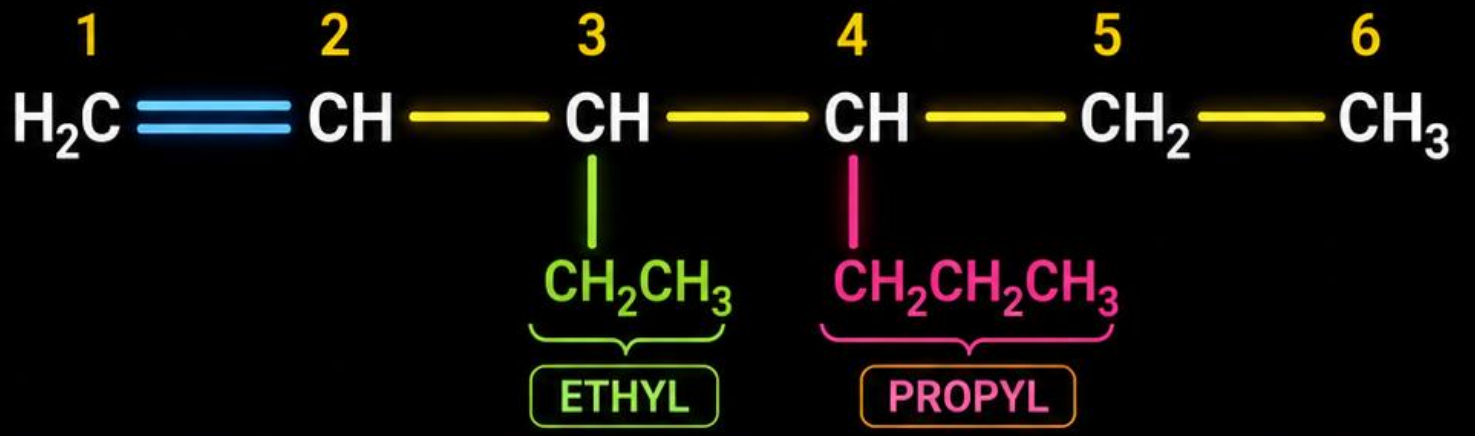
NAMING A BRANCHED ALKENE

Parent chain (6 carbons)

Double bond (locant 1)

Ethyl group at C3

Propyl group at C4



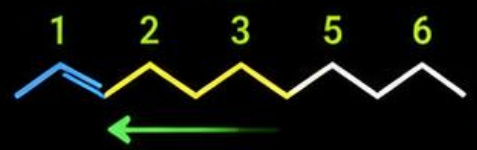
Double bond gets the lowest possible locant.

1

Choose the longest chain containing the C=C bond.

Here: 6 carbons (hex-)

2



Number from the end nearest the double bond.

Double bond gets locant 1.

3

Identify substituents:

- C3 → Ethyl ($-CH_2CH_3$)
- C4 → Propyl ($-CH_2CH_2CH_3$)

4

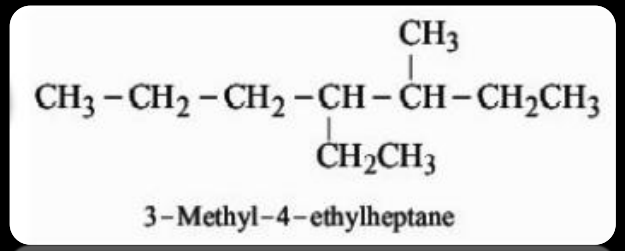
Write substituents in alphabetical order (ignoring di, tri, etc.).

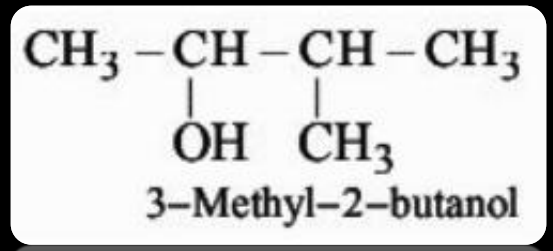
Ethyl (E) before Propyl (P).

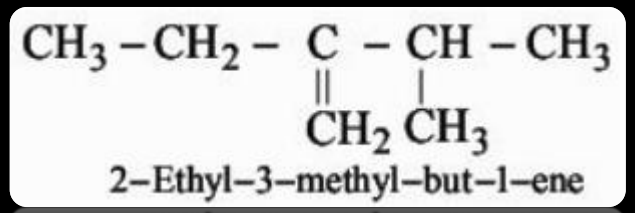
DERIVED IUPAC NAME

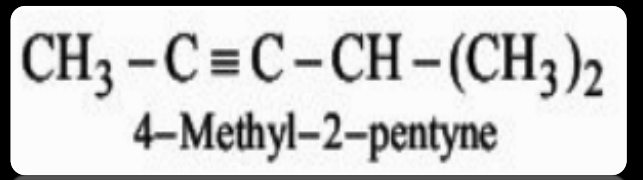
3-ethyl-4-propylhex-1-ene

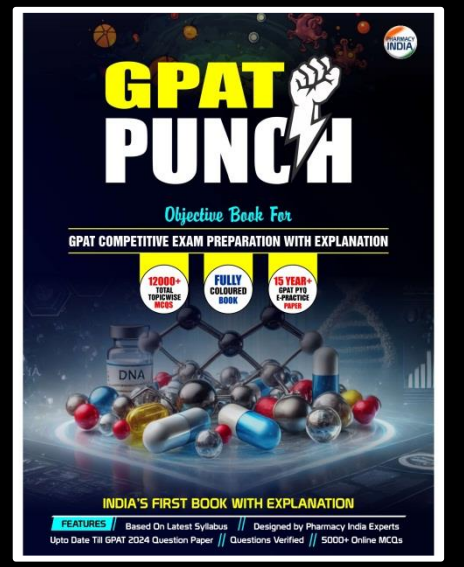
42. **Name of some compounds are given. Which one is not correct in IUPAC system?**

(a) 

(b) 

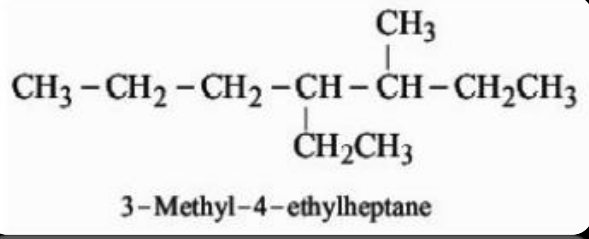
(c) 

(d) 

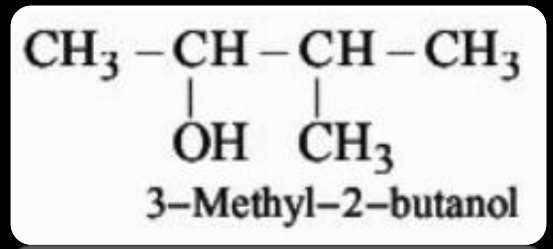


42. **Name of some compounds are given. Which one is not correct in IUPAC system?**

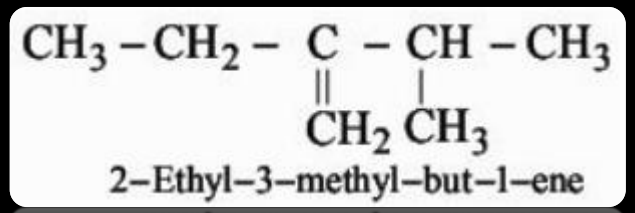
(a)



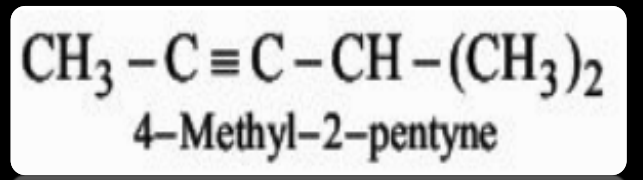
(b)

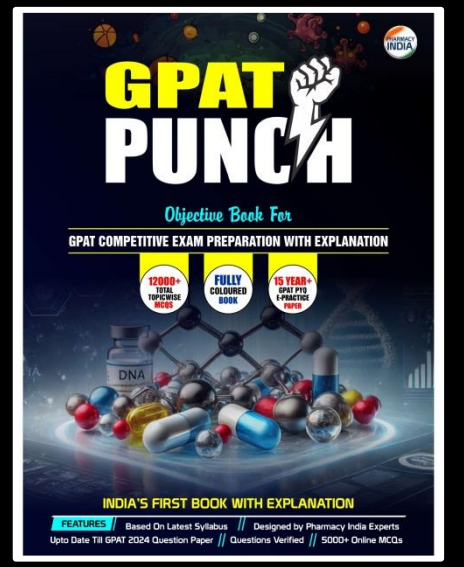


(c)



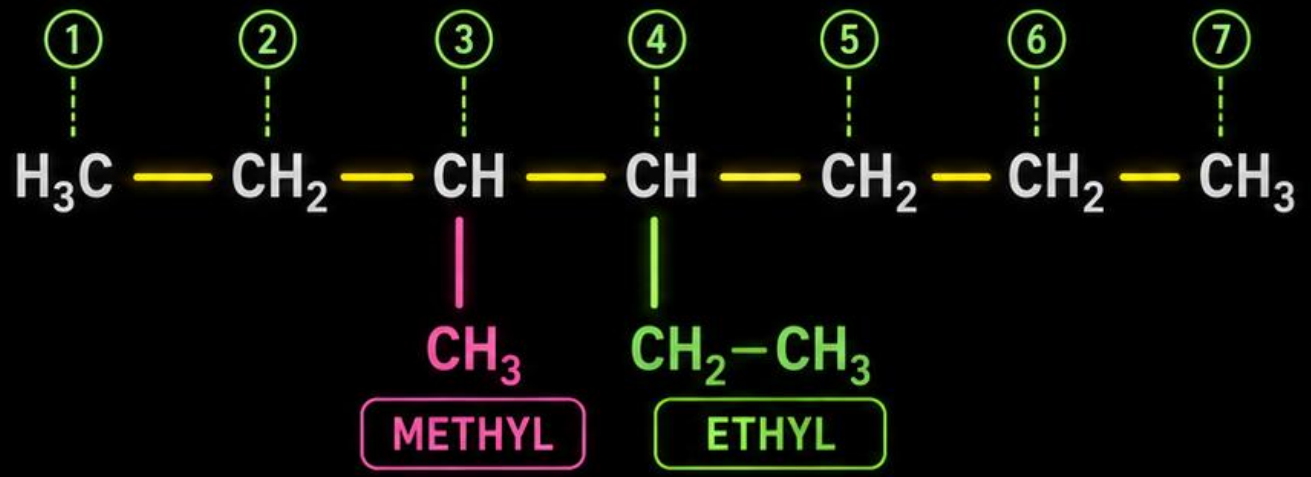
(d)





ALPHABETICAL ORDER OF SUBSTITUENTS

STRUCTURE: 4-ETHYL-3-METHYLHEPTANE



Parent chain = 7 carbons → **HEPTANE**

1. Longest chain selected = **heptane**.
2. Number the chain to get the lowest locants: **3 and 4**.
3. In the final name, substituents are written **alphabetically**.
4. Therefore, write **ethyl** before **methyl**.

SUBSTITUENTS PRESENT

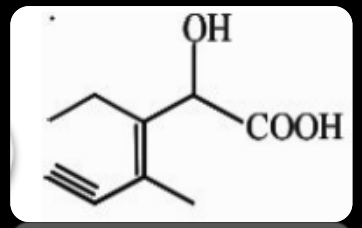
- Ethyl ($-CH_2CH_3$) Starts with **E**
- Methyl ($-CH_3$) Starts with **M**

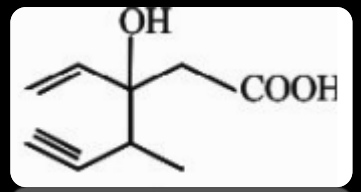
E < M →

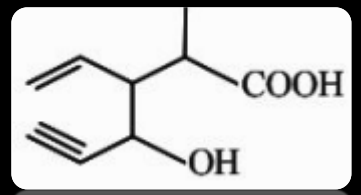
PREFERRED FORM:

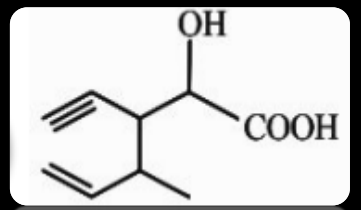
4-ethyl-3-methylheptane

43. **Structure of the compound whose IUPAC name is 3 - ethyl - 2 -hydroxy- 4- methylhex - 3- en- 5- ynoic acid is :**

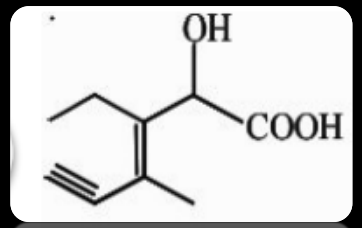
(a) 

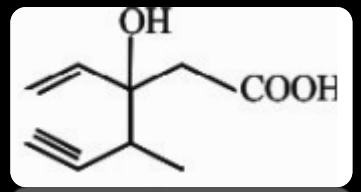
(b) 

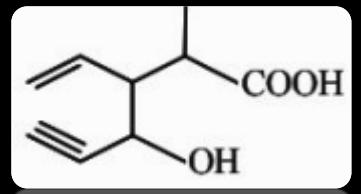
(c) 

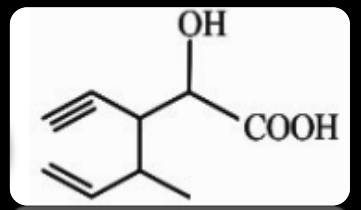
(d) 

43. **Structure of the compound whose IUPAC name is 3 - ethyl - 2 -hydroxy- 4- methylhex - 3- en- 5- ynoic acid is :**

(a) 

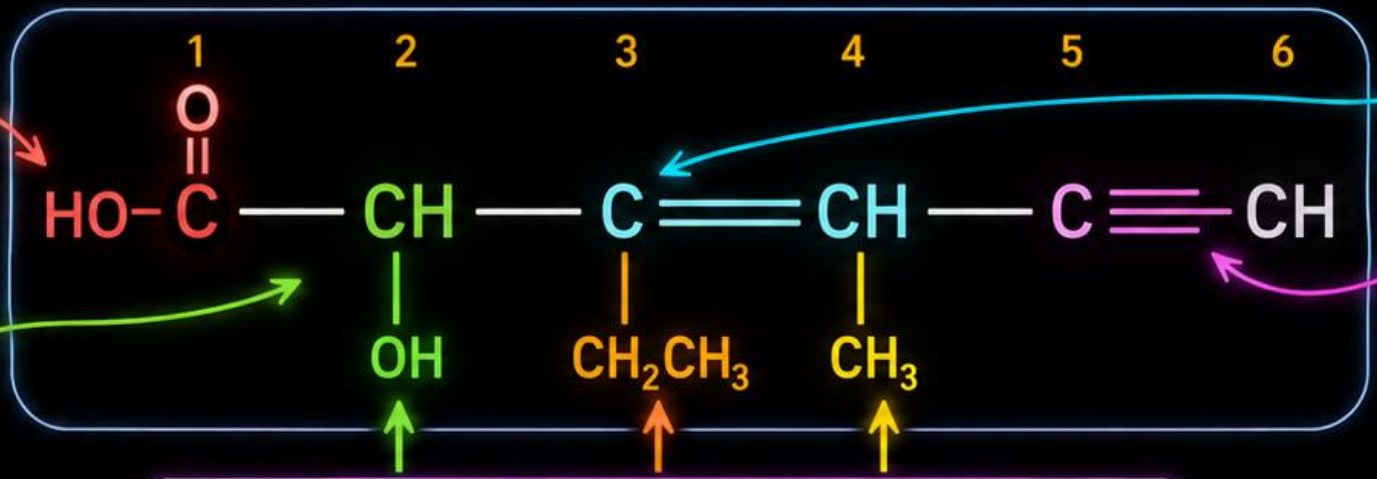
(b) 

(c) 

(d) 

Reading a Complex IUPAC Name

Carboxylic acid	Hydroxy	Double bond	Triple bond	Methyl	Ethyl
$-C(=O)OH$	$-OH$	$C=C$	$C\equiv C$	$-CH_3$	$-CH_2CH_3$



1) Carboxylic acid is the principal functional group, so its carbon is **C1**.

2) Parent chain has **6** carbons → **hexanoic acid** framework.

3) Double bond at **C3** and **triple** bond at **C5** → **hex-3-en-5-ynoic acid**.

4) Substituents on the parent chain:

- **Hydroxy at C2** — $-OH$
- **Ethyl at C3** — $-CH_2CH_3$
- **Methyl at C4** — $-CH_3$

Number from the carboxyl carbon. Use lowest locants for multiple bonds, then substituents.

SYSTEMATIC NAME

3-ethyl-2-hydroxy-4-methylhex-3-en-5-ynoic acid

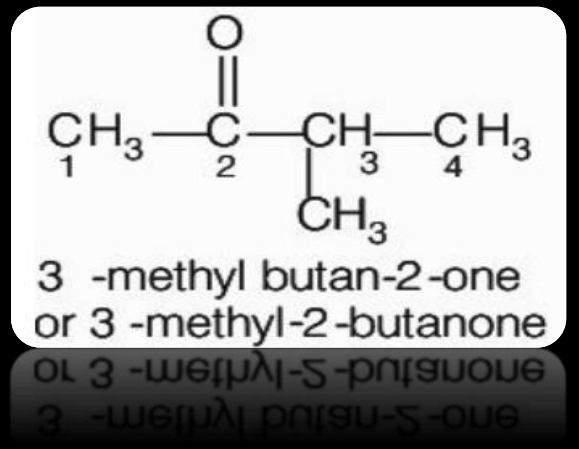
44. **The IUPAC name of CH3COCH(CH3)2 is**

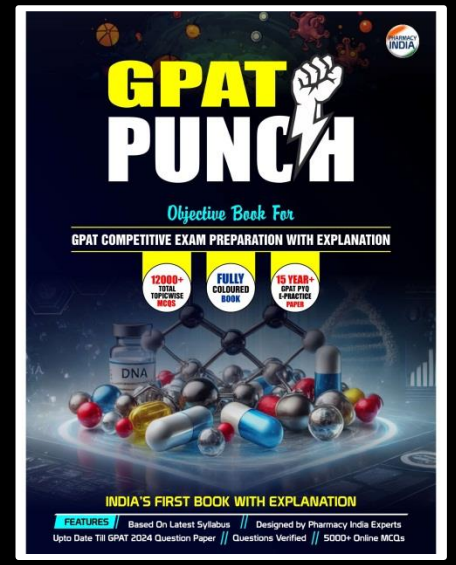
a) isopropylmethyl ketone

b) 2-methyl-3-butanone

c) 4-methylisopropyl ketone

d) 3-methyl-2-butanone





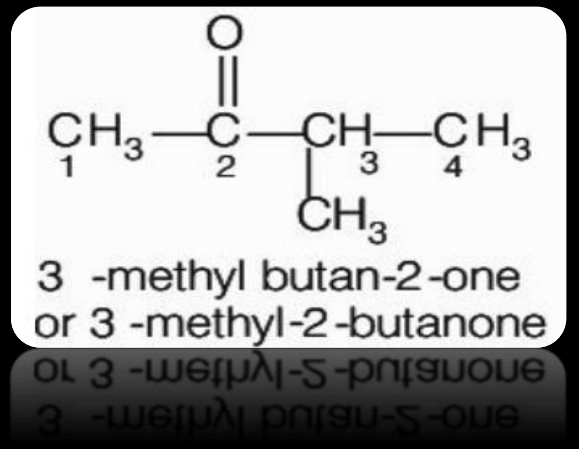
44. **The IUPAC name of CH3COCH(CH3)2 is**

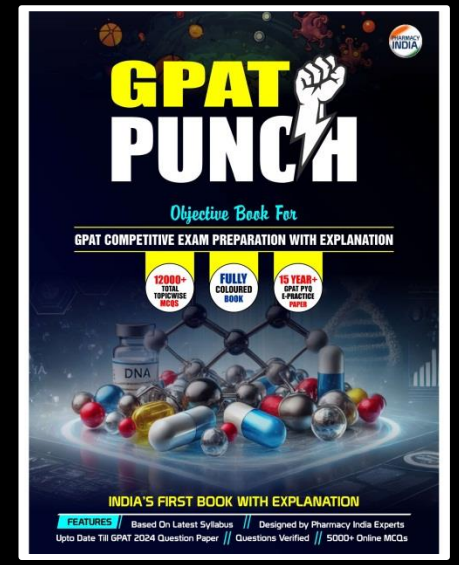
a) isopropylmethyl ketone

b) 2-methyl-3-butanone

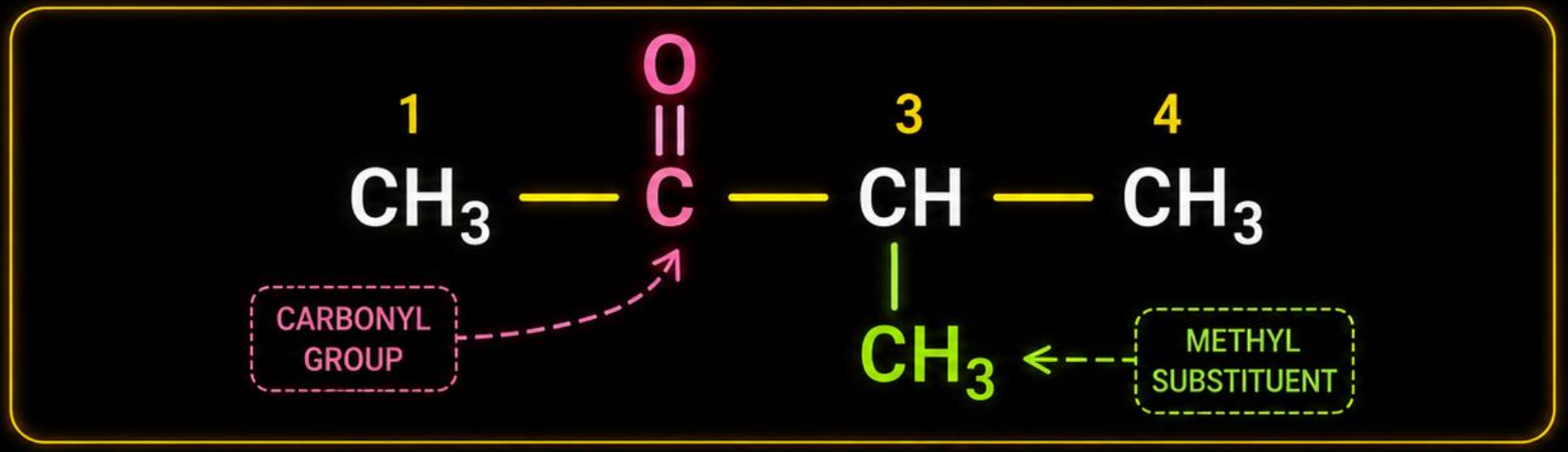
c) 4-methylisopropyl ketone

d) 3-methyl-2-butanone





KETONE NAMING LOGIC



1 Longest chain containing C=O has **4** carbons → **butanone**.

2 Number from the end **nearest** the **carbonyl group**.

3 Carbonyl gets locant **2**.

4 Methyl substituent is on **C3**.

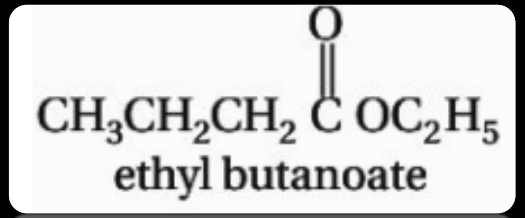
DERIVED NAME:

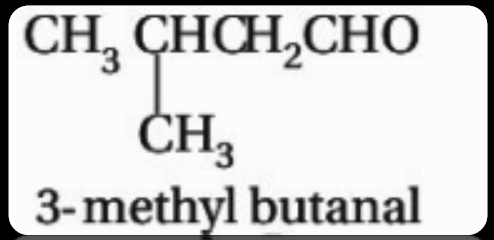
3-methylbutan-2-one

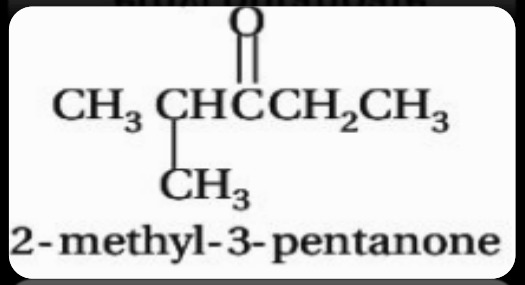
Common exam style:
3-methyl-2-butanone

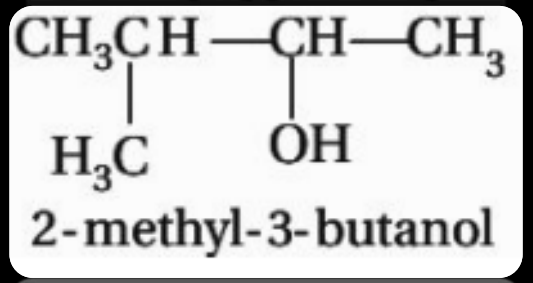
45.

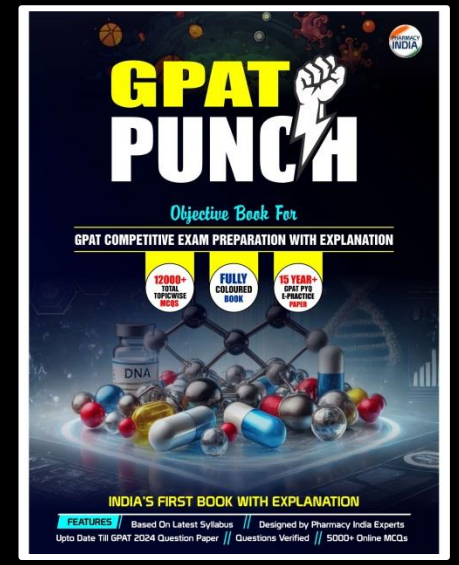
The incorrect IUPAC name is

(a) 

(b) 

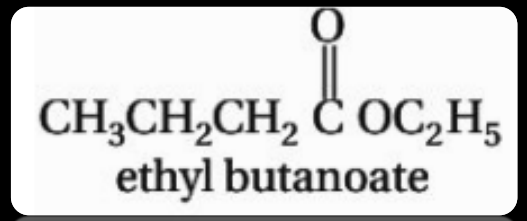
(c) 

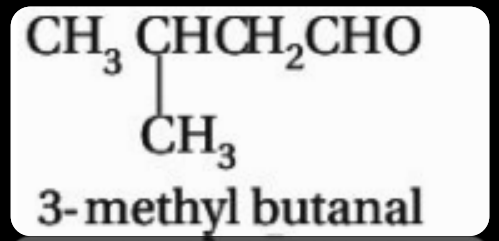
(d) 

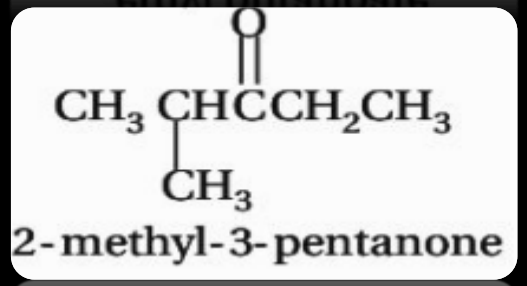


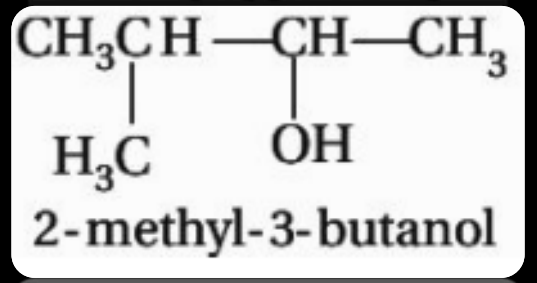
45.

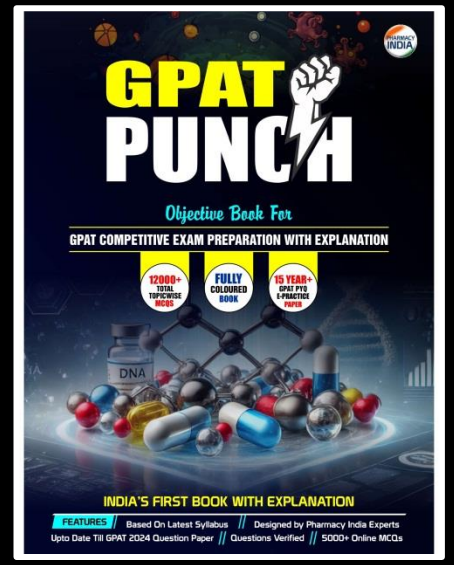
The incorrect IUPAC name is

(a) 

(b) 

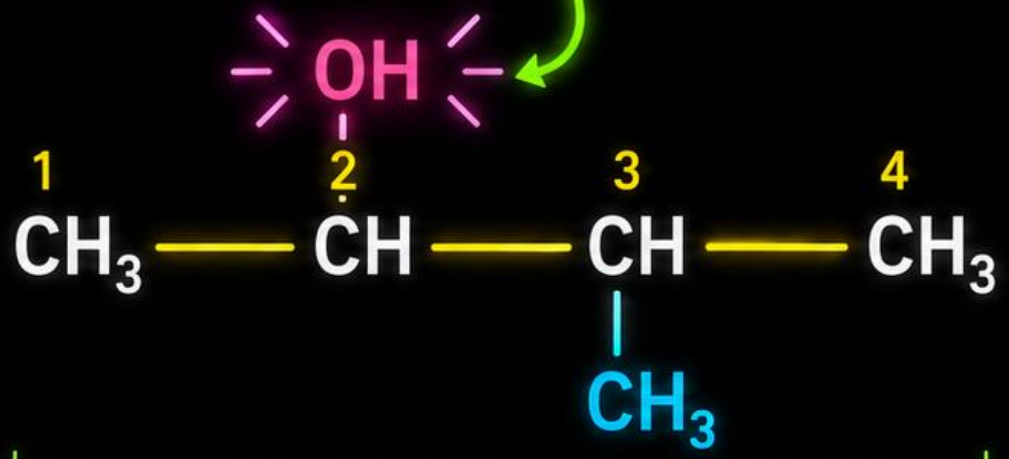
(c) 

(d) 



Alcohol Gets the Lowest Number

OH gets the lowest number



Parent chain (4 carbons) = butane

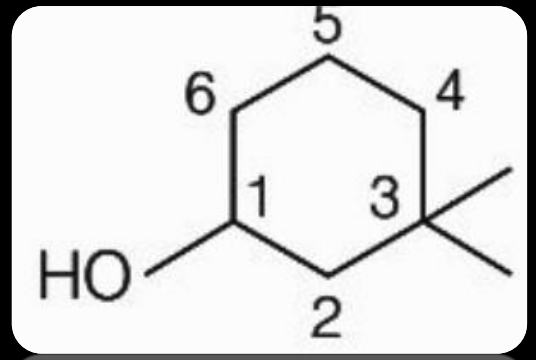
1. In alcohols, the OH group has naming priority over alkyl substituents.
2. Choose the numbering that gives OH the lowest locant.
3. Parent chain = butane (4 carbons in the longest chain).
4. CH_3 Substituent = methyl at C3.

Preferred systematic name:

3-methylbutan-2-ol

Avoid the non-preferred form **2-methyl-3-butanol.**

46. **The IUPAC name of the following compound is**

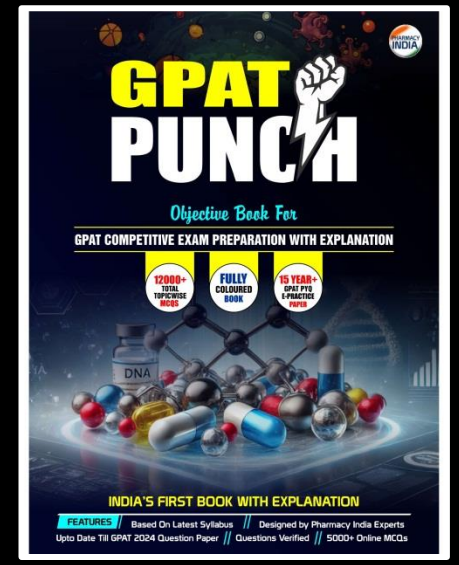


a) 3, 3-dimethyl-1-hydroxy cyclohexane

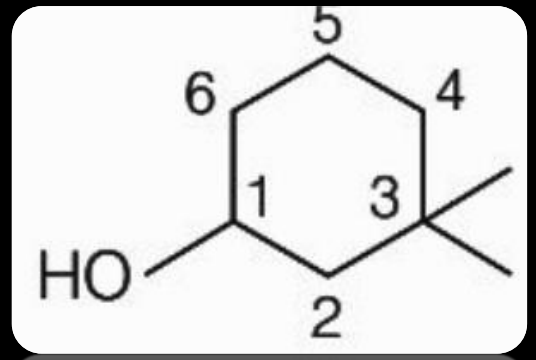
b) 1, 1-dimethyl-3-hydroxy cyclohexane

c) 3,3-dimethyl-1-cyclohexanol

d) 1, 1-dimethyl-3-cyclohexanol



46. **The IUPAC name of the following compound is**

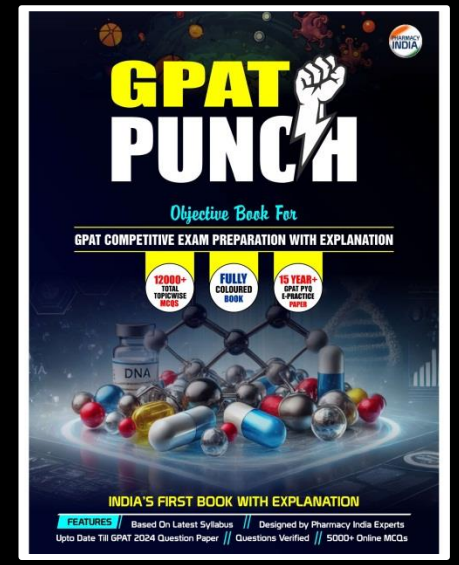


a) 3, 3-dimethyl-1-hydroxy cyclohexane

b) 1, 1-dimethyl-3-hydroxy cyclohexane

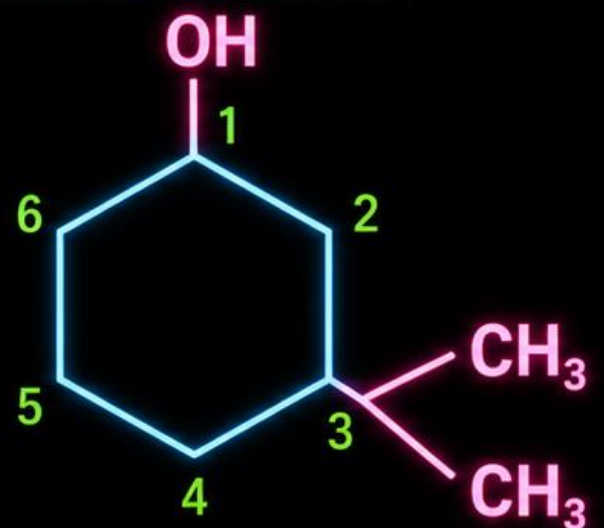
c) 3,3-dimethyl-1-cyclohexanol

d) 1, 1-dimethyl-3-cyclohexanol



NAMING A CYCLOALKANOL

Cyclohexane ring



OH on C1; two methyl groups on C3 (gem-dimethyl)

1. In cyclic alcohols, the carbon bearing **OH** is carbon **1**.
2. Number the ring to give the substituents the **lowest locants**.
3. Two methyl groups are on C3 → **3,3-dimethyl**.

4. The suffix is **-ol**.

Preferred name: **3,3-dimethylcyclohexan-1-ol**

Note: Older exam wording may appear as "3,3-dimethyl-1-cyclohexanol"

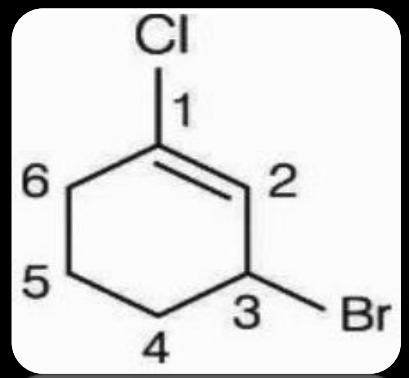
47. **The IUPAC name of the following compound is**

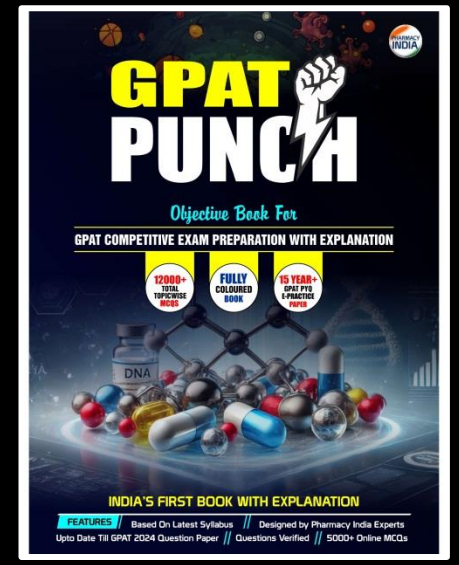
a) 2-bromo-6-chlorocyclohex-1-ene

b) 6-bromo-2-chlorocyclohexene

c) 3-bromo-1-chlorocyclohexene

d) 1-bromo-3-chlorocyclohexene





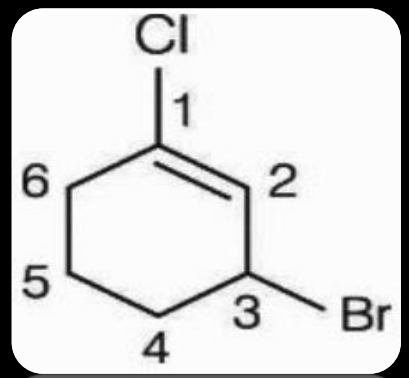
47. **The IUPAC name of the following compound is**

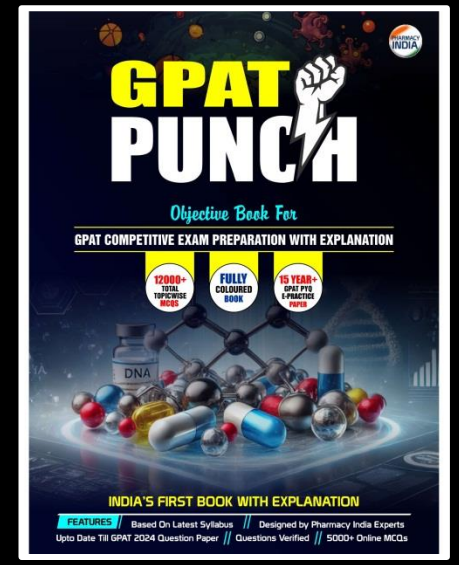
a) 2-bromo-6-chlorocyclohex-1-ene

b) 6-bromo-2-chlorocyclohexene

c) 3-bromo-1-chlorocyclohexene

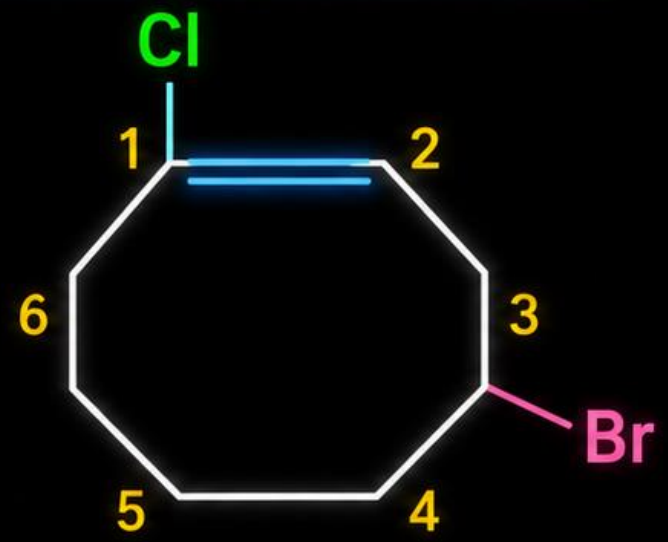
d) 1-bromo-3-chlorocyclohexene





Cyclohexene Numbering Rule

Cyclohex-1-ene



Double bond (between C1 and C2)
Cl = Chloro substituent on C1
Br = Bromo substituent on C3

1. The double bond in cycloalkenes must receive locants **1 and 2**.
2. Choose the direction that gives the substituents the **lowest set of locants**.
3. Here the substituent locants become **1-chloro** and **3-bromo**.
4. A→Z Write substituents **alphabetically** in the name.

Preferred name:

3-bromo-1-chlorocyclohex-1-ene

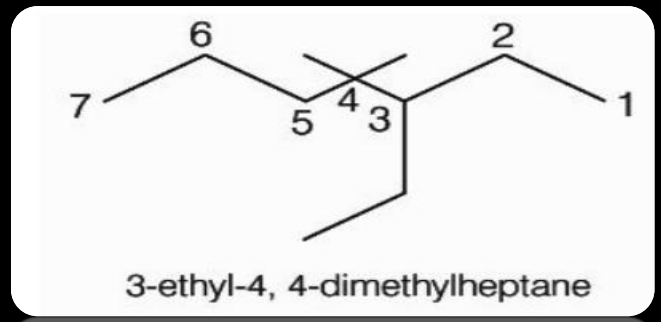
48. **The IUPAC name of the following compound is**

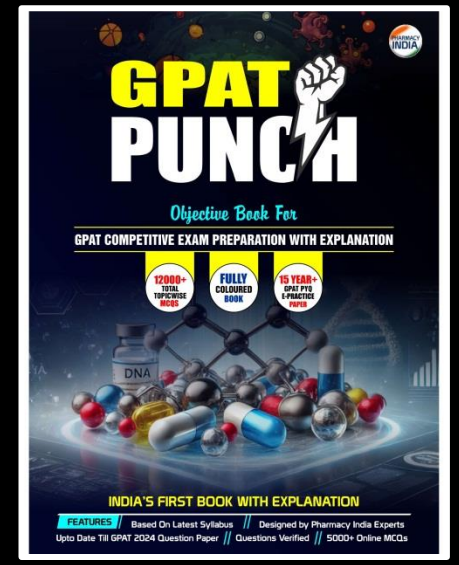
a) 1, 1-diethyl-2,2-dimethylpentane

b) 4, 4-dimethyl-5,5-diethylpentane

c) 5, 5-diethyl-4,4-dimethylpentane

d) 3-ethyl-4, 4-dimethylheptane





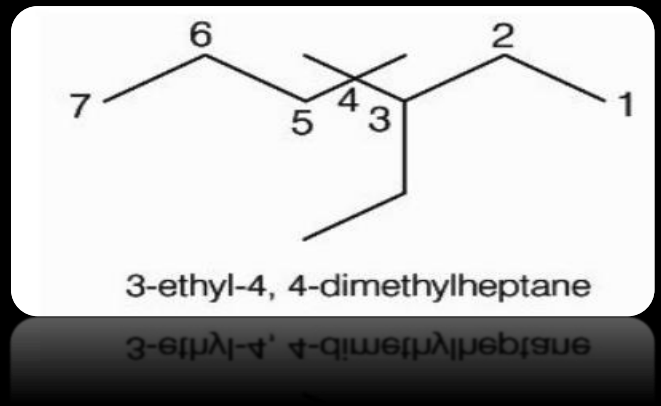
48. **The IUPAC name of the following compound is**

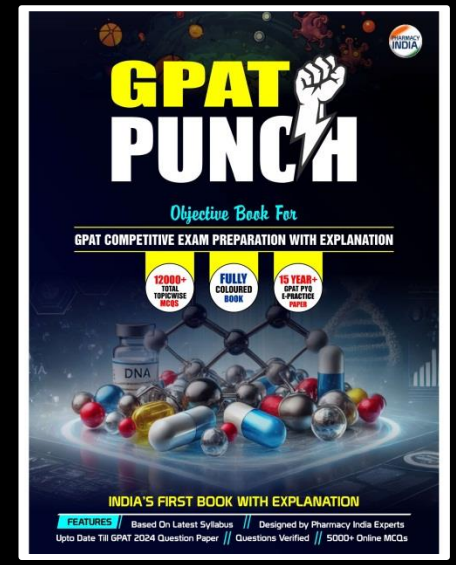
a) 1, 1-diethyl-2,2-dimethylpentane

b) 4, 4-dimethyl-5,5-diethylpentane

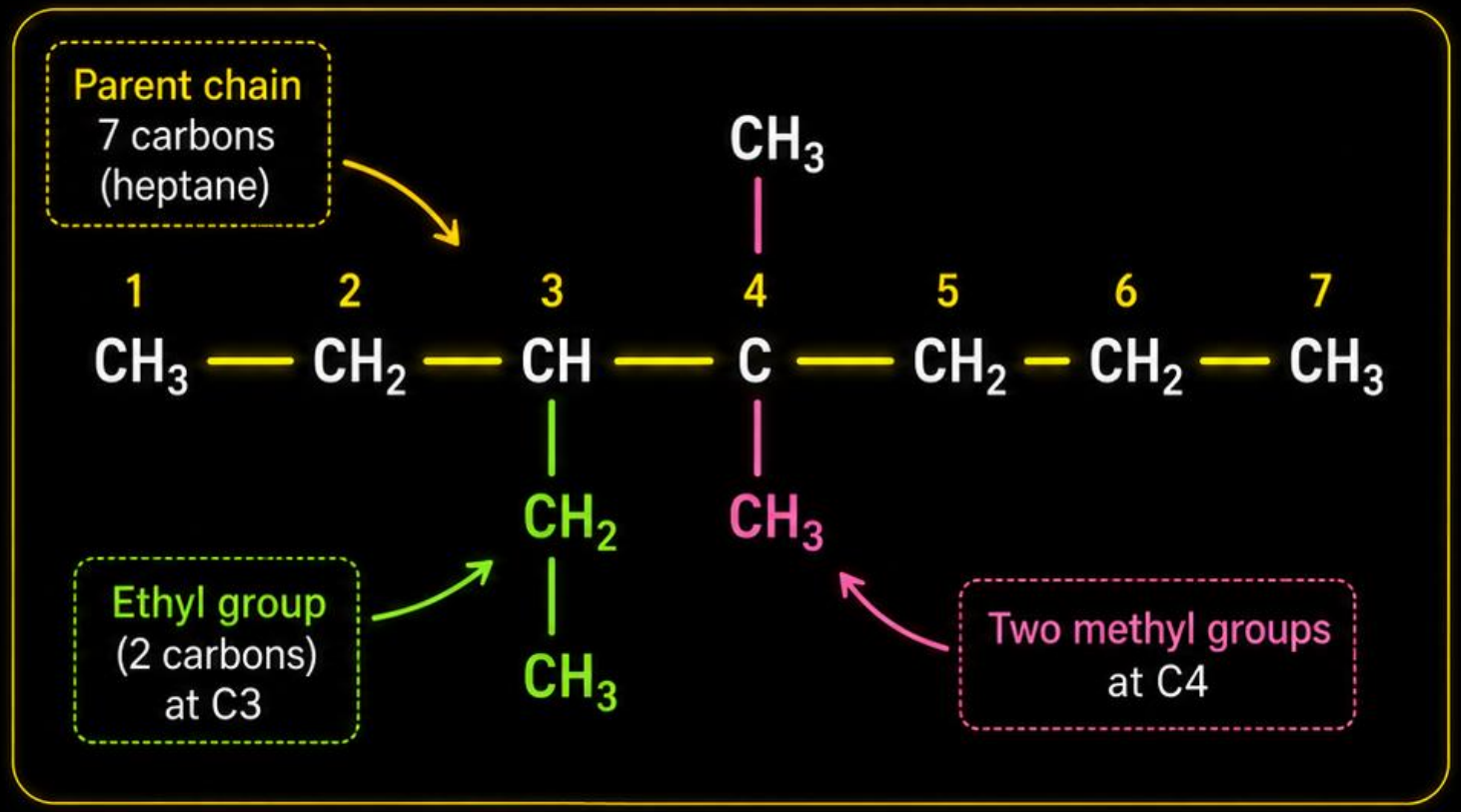
c) 5, 5-diethyl-4,4-dimethylpentane

d) 3-ethyl-4, 4-dimethylheptane





CHOOSE THE LONGEST CHAIN



1. The longest continuous chain contains **7 carbons → heptane.**
2. Number the chain to give the **lowest set of locants.** (3,4,4)
3. Substituents are:
   - **ethyl** at C3
   - **two methyl groups** at C4
4. Ignore multiplicative prefixes when **alphabetizing.** (di, tri) → ethyl

COLOR KEY

- Parent chain (7 C)
- Ethyl substituent
- Methyl substituents
- Other bonds

7 CARBONS = HEPTANE

Derived name:

3-ethyl-4,4-dimethylheptane

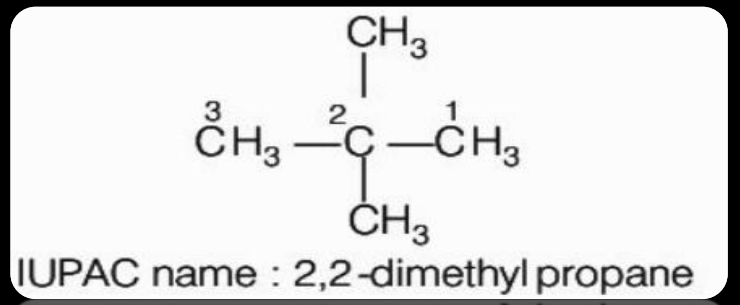
49. **The IUPAC name of neopentane is**

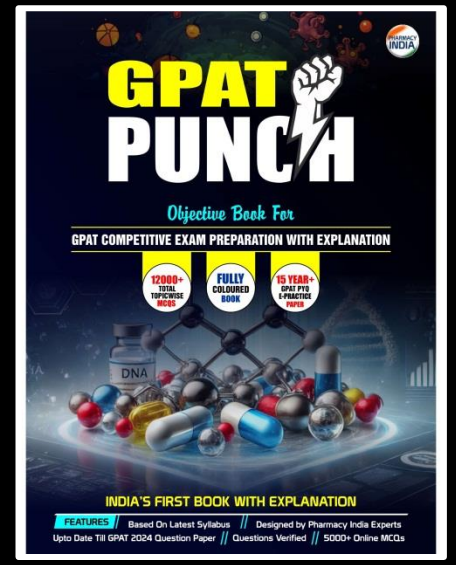
a) 2-methylbutane

b) 2,2-dimethylpropane

c) 2-methylpropane

d) 2,2-dimethylbutane





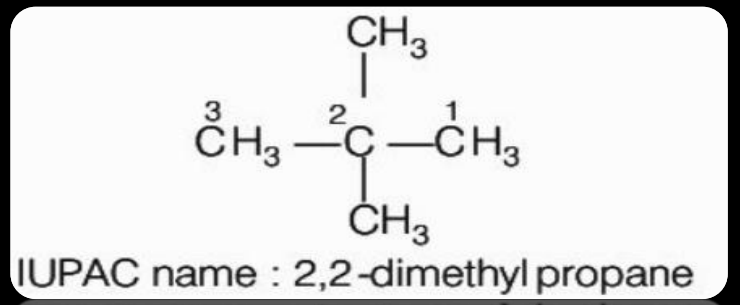
49. **The IUPAC name of neopentane is**

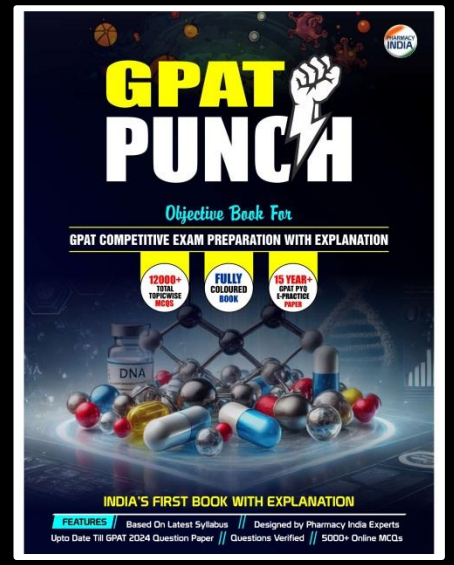
a) 2-methylbutane

b) 2,2-dimethylpropane

c) 2-methylpropane

d) 2,2-dimethylbutane



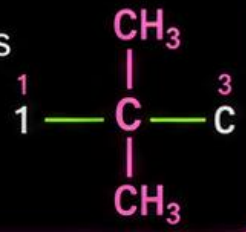


Neopentane in IUPAC Form

1 Neopentane is a **common name.**

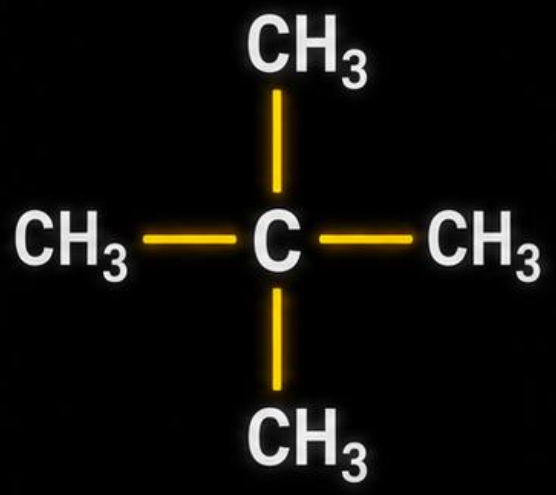
2 The longest chain is **propane.**

3 Two methyl groups are attached to **carbon 2.**



4 This gives the systematic name **2,2-dimethylpropane.**

Neopentane

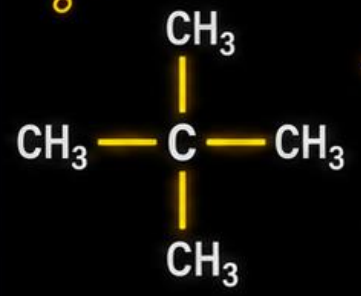


A **quaternary** carbon bonded to **four** methyl groups.

COMMON NAME vs SYSTEMATIC NAME

Common-name idea

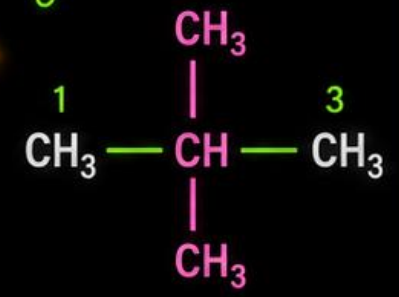
Looks like a "new" pentane skeleton.



Neopentane

Systematic-name logic

Find longest chain (propane) and name substituents.



Two methyls at carbon 2 on a propane chain

Systematic name: **2,2-dimethylpropane**

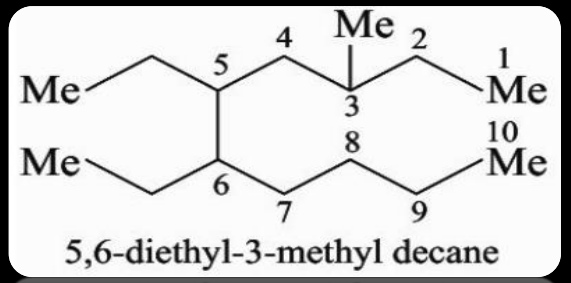
50. **The IUPAC name(s) of the following compound is**

a) 2,3-diethyl-3-methyl decane

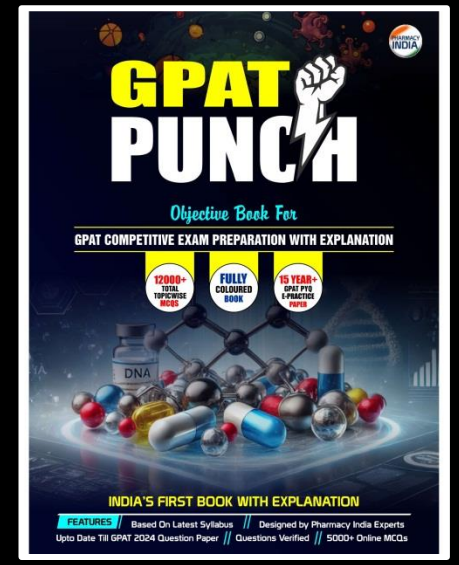
b) 1,6-diethyl-3-methyl decane

c) 5,3-diethyl-6-methyl decane

d) 5,6-diethyl-3-methyl decane



5,6-diethyl-3-methyl decane



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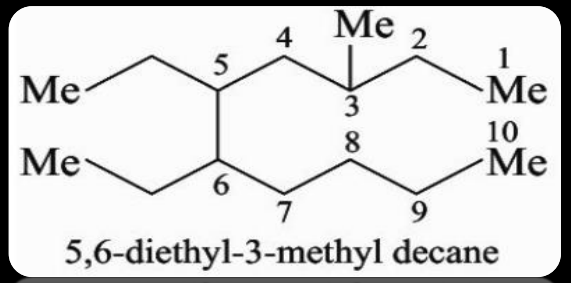
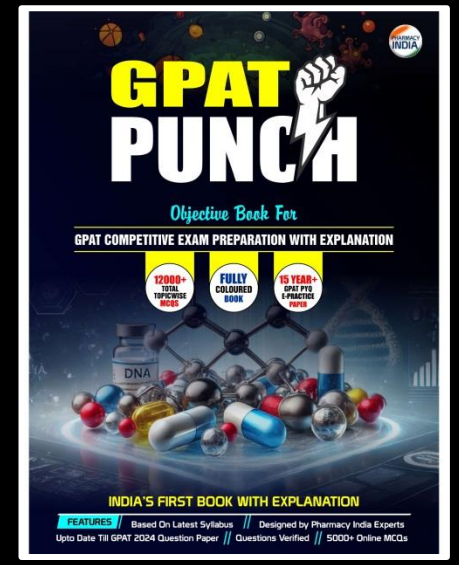
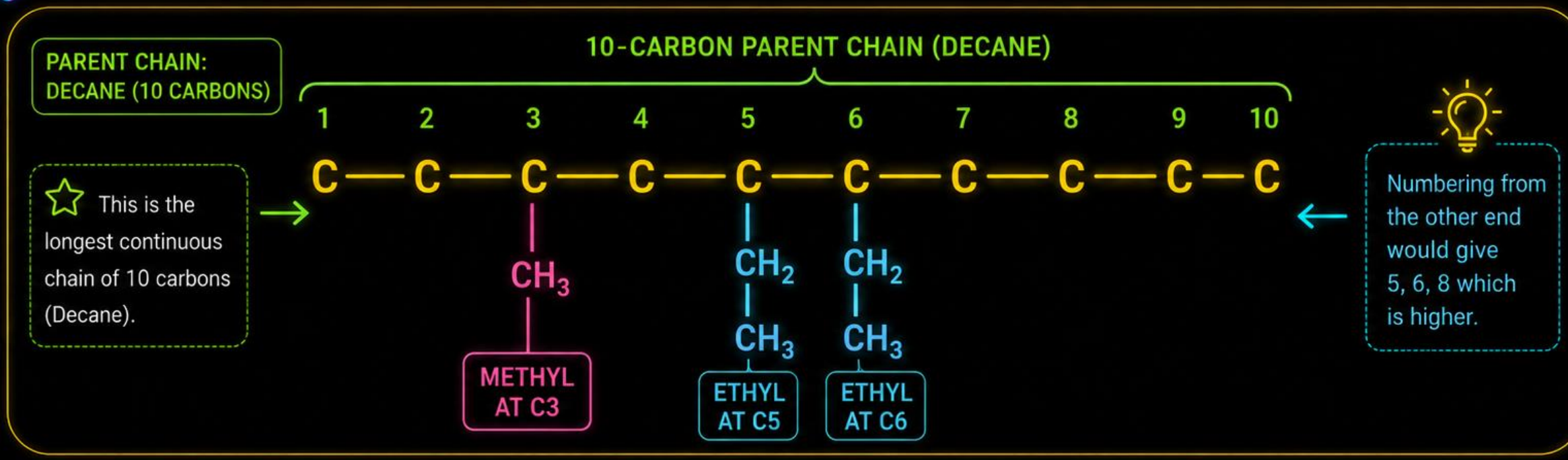


5,6-diethyl-3-methyl decane



NAMING A BRANCHED DECANE



1 LONGEST CHAIN

The longest parent chain has 10 carbons → **decane.**

2 NUMBERING RULE

Number from the end that gives the lowest set of locants: **3, 5, 6.**

3 SUBSTITUENTS

Two ethyl groups (at C5 and C6) and one methyl group (at C3).

4 ALPHABETICAL ORDER

In the name, substituents are written in alphabetical order: ethyl comes before methyl.

DERIVED NAME: **5,6-diethyl-3-methyldecane**

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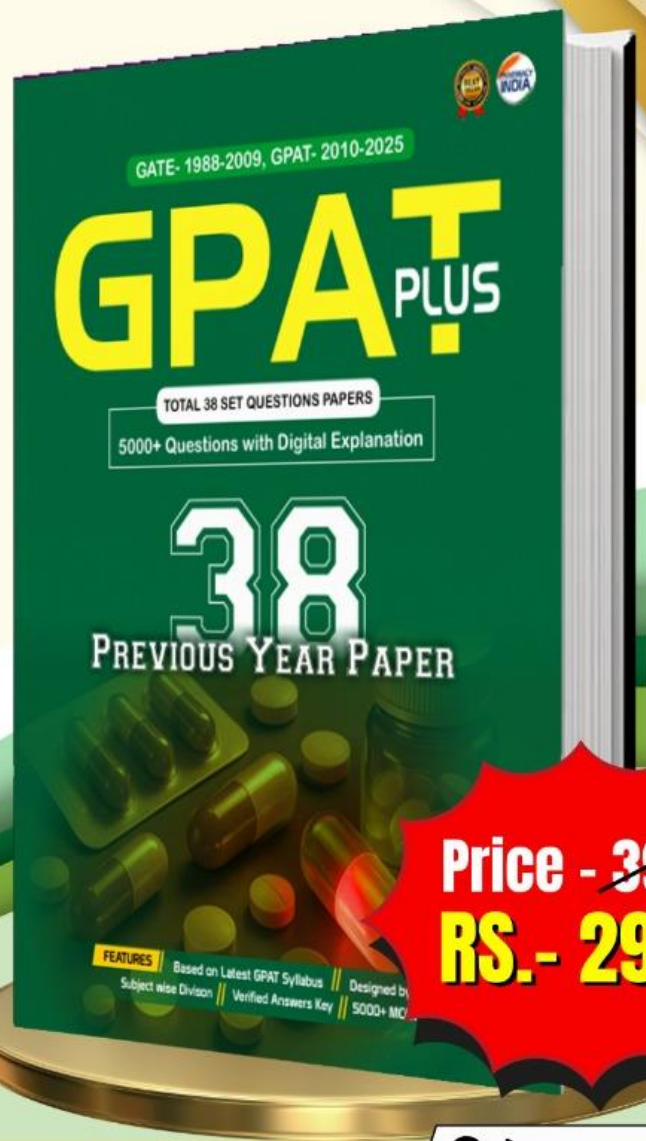

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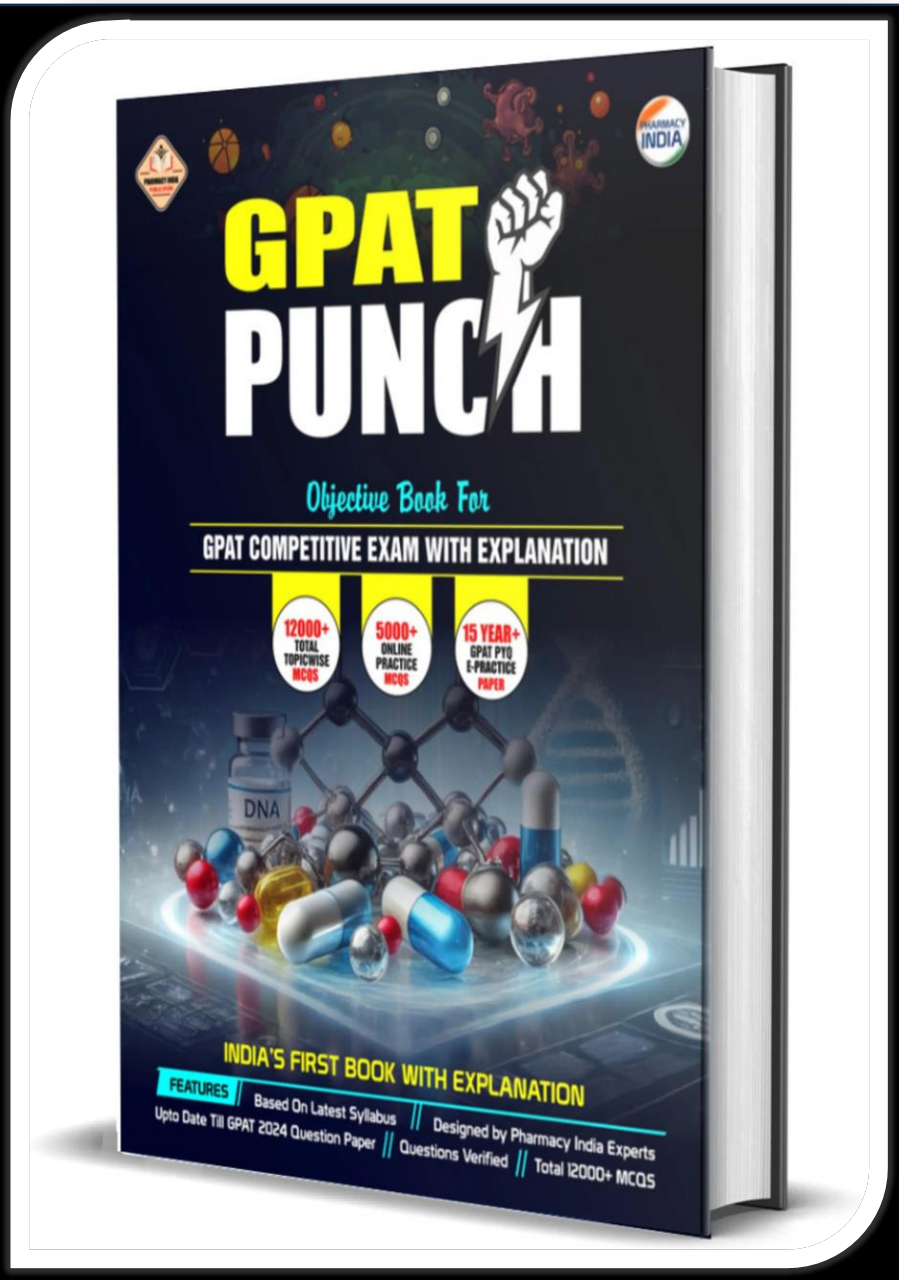

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