

CHEMISTRY · JEE MAIN

Hydrocarbons: Alkanes

Chapter-wise previous year questions, with answer key

28

PYQS

2020–2026

PAPERS

4

TOPICS

Combustion and Cracking

Conformations

Free Radical Halogenation

Preparation of Alkanes

- 1 Attempt each question on paper first. They're grouped by topic, newest papers first.
- 2 Check yourself against the answer key at the end.
- 3 Got one wrong? Tap "Step-by-step solution" at the top right of it for the full working, where available.

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Combustion and Cracking · 4 PYQs

Q1 JEE Main 2026 · 2 Apr · Shift 2

[Step-by-step solution](#) · [prepwise.in/questions/sDKFJ2k2v2](https://www.prepwise.in/questions/sDKFJ2k2v2)

The compound (X) on

- (i) on heating in the presence of anhydrous AlCl_3 and HCl gas gives 2,4-dimethyl pentane
- (ii) aromatization gives toluene and
- (iii) cyclisation gives methyl cyclohexane

The correct name of compound (X) is:

- (A) Hept-2-ene (B) Hept-1,3,5-triene (C) Heptane (D) Hept-2,4,6-triene

Q2 JEE Main 2026 · 2 Apr · Shift 1 **NUMERICAL**

[Step-by-step solution](#) · [prepwise.in/questions/SdHfNuOAgZ](https://www.prepwise.in/questions/SdHfNuOAgZ)

One mole of an alkane (x) requires 8 mole oxygen for complete combustion. Sum of number of carbon and hydrogen atoms in the alkane (x) is _____.

Q3 JEE Main 2026 · 28 Jan · Shift 2

[Step-by-step solution](#) · [prepwise.in/questions/-wEZvBdAdB](https://www.prepwise.in/questions/-wEZvBdAdB)

The reactions which produce alcohol as the product are:

- A. $\text{CH}_4 + \text{O}_2 \xrightarrow{\text{Mo}_2\text{O}_3, \Delta}$
- B. $2\text{CH}_3\text{CH}_3 + 3\text{O}_2 \xrightarrow{(\text{CH}_3\text{COO})_2\text{Mn}, \Delta}$
- C. $(\text{CH}_3)_3\text{CH} \xrightarrow{\text{KMnO}_4}$
- D. $2\text{CH}_4 + \text{O}_2 \xrightarrow{\text{Cu}/523\text{K}/100\text{atm.}}$
- E. $\text{CH}_3 - \text{CH} = \text{CH} - \text{CH}_3 \xrightarrow{\text{KMnO}_4/\text{H}^+}$

Choose the **correct** answer from the options given below:

- (A) B, D and E Only (B) A and D Only (C) A, C and E Only (D) C and D Only

Q4 JEE Main 2021 · 17 Mar · Shift 2

[Step-by-step solution](#) · [prepwise.in/questions/XpIk7mBha5](https://www.prepwise.in/questions/XpIk7mBha5)

Given below are two statements:

Statement I : 2-methylbutane on oxidation with KMnO_4 gives 2-methylbutan-2-ol.

Statement II : n-alkanes can be easily oxidised to corresponding alcohols with KMnO_4 .

Choose the correct option:

- (A) Both statement I and statement II are incorrect
- (B) Both statement I and statement II are correct
- (C) Statement I is correct but statement II is incorrect
- (D) Statement I is incorrect but statement II is correct

Conformations · 6 PYQs

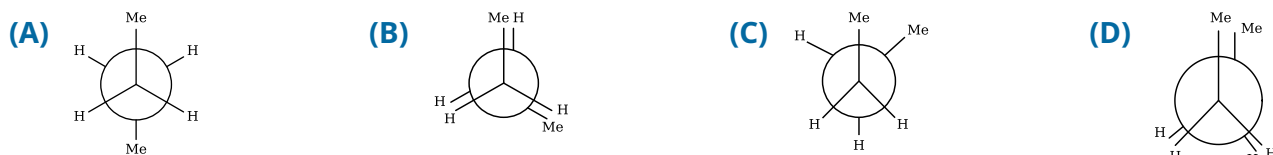
Q5 JEE Main 2024 · 27 Jan · Shift 2

[Step-by-step solution](#) · [prepwise.in/questions/wenYw7SGFQ](https://www.prepwise.in/questions/wenYw7SGFQ)

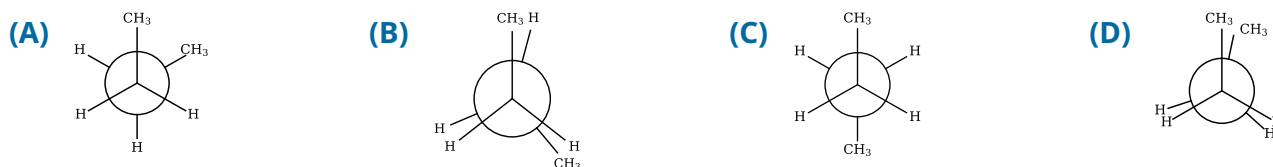
The incorrect statement regarding conformations of ethane is:

- (A) The dihedral angle in staggered conformation is 60° .
- (B) Ethane has infinite number of conformations.
- (C) Eclipsed conformation is the most stable conformation.
- (D) The conformations of ethane are inter-convertible to one-another.

Which of the following conformations will be the most stable?

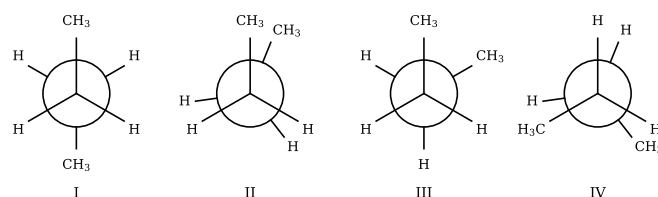


In the following structures, which one is having staggered conformation with maximum dihedral angle?



Arrange the following conformational isomers of n-butane in order of their increasing potential energy:

- (A) II < III < IV < I (B) I < IV < III < II
(C) II < IV < III < I (D) I < III < IV < II



Staggered and eclipsed conformers of ethane are:

- (A) Polymers (B) Rotamers (C) Enantiomers (D) Mirror images

The dihedral angle in staggered form of Newman projection of 1, 1, 1-Trichloro ethane is _____ degree. (Round off to the nearest integer)

Free Radical Halogenation · 15 PYQs

n-Butane on monochlorination under photochemical condition gives an optically active compound "P". "P" on further chlorination gives dichloro compounds.

The number of dichloro compounds obtained (ignore stereoisomers) is:

- (A) 3 (B) 4 (C) 5 (D) 6

An alkane (Y) requires 8 moles of oxygen for complete combustion and on chlorination with $\text{Cl}_2/h\nu$, (Y) gives only one monochlorinated product (Z). The total number of primary carbon atoms in (Y) is ____.

Solve these online with step-by-step solutions · [prepwiser.in/learn/chapter/Chk_UmxYrW/questions](https://www.prepwiser.in/learn/chapter/Chk_UmxYrW/questions)

Consider the isomers of hydrocarbon with molecular formula C_5H_{10} . These isomers do not decolourise $KMnO_4$ solution. These isomers are subjected to chlorination with chlorine in presence of light to give monochloro compounds. The total number of monochloro compounds (structural isomers only) formed is _____.

Given below are two statements:

Statement (I) : Neopentane forms only one monosubstituted derivative.

Statement (II) : Melting point of neopentane is higher than n-pentane.

In the light of the above statements, choose the most appropriate answer from the options given below:

- (A) Statement I is incorrect but Statement II is correct
- (B) Both Statement I and Statement II are correct
- (C) Statement I is correct but Statement II is incorrect
- (D) Both Statement I and Statement II are incorrect

Propane molecule on chlorination under photochemical condition gives two di-chloro products, "x" and "y". Amongst "x" and "y", "x" is an optically active molecule. How many tri-chloro products (consider only structural isomers) will be obtained from "x" when it is further treated with chlorine under the photochemical condition?

- (A) 4
- (B) 2
- (C) 3
- (D) 5

Total number of isomeric compounds (including stereoisomers) formed by monochlorination of 2-methylbutane is _____.

Number of isomeric products formed by monochlorination of 2-methylbutane in presence of sunlight is _____.

2-chlorobutane + $Cl_2 \rightarrow C_4H_8Cl_2$ (isomers)

Total number of optically active isomers shown by $C_4H_8Cl_2$, obtained in the above reaction is _____.

Number of bromo derivatives obtained on treating ethane with excess of Br_2 in diffused sunlight is _____.

Total number of isomers (including stereoisomers) obtained on monochlorination of methylcyclohexane is _____.

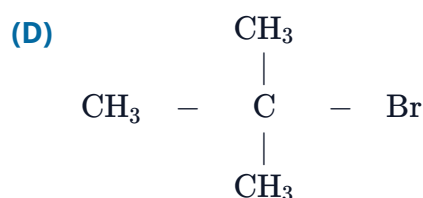
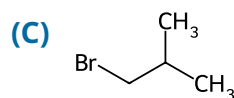
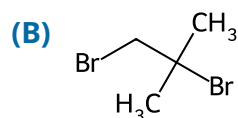
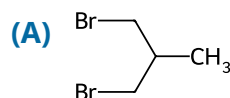


A and B in the above atmospheric reaction step are:

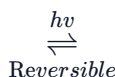
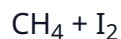
- (A) C_2H_6 and Cl_2 (B) $\dot{\text{C}} \text{HCl}_2$ and H_2 (C) $\dot{\text{C}} \text{H}_3$ and HCl (D) C_2H_6 and HCl

The total number of monobromo derivatives formed by the alkanes with molecular formula C_5H_{12} is (excluding stereo isomers) _____.

Excess of isobutane on reaction with Br_2 in presence of light at 125°C gives which one of the following, as the major product?



Presence of which reagent will affect the reversibility of the following reaction, and change it to a irreversible reaction:



- (A) HOCl (B) dilute HNO_2 (C) Liquid NH_3 (D) Concentrated HIO_3

The total number of monohalogenated organic products in the following (including stereoisomers) reaction is _____.



Q26 JEE Main 2026 · 6 Apr · Shift 1

[Step-by-step solution](#) · [prepwisar.in/questions/6C8zmvcvID](#)

Given below are two statements:

Statement I: Methane can be prepared by decarboxylation of sodium ethanoate, Kolbe's electrolysis of sodium acetate and reaction of CH_3MgBr with water.

Statement II: Methane cannot be prepared from unsaturated hydrocarbons and by Wurtz reaction.

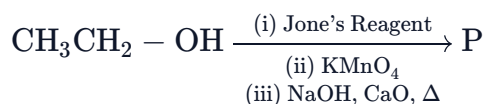
In the light of the above statements, choose the correct answer from the options given below

- (A) Both Statement I and Statement II are true (B) Both Statement I and Statement II are false
(C) Statement I is true but Statement II is false (D) Statement I is false but Statement II is true

Q27 JEE Main 2026 · 5 Apr · Shift 2 **NUMERICAL**[Step-by-step solution](#) · [prepwisar.in/questions/2AjRRh1ZWU](#)

RMgI when treated with ice cold water liberated a gas which occupied $1.4\text{dm}^3/\text{g}$ at STP. The gas produced is further reacted with iodine in presence of HIO_3 to give compound (X). Compound (X) in presence of Na and dry ether produced compound (Y). Molar mass of compound (Y) is ____ gmol^{-1} . (Nearest integer)

Q28 JEE Main 2024 · 5 Apr · Shift 2

[Step-by-step solution](#) · [prepwisar.in/questions/2FoC3NT08X](#)

Consider the above reaction sequence and identify the major product P.

- (A) Methanoic acid (B) Methoxymethane (C) Methane (D) Methanal

Answer key: Hydrocarbons: Alkanes

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1. C	2. 17	3. D	4. C	5. C	6. A	7. C	8. D	9. B	10. 60
11. B	12. 4	13. 14	14. B	15. C	16. 6	17. 6	18. 6	19. 9	20. 12
21. C	22. 8	23. D	24. D	25. 8	26. D	27. 30	28. C		

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