

CHEMISTRY · JEE MAIN

# Hydrocarbons: Alkenes & Alkynes

Chapter-wise previous year questions, with answer key

**28**

PYQS

**2020–2026**

PAPERS

**6**

TOPICS

Electrophilic Addition

Preparation of Alkenes

Markovnikov and Anti-Markovnikov

Preparation of Alkynes

Ozonolysis and Oxidation

Acidity of Terminal Alkynes

- 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" under it for the full working.

## Stuck on a question?

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Answers follow NTA's final answer keys. Typing errors are possible, so check doubtful answers against the official key. Spotted a mistake? [prepwis.in/feedback](https://prepwis.in/feedback) · Terms: [prepwis.in/terms](https://prepwis.in/terms)

## Electrophilic Addition · 12 PYQs

**Q1** JEE Main 2026 · 8 Apr · Shift 2

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

[Step-by-step solution ► prepwiser.in/questions/tRTOoA0HHk](https://www.prepwiser.in/questions/tRTOoA0HHk)

**Q2** JEE Main 2026 · 6 Apr · Shift 1

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  $\text{CH}_3\text{MgBr}$  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

[Step-by-step solution ► prepwiser.in/questions/6C8zmvclD](https://www.prepwiser.in/questions/6C8zmvclD)

**Q3** JEE Main 2026 · 6 Apr · Shift 2

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 \_\_\_\_ .

*Numerical answer: enter the value.*

[Step-by-step solution ► prepwiser.in/questions/mCuGZDzIRx](https://www.prepwiser.in/questions/mCuGZDzIRx)

**Q4** JEE Main 2026 · 5 Apr · Shift 2

Identify the correct IUPAC name of hydrocarbon (x) containing three primary carbon atoms and with molar mass  $72\text{g mol}^{-1}$ .

- (A) 1, 1 - Dimethylcyclopropane
- (B) 2, 2 - Dimethylpropane
- (C) 2 - Methylbutane
- (D) n-pentane

[Step-by-step solution ► prepwiser.in/questions/\\_AMAVhgYGC](https://www.prepwiser.in/questions/_AMAVhgYGC)

**Q5** JEE Main 2026 · 2 Apr · Shift 2

The compound (X) on

(i) on heating in the presence of anhydrous  $\text{AlCl}_3$  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

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

Solve these online with step-by-step solutions → [prepwiser.in/learn/chapter/a8e92hkIyD/questions](https://www.prepwiser.in/learn/chapter/a8e92hkIyD/questions)

**Q6** JEE Main 2026 · 2 Apr · Shift 1

Consider the isomers of hydrocarbon with molecular formula  $\text{C}_5\text{H}_{10}$ . These isomers do not decolourise  $\text{KMnO}_4$  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 \_\_\_\_\_.

Numerical answer: enter the value.

[Step-by-step solution](#) ► [prepwiser.in/questions/gZKe88pPrT](https://www.prepwiser.in/questions/gZKe88pPrT)

**Q7** JEE Main 2026 · 2 Apr · Shift 1

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 \_\_\_\_\_.

Numerical answer: enter the value.

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

**Q8** JEE Main 2023 · 11 Apr · Shift 2

The number of possible isomeric products formed when 3-chloro-1-butene reacts with HCl through carbocation formation is \_\_\_\_\_.

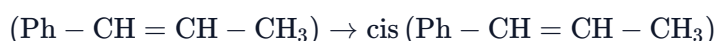
Numerical answer: enter the value.

[Step-by-step solution](#) ► [prepwiser.in/questions/RVwIK98HiD](https://www.prepwiser.in/questions/RVwIK98HiD)

**Q9** JEE Main 2023 · 31 Jan · Shift 1

Choose the correct set of reagents for the following conversion.

trans



- (A)  $\text{Br}_2$ , alc · KOH,  $\text{NaNH}_2$ ,  $\text{H}_2$  Lindlar Catalyst
- (B)  $\text{Br}_2$ , aq · KOH,  $\text{NaNH}_2$ , Na (Liq  $\text{NH}_3$ )
- (C)  $\text{Br}_2$ , alc · KOH,  $\text{NaNH}_2$ , Na (Liq  $\text{NH}_3$ )
- (D)  $\text{Br}_2$ , aq · KOH,  $\text{NaNH}_2$ ,  $\text{H}_2$  Lindlar Catalyst

[Step-by-step solution](#) ► [prepwiser.in/questions/iQhLEFdBf](https://www.prepwiser.in/questions/iQhLEFdBf)

**Q10** JEE Main 2022 · 24 Jun · Shift 2

Given below are two statements :

Statement I : The presence of weaker  $\pi$ -bonds make alkenes less stable than alkanes.

Statement II : The strength of the double bond is greater than that of carbon-carbon single bond.

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

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

Step-by-step solution ► [prepwiser.in/questions/flj5jhFltj](https://www.prepwiser.in/questions/flj5jhFltj)

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**Q11** JEE Main 2021 · 1 Sep · Shift 2

The stereoisomers that are formed by electrophilic addition of bromine to trans-but-2-ene is/are :

- (A) 2 enantiomers and 2 mesomers
- (B) 2 identical mesomers
- (C) 2 enantiomers
- (D) 1 racemic and 2 enantiomers

Step-by-step solution ► [prepwiser.in/questions/Oguz0PxNDR](https://www.prepwiser.in/questions/Oguz0PxNDR)

**Q12** JEE Main 2021 · 31 Aug · Shift 1

Given below are two statements : one is labelled as Assertion (A) and the other is labelled as Reason (R).

Assertion (A) : Treatment of bromine water with propene yields 1-bromopropan-2-ol.

Reason (R) : Attack of water on bromonium ion follows Markovnikov rule and results in 1-bromopropan-2-ol.

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

- (A) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (B) (A) is false but (R) is true
- (C) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (D) (A) is true but (R) is false

Step-by-step solution ► [prepwiser.in/questions/vX26z4RGr7](https://www.prepwiser.in/questions/vX26z4RGr7)

## Preparation of Alkenes · 3 PYQs

**Q13** JEE Main 2026 · 5 Apr · Shift 2

IUPAC name of the some alkenes are given below.

Find out the correct stability order.

- A. 2-Methylbut-2-ene
- B. cis-But-2-ene
- C. 2,3-Dimethylbut-2-ene
- D. Prop-1-ene

Choose the correct answer from the options given below :

- (A)  $C > A > B > D$
- (B)  $C > A > D > B$
- (C)  $B > D > A > C$
- (D)  $A > B > C > D$

[Step-by-step solution ► prepwiser.in/questions/l3QzLCwZRq](https://www.prepwiser.in/questions/l3QzLCwZRq)

**Q14** JEE Main 2026 · 22 Jan · Shift 1

The cycloalkene (X) on bromination consumes one mole of bromine per mole of (X) and gives the product (Y) in which C : Br ratio is 3:1. The percentage of bromine in the product (Y) is \_\_\_\_ %. (Nearest integer)

(Given : molar mass in  $\text{g mol}^{-1}$  H : 1, C : 12, O : 16, Br : 80 )

Numerical answer: enter the value.

[Step-by-step solution ► prepwiser.in/questions/dqkpA2dIqO](https://www.prepwiser.in/questions/dqkpA2dIqO)

**Q15** JEE Main 2021 · 16 Mar · Shift 1

Which of the following is Lindlar catalyst?

- (A) Partially deactivated palladised charcoal
- (B) Zinc chloride and HCl
- (C) Sodium and Liquid  $\text{NH}_3$
- (D) Cold dilute solution of  $\text{KMnO}_4$

[Step-by-step solution ► prepwiser.in/questions/ceRW4HMhfE](https://www.prepwiser.in/questions/ceRW4HMhfE)

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**Q16** JEE Main 2020 · 5 Sep · Shift 2

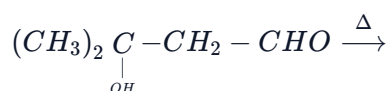
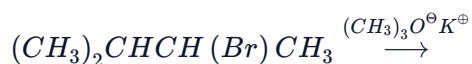
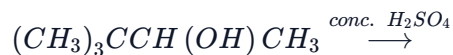
The major product formed in the following reaction is :



- (A)  $\text{Br}(\text{CH}_2)_3\text{CH}(\text{CH}_3)_2$   
 (B)  $\text{CH}_3\text{CH}(\text{Br})\text{CH}_2\text{CH}(\text{CH}_3)_2$   
 (C)  $\text{CH}_3\text{CH}_2\text{CH}(\text{Br})\text{CH}(\text{CH}_3)_2$   
 (D)  $\text{CH}_3\text{CH}_2\text{CH}_2\text{C}(\text{Br})(\text{CH}_3)_2$

[Step-by-step solution ► prepwisar.in/questions/Ifz9CPTVGD](https://www.prepwisar.in/questions/Ifz9CPTVGD)
**Q17** JEE Main 2020 · 7 Jan · Shift 1

Consider the following reaction :



Which of these reaction(s) will not produce Saytzeff product ?

- (A) (d) only (B) (b) and (d)  
 (C) (a), (c) and (d) (D) (c) only

[Step-by-step solution ► prepwisar.in/questions/2HgsS28H\\_0](https://www.prepwisar.in/questions/2HgsS28H_0)

## Preparation of Alkynes · 1 PYQs

**Q18** JEE Main 2025 · 2 Apr · Shift 1

An optically active alkyl halide  $C_4H_9Br$  [A] reacts with hot KOH dissolved in ethanol and forms alkene [B] as major product which reacts with bromine to give dibromide [C]. The compound [C] is converted into a gas [D] upon reacting with alcoholic  $NaNH_2$ . During hydration 18 gram of water is added to 1 mole of gas [D] on warming with mercuric sulphate and dilute acid at 333 K to form compound [E]. The IUPAC name of compound [E] is :

(A) Butan-2-ol

(B) But-2-yne

(C) Butan-2-one

(D) Butan-1-al

[Step-by-step solution ► prepwiser.in/questions/9EgfOZ1B3u](https://www.prepwiser.in/questions/9EgfOZ1B3u)

## Ozonolysis and Oxidation · 8 PYQs

**Q19** JEE Main 2025 · 7 Apr · Shift 1

Given below are two statements:

**Statement I :** Ozonolysis followed by treatment with  $Zn, H_2O$  of cis-2-butene gives ethanal.

**Statement II :** The product obtained by ozonolysis followed by treatment with  $Zn, H_2O$  of 3, 6-dimethyloct-4-ene has no chiral carbon atom.

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

(A) Statement I is false but Statement II are true

(B) Both Statement I and Statement II are False

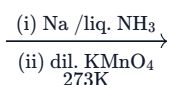
(C) Statement I is true but Statement II is false

(D) Both Statement I and Statement II are true

[Step-by-step solution ► prepwiser.in/questions/3\\_DEGKeqF5](https://www.prepwiser.in/questions/3_DEGKeqF5)

**Q20** JEE Main 2024 · 6 Apr · Shift 1

The major product of the following reaction is P.



'P'

Number of oxygen atoms present in product 'P' is \_\_\_\_\_. (nearest integer)

Numerical answer: enter the value.

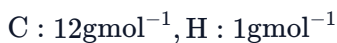
[Step-by-step solution ► prepwiser.in/questions/H6mSOdky15](https://www.prepwiser.in/questions/H6mSOdky15)

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**Q21** JEE Main 2023 · 8 Apr · Shift 1

Molar mass of the hydrocarbon (X) which on ozonolysis consumes one mole of  $O_3$  per mole of (X) and gives one mole each of ethanal and propanone is \_\_\_\_\_  $gmol^{-1}$

(Molar mass of



)

Numerical answer: enter the value.

[Step-by-step solution ► prepwiser.in/questions/xnNR8VBS0f](https://www.prepwiser.in/questions/xnNR8VBS0f)

**Q22** JEE Main 2023 · 31 Jan · Shift 2

A hydrocarbon 'X' with formula  $C_6H_8$  uses two moles of  $H_2$  on catalytic hydrogenation of its one mole. On ozonolysis, 'X' yields two moles of methane dicarbaldehyde. The hydrocarbon 'X' is:

(A) hexa-1, 3, 5-triene

(B) cyclohexa-1, 4-diene

(C) cyclohexa - 1,3 - diene

(D) 1-methylcyclopenta-1, 4-diene

[Step-by-step solution ► prepwiser.in/questions/DihQgAZKCd](https://www.prepwiser.in/questions/DihQgAZKCd)

**Q23** JEE Main 2022 · 29 Jul · Shift 2

When ethanol is heated with conc.  $H_2SO_4$ , a gas is produced. The compound formed, when this gas is treated with cold dilute aqueous solution of Baeyer's reagent, is

(A) formaldehyde

(B) formic acid

(C) glycol

(D) ethanoic acid

[Step-by-step solution ► prepwiser.in/questions/yqSAkRFumS](https://www.prepwiser.in/questions/yqSAkRFumS)

**Q24** JEE Main 2022 · 30 Jun · Shift 1

A hydrocarbon 'X' is found to have molar mass of 80. A 10.0 mg of compound 'X' on hydrogenation consumed 8.40 mL of  $H_2$  gas (measured at STP). Ozonolysis of compound 'X' yields only formaldehyde and dialdehyde. The total number of fragments/molecules produced from the ozonolysis of compound 'X' is \_\_\_\_\_.

Numerical answer: enter the value.

[Step-by-step solution ► prepwiser.in/questions/y7jH7LSt3E](https://www.prepwiser.in/questions/y7jH7LSt3E)

**Q25** JEE Main 2022 · 29 Jun · Shift 1

Two isomers 'A' and 'B' with molecular formula  $C_4H_8$  give different products on oxidation with  $KMnO_4$  in acidic medium. Isomer 'A' on reaction with  $KMnO_4/H^+$  results in effervescence of a gas and gives ketone. The compound 'A' is

(A) But-1-ene.

(B) cis-But-2-ene.

(C) trans-But-2-ene.

(D) 2-methyl propene.

[Step-by-step solution ► prepwiser.in/questions/sMa\\_92-Fxh](https://www.prepwiser.in/questions/sMa_92-Fxh)

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**Q26** JEE Main 2021 · 25 Jul · Shift 1

An organic compound 'A'  $C_4H_8$  on treatment with  $KMnO_4/H^+$  yields compound 'B'  $C_3H_6O$ .

Compound 'A' also yields compound 'B' on ozonolysis. Compound 'A' is :

- (A) 2-Methylpropene (B) 1-Methylcyclopropane  
(C) But-2-ene (D) Cyclobutane

[Step-by-step solution ► prepwiser.in/questions/QydOpfxOSn](https://www.prepwiser.in/questions/QydOpfxOSn)

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## Acidity of Terminal Alkynes · 2 PYQs

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**Q27** JEE Main 2025 · 22 Jan · Shift 1

Given below are two statements :

Statement I : One mole of propyne reacts with excess of sodium to liberate half a mole of  $H_2$  gas.

Statement II : Four g of propyne reacts with  $NaNH_2$  to liberate  $NH_3$  gas which occupies 224 mL at STP.

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

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

[Step-by-step solution ► prepwiser.in/questions/cg3OKwf3Qc](https://www.prepwiser.in/questions/cg3OKwf3Qc)

**Q28** JEE Main 2024 · 9 Apr · Shift 2

The incorrect statement regarding ethyne is

- (A) The carbon - carbon bonds in ethyne is weaker than that in ethene  
(B) Both carbons are  $sp$  hybridised  
(C) The C – C bonds in ethyne is shorter than that in ethene  
(D) Ethyne is linear

[Step-by-step solution ► prepwiser.in/questions/TQ1doaxbUI](https://www.prepwiser.in/questions/TQ1doaxbUI)

## Answer key: Hydrocarbons: Alkenes & Alkynes

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|----|---|----|---|----|---|----|---|----|----|----|----|----|----|----|---|
| 1  | B | 2  | D | 3  | 4 | 4  | C | 5  | C  | 6  | 14 | 7  | 17 | 8  | 4 |
| 9  | A | 10 | A | 11 | B | 12 | C | 13 | A  | 14 | 66 | 15 | A  | 16 | D |
| 17 | D | 18 | C | 19 | C | 20 | 2 | 21 | 70 | 22 | B  | 23 | C  | 24 | 4 |
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