

JEE MAIN HYDROCARBONS — PYQs

Max. Marks: 244

Questions: 61

Section A (MCQ) — 47 questions

Q.1 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 :

[JEE Main 2026 (Online) 8th April Evening Shift]

- (1) 3 (2) 4 (3) 5 (4) 6

Scan or tap for the full solution



Q.2 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 :

[JEE Main 2026 (Online) 6th April Morning Shift]

- (1) Both Statement-I and Statement-II are true
 (2) Both Statement-I and Statement-II are false
 (3) Statement-I is true but Statement-II is false
 (4) Statement-I is false but Statement-II is true

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Q.3 An optically active alkyl bromide $\text{C}_4\text{H}_9\text{Br}$, reacts with ethanolic KOH to form major compound [A] which reacts with bromine to give compound [B]. Compound [B] reacts with ethanolic KOH and sodamide to give compound [C]. One molecule of water adds to compound [C] on warming with mercuric sulphate and dilute sulphuric acid at 333 K to form compound [D]. The functional group in compound D will be confirmed by :

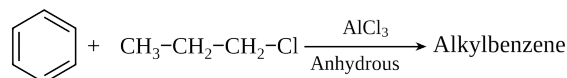
[JEE Main 2026 (Online) 6th April Evening Shift]

- (1) Haloform test (2) Lucas test
 (3) Silver mirror test (4) Benedict test

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Q.4 For the following Friedel Craft's alkylation reaction, which of the statements are correct?



- A. Major product is n-propyl benzene.
 B. iso-propyl carbocation intermediate is also generated.
 C. Multiple substitution is inevitable.
 D. Introducing electron-donating substituent on benzene will not produce any alkyl benzene.

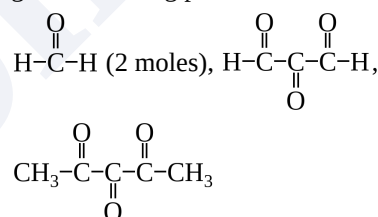
Choose the correct answer from the options given below : [JEE Main 2026 (Online) 5th April Morning Shift]

- (1) A and D only (2) B and C only
 (3) A and C only (4) B and D only

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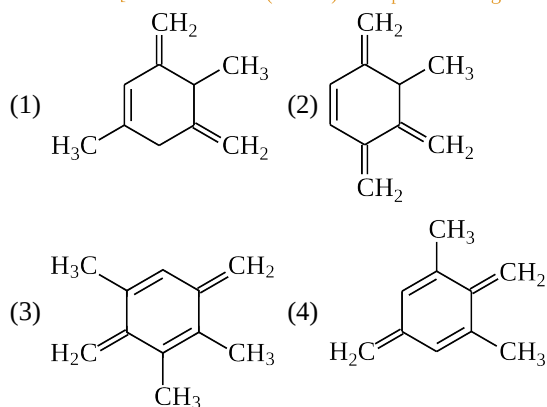


Q.5 An alkene (X) on ozonolysis followed by reduction gives following products.



The alkene (X) is :

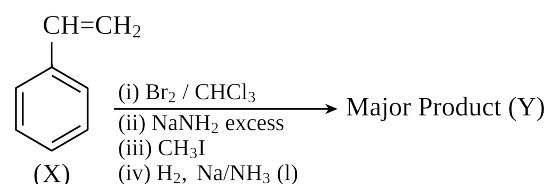
[JEE Main 2026 (Online) 4th April Morning Shift]



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Q.6



Compound (X) is subjected to the sequence of reactions as shown above. Molar mass of the major product (Y) formed is _____ g mol^{-1} .

(Given molar mass in g mol⁻¹ C : 12, H : 1, O : 16)

[JEE Main 2026 (Online) 4th April Evening Shift]

- (1) 90 (2) 118 (3) 160 (4) 125

Scan or tap for the full solution



Q.7 The compound (X) on

- on heating in the presence of anhydrous AlCl₃ and HCl gas gives 2,4-dimethyl pentane
- aromatization gives toluene and
- cyclisation gives methyl cyclohexane

The correct name of compound (X) is:

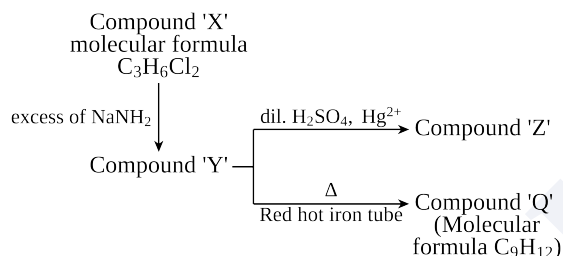
[JEE Main 2026 (Online) 2nd April Evening Shift]

- (1) Hept-2-ene (2) Hept-1,3,5-triene
(3) Heptane (4) Hept-2,4,6-triene

Scan or tap for the full solution



Q.8 Given below are two statements for the following reaction sequence.



Statement-I: Compound 'Z' will give yellow precipitate with NaOI.

Statement-II: Compound 'Q' has two different types of 'H' atoms (aromatic : aliphatic) in the ratio 1:3.

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

[JEE Main 2026 (Online) 28th January Morning Shift]

- Statement-I is true but Statement-II is false
- Both Statement-I and Statement-II are true
- Statement-I is false but Statement-II is true
- Both Statement-I and Statement-II are false

Scan or tap for the full solution



Q.9 Ph-CH=CH₂ $\xrightarrow[\text{HBr}]{(\text{PhCOO})_2}$ Product

Consider the above reaction

- The reaction proceeds through a more stable radical intermediate.
- The role of peroxide is to generate H[•] (Hydrogen radical).
- During this reaction, benzene is formed as a byproduct.
- 1-Bromo-2-phenylethane is formed as the minor product.
- The same reaction in absence of peroxide proceeds via carbocation intermediate.

Identify the correct statements.

Choose the correct answer from the options given below :

[JEE Main 2026 (Online) 28th January Morning Shift]

- (1) A & E Only (2) A, B & D Only
(3) A, C & E Only (4) C, D & E Only

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Q.10 The reactions which produce alcohol as the product are :

- CH₄ + O₂ $\xrightarrow[\Delta]{\text{Mo}_2\text{O}_3}$
- 2CH₃CH₃ + 3O₂ $\xrightarrow[\Delta]{(\text{CH}_3\text{COO})_2\text{Mn}}$
- (CH₃)₃CH $\xrightarrow{\text{KMnO}_4}$
- 2CH₄ + O₂ $\xrightarrow[\text{Cu/523 K/100 atm}]{} \text{---}$
- CH₃-CH=CH-CH₃ $\xrightarrow{\text{KMnO}_4/\text{H}^+}$

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

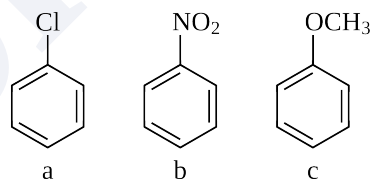
[JEE Main 2026 (Online) 28th January Evening Shift]

- (1) B, D and E Only (2) A and D Only
(3) A, C and E Only (4) C and D Only

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Q.11 Consider the following compounds :



Arrange these compounds in the increasing order of reactivity with nitrating mixture.

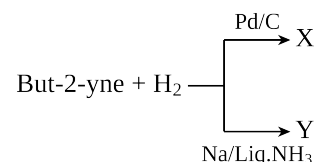
[JEE Main 2026 (Online) 23rd January Morning Shift]

- (1) c < b < a (2) b < c < a
(3) c < a < b (4) b < a < c

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Q.12 But-2-yne and hydrogen (one mole each) are separately treated with (i) Pd/C and (ii) Na/ liq. NH₃ to give the products X and Y respectively.

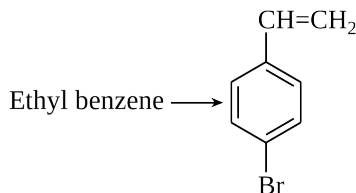


Identify the incorrect statements.

- X and Y are stereoisomers.
- Dipole moment of X is zero.
- Boiling point of X is higher than Y.
- X and Y react with O₃/Zn + H₂O to give different products.

Choose the correct answer from the options given below :

[JEE Main 2026 (Online) 23rd January Morning Shift]



- (1) $\text{Cl}_2/\text{anh. AlCl}_3; \text{Br}_2/\text{Fe}; \text{alc. KOH}$
- (2) $\text{Cl}_2/\text{Fe}; \text{Br}_2/\text{anh. AlCl}_3; \text{aq. KOH}$
- (3) $\text{Br}_2/\text{Fe}; \text{Cl}_2, \Delta; \text{alc. KOH}$
- (4) $\text{Br}_2/\text{anh. AlCl}_3; \text{Cl}_2, \Delta; \text{aq. KOH}$

Scan or tap for the full solution



Q.20 Given below are two statements:

Statement-I: Ozonolysis followed by treatment with $\text{Zn}, \text{H}_2\text{O}$ of cis-2-butene gives ethanal.

Statement-II: The product obtained by ozonolysis followed by treatment with $\text{Zn}, \text{H}_2\text{O}$ 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

[JEE Main 2025 (Online) 7th April Morning Shift]

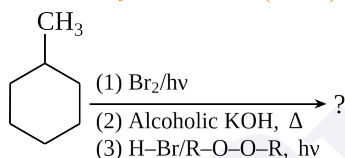
- (1) Statement-I is false but Statement-II is true
- (2) Both Statement-I and Statement-II are false
- (3) Statement-I is true but Statement-II is false
- (4) Both Statement-I and Statement-II are true

Scan or tap for the full solution



Q.21 Predict the major product of the following reaction sequence:

[JEE Main 2025 (Online) 4th April Morning Shift]

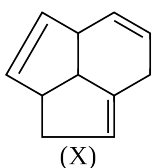


- (1)
- (2)
- (3)
- (4)

Scan or tap for the full solution



Q.22 Consider the following molecule(X).



The major product formed when the given molecule (X) is treated with HBr (1 eq) is :

[JEE Main 2025 (Online) 4th April Evening Shift]

- (1)
- (2)
- (3)
- (4)

Scan or tap for the full solution



Q.23 Which compound would give 3-methyl-6-oxoheptanal upon ozonolysis?

[JEE Main 2025 (Online) 3rd April Morning Shift]

- (1)
- (2)
- (3)
- (4)

Scan or tap for the full solution



Q.24 An optically active alkyl halide $\text{C}_4\text{H}_9\text{Br}$ [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 :

[JEE Main 2025 (Online) 2nd April Morning Shift]

- (1) Butan-2-ol
- (2) But-2-yne
- (3) Butan-2-one
- (4) Butan-1-al

Scan or tap for the full solution



Q.25 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:

[JEE Main 2025 (Online) 2nd April Evening Shift]

- (1) Statement-I is incorrect but Statement-II is correct
- (2) Both Statement-I and Statement-II are correct

(3) Statement-I is correct but Statement-II is incorrect

(4) Both Statement-I and Statement-II are incorrect

Scan or tap for the full solution



Q.26 Given below are two statements :

Statement-I: On nitration of m-xylene with HNO_3 , H_2SO_4 followed by oxidation, 4-nitrobenzene-1,3-dicarboxylic acid is obtained as the major product.

Statement-II: $-\text{CH}_3$ group is o/p-directing while $-\text{NO}_2$ group is m-directing group.

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

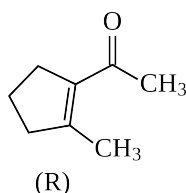
[JEE Main 2025 (Online) 29th January Evening Shift]

- (1) Statement-I is true but Statement-II is false
- (2) Both Statement-I and Statement-II are true
- (3) Both Statement-I and Statement-II are false
- (4) Statement-I is false but Statement-II is true

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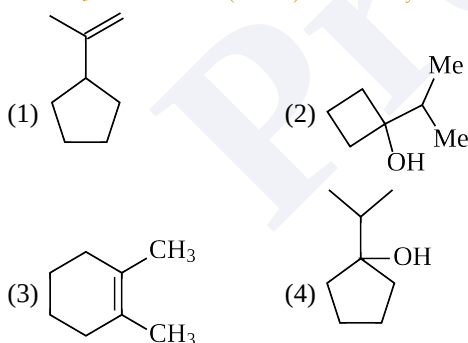


Q.27 A molecule (P) on treatment with acid undergoes rearrangement and gives (Q). (Q) on ozonolysis followed by reflux under alkaline condition gives (R). The structure of (R) is given below.



The structure of (P) is

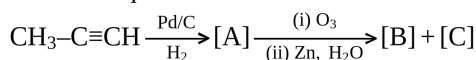
[JEE Main 2025 (Online) 28th January Morning Shift]



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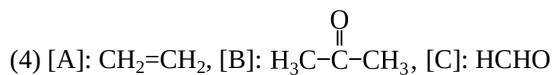


Q.28 Identify product [A], [B] and [C] in the following reaction sequence.



[JEE Main 2025 (Online) 28th January Evening Shift]

- (1) [A]: $\text{CH}_3-\text{CH}=\text{CH}_2$, [B]: CH_3CHO , [C]: $\text{CH}_3\text{CH}_2\text{OH}$
- (2) [A]: $\text{CH}_3-\text{CH}=\text{CH}_2$, [B]: CH_3CHO , [C]: HCHO
- (3) [A]: $\text{CH}_3\text{CH}_2\text{CH}_3$, [B]: CH_3CHO , [C]: HCHO

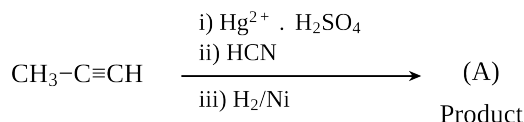


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Q.29 The product (A) formed in the following reaction sequence is

[JEE Main 2025 (Online) 24th January Morning Shift]



- (1) $\text{CH}_3-\text{CH}_2-\overset{\text{OH}}{\underset{|}{\text{CH}}}-\text{CH}_2-\text{NH}_2$
- (2) $\text{CH}_3-\text{CH}_2-\overset{\text{NH}_2}{\underset{|}{\text{CH}}}-\text{CH}_2-\text{NH}_2$
- (3) $\text{CH}_3-\overset{\text{OH}}{\underset{\text{CH}_3}{\underset{|}{\text{C}}}}-\text{CH}_2-\text{NH}_2$
- (4) $\text{CH}_3-\overset{\text{NH}_2}{\underset{\text{CH}_3}{\underset{|}{\text{C}}}}-\text{CH}_2-\text{OH}$

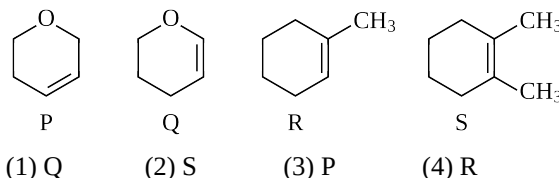
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Q.30 Following are the four molecules "P", "Q", "R" and "S".

Which one among the four molecules will react with $\text{H}-\text{Br}_{(\text{aq})}$ at the fastest rate?

[JEE Main 2025 (Online) 24th January Morning Shift]



Scan or tap for the full solution



Q.31 Identify correct statement/s :

- A. $-\text{OCH}_3$ and $-\text{NHCOCH}_3$ are activating group.
- B. $-\text{CN}$ and $-\text{OH}$ are meta directing group.
- C. $-\text{CN}$ and $-\text{SO}_3\text{H}$ are meta directing group.
- D. Activating groups act as ortho - and para directing groups.
- E. Halides are activating groups.

Choose the correct answer from the options given below :

[JEE Main 2025 (Online) 24th January Evening Shift]

- (1) A, C and D only (2) A, B and E only
- (3) A and C only (4) A only

Scan or tap for the full solution



Q.32 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?

[JEE Main 2025 (Online) 23rd January Morning Shift]

- (1) 4 (2) 2 (3) 3 (4) 5

Scan or tap for the full solution



Q.33 Match List - I with List - II

List - I (Isomers of $\text{C}_{10}\text{H}_{14}$)	
A.	
B.	
C.	
D.	
List - II (Ozonolysis product)	
I.	
II.	
III.	
IV.	

Choose the correct answer from the options given below :

[JEE Main 2025 (Online) 23rd January Evening Shift]

- (1) A-III, B-IV, C-I, D-II
 (2) A-I, B-IV, C-III, D-II
 (3) A-III, B-II, C-I, D-IV
 (4) A-II, B-II, C-I, D-IV



Solution

Q.34 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 :

[JEE Main 2025 (Online) 22nd January Morning Shift]

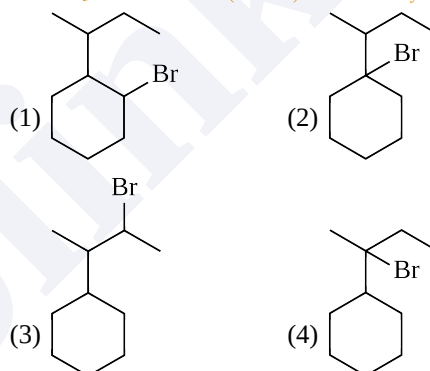
- (1) Both Statement-I and Statement-II are incorrect
 (2) Statement-I is incorrect but Statement-II is correct
 (3) Both Statement-I and Statement-II are correct
 (4) Statement-I is correct but Statement-II is incorrect

Scan or tap for the full solution



Q.35 When sec-butylcyclohexane reacts with bromine in the presence of sunlight, the major product is :

[JEE Main 2025 (Online) 22nd January Evening Shift]



Scan or tap for the full solution



Q.36 The incorrect statement regarding ethyne is

[JEE Main 2024 (Online) 9th April Evening Shift]

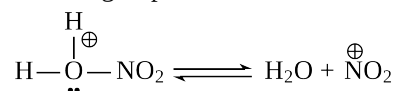
- (1) The carbon-carbon bond in ethyne is weaker than that in ethene
 (2) Both carbons are sp hybridised
 (3) The C-C bond in ethyne is shorter than that in ethene
 (4) Ethyne is linear

Scan or tap for the full solution



Q.37 Given below are two statements :

Statement-I: Nitration of benzene involves the following step -



Statement-II: Use of Lewis base promotes the electrophilic substitution of benzene.

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

[JEE Main 2024 (Online) 5th April Morning Shift]

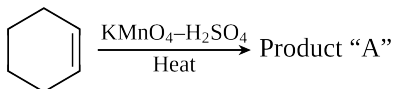
- (1) Both Statement-I and Statement-II are incorrect

- (2) Statement-I is correct but Statement-II is incorrect
 (3) Statement-I is incorrect but Statement-II is correct
 (4) Both Statement-I and Statement-II are correct

Scan or tap for the full solution



Q.38 Consider the given chemical reaction :



Product "A" is :

[JEE Main 2024 (Online) 5th April Evening Shift]

- (1) picric acid (2) oxalic acid
 (3) adipic acid (4) acetic acid

Scan or tap for the full solution



Q.39 Which of the following compound will most easily be attacked by an electrophile?

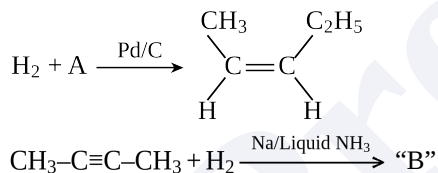
[JEE Main 2024 (Online) 1st February Morning Shift]

- (1) (2)
 (3) (4)

Scan or tap for the full solution



Q.40 In the given reactions identify A and B



[JEE Main 2024 (Online) 1st February Evening Shift]

- (1) A : n-Pentane B : Cis - 2 - butene
 (2) A : 2-Pentyne B : Cis-2-butene
 (3) A : n-Pentane B : trans-2-butene
 (4) A : 2-Pentyne B : trans-2-butene



Solution

Q.41 The set of meta directing functional groups from the following sets is :

[JEE Main 2024 (Online) 1st February Evening Shift]

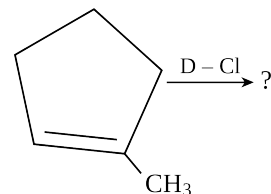
- (1) -CN, -NH₂, -NHR, -OCH₃
 (2) -CN, -CHO, -NHCOCH₃, -COOR
 (3) -NO₂, -NH₂, -COOH, -COOR
 (4) -NO₂, -CHO, -SO₃H, -COR

Scan or tap for the full solution



Q.42 Major product of the following reaction is -

[JEE Main 2024 (Online) 31st January Evening Shift]



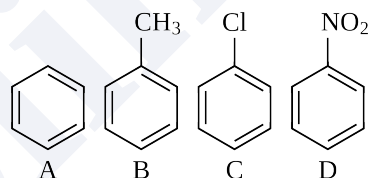
- (1) (2)
 (3) (4)

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Q.43 The correct order of reactivity in electrophilic substitution reaction of the following compounds is :

[JEE Main 2024 (Online) 31st January Evening Shift]

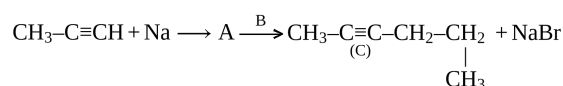


- (1) B > C > A > D (2) B > A > C > D
 (3) D > C > B > A (4) A > B > C > D

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Q.44 Compound A formed in the following reaction reacts with B to give the product C. Find out A and B.



[JEE Main 2024 (Online) 30th January Morning Shift]

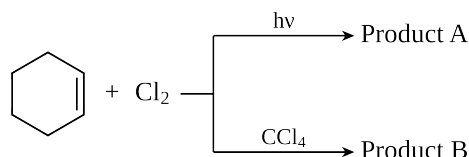
- (1) A = CH₃-C≡C[⊖]Na⁺, B = CH₃-CH₂-CH₂-Br
 (2) A = CH₃-CH=CH₂, B = CH₃-CH₂-CH₂-Br
 (3) A = CH₃-C≡C[⊖]Na⁺, B = CH₃-CH₂-CH₃
 (4) A = CH₃-CH₂-CH₃, B = CH₃-C≡CH

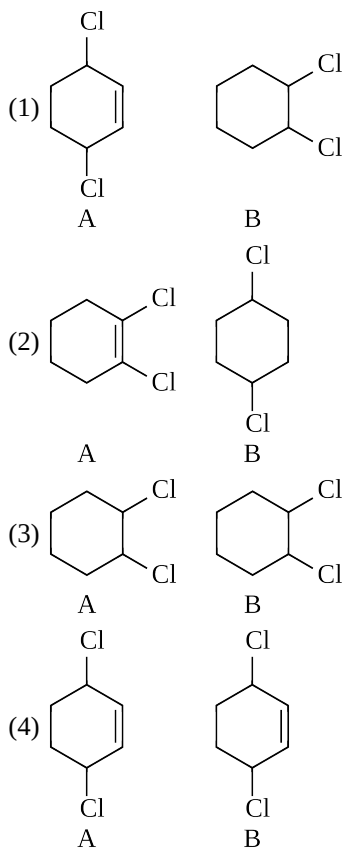
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Q.45 Identify product A and product B :

[JEE Main 2024 (Online) 29th January Morning Shift]



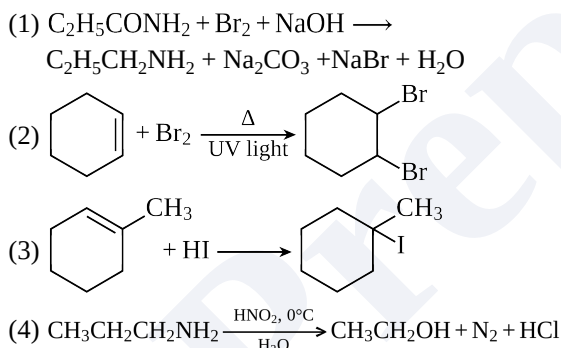


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Q.46 Which of the following reaction is correct?

[JEE Main 2024 (Online) 29th January Evening Shift]



Scan or tap for the full solution



Q.47 The incorrect statement regarding conformations of ethane is :

[JEE Main 2024 (Online) 27th January Evening Shift]

- (1) The dihedral angle in staggered conformation is 60° .
- (2) Ethane has infinite number of conformations.
- (3) Eclipsed conformation is the most stable conformation.
- (4) The conformations of ethane are inter-convertible to one-another.

Scan or tap for the full solution



Section B (Numerical) — 14 questions

Q.48 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 _____.

[JEE Main 2026 (Online) 6th April Evening Shift]

Scan or tap for the full solution



Q.49 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 _____.

[JEE Main 2026 (Online) 2nd April Morning Shift]

Scan or tap for the full solution



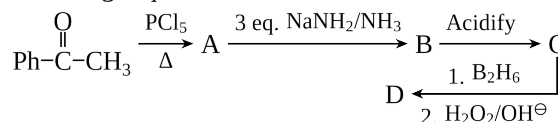
Q.50 The cycloalkene (X) on bromination consumes one mole of bromine per mole of (X) and gives the product (Y) in which C:Br ratio is 3:1. The percentage of bromine in the product (Y) is _____ %. (Nearest integer)
(Given : molar mass in g mol^{-1}
H:1, C:12, O:16, Br:80)

[JEE Main 2026 (Online) 22nd January Morning Shift]

Scan or tap for the full solution



Q.51 Identify the structure of the final product (D) in the following sequence of the reactions :



Total number of sp^2 hybridised carbon atoms in product D is _____.

[JEE Main 2025 (Online) 7th April Evening Shift]

Scan or tap for the full solution



Q.52 Isomeric hydrocarbons $\longrightarrow$ negative Baeyer's test (Molecular formula C_9H_{12})

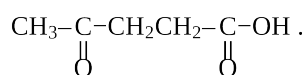
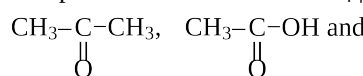
The total number of isomers from above with four different non-aliphatic substitution sites is -

[JEE Main 2025 (Online) 29th January Evening Shift]

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Q.53 A compound 'X' absorbs 2 moles of hydrogen and 'X' upon oxidation with KMnO_4/H^+ gives



The total number of σ bonds present in the compound 'X' is ____.

[JEE Main 2025 (Online) 23rd January Evening Shift]

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Q.54 The compound with molecular formula C_6H_6 , which gives only one monobromo derivative and takes up four moles of hydrogen per mole for complete hydrogenation has ____ π electrons.

[JEE Main 2025 (Online) 22nd January Evening Shift]

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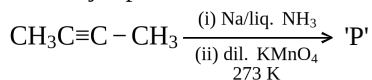
Q.55 Number of compounds from the following which cannot undergo Friedel-Crafts reactions is: ____
toluene, nitrobenzene, xylene, cumene, aniline, chlorobenzene, m-nitroaniline, m-dinitrobenzene

[JEE Main 2024 (Online) 9th April Evening Shift]

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Q.56 The major product of the following reaction is P.



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

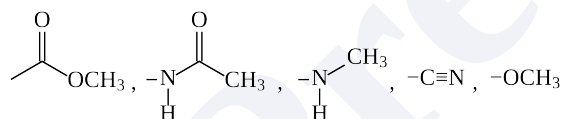
[JEE Main 2024 (Online) 6th April Morning Shift]

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Q.57 Total number of deactivating groups in aromatic electrophilic substitution reaction among the following is ____.

[JEE Main 2024 (Online) 1st February Morning Shift]



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Q.58 Number of alkanes obtained on electrolysis of a mixture of CH_3COONa and C_2H_5COONa is ____.

[JEE Main 2024 (Online) 31st January Morning Shift]

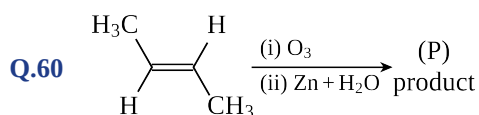
Scan or tap for the full solution



Q.59 Number of isomeric products formed by monochlorination of 2-methylbutane in presence of sunlight is ____.

[JEE Main 2024 (Online) 31st January Evening Shift]

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Consider the given reaction. The total number of oxygen atom/s present per molecule of the product (P) is ____.

[JEE Main 2024 (Online) 29th January Morning Shift]

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Q.61 Among the following, total number of meta directing functional groups is (Integer based)

$-\text{OCH}_3$, $-\text{NO}_2$, $-\text{CN}$, $-\text{CH}_3$, $-\text{NHCOCH}_3$, $-\text{COR}$, $-\text{OH}$, $-\text{COOH}$, $-\text{Cl}$

[JEE Main 2024 (Online) 27th January Morning Shift]

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ANSWER KEY

Section A (MCQ) — 47 questions

Ques.	1	2	3	4	5	6	7
Ans.	2	4	1	2	4	2	3
Ques.	8	9	10	11	12	13	14
Ans.	2	3	4	4	1	4	1
Ques.	15	16	17	18	19	20	21
Ans.	1	4	1	3	3	3	2
Ques.	22	23	24	25	26	27	28
Ans.	1	1	3	2	2	1, 4	2
Ques.	29	30	31	32	33	34	35
Ans.	3	1	1	3	1	4	4
Ques.	36	37	38	39	40	41	42
Ans.	1	2	3	2	4	4	4
Ques.	43	44	45	46	47		
Ans.	2	1	1	3	3		

Section B (Numerical) — 14 questions

Ques.	48	49	50	51	52	53	54
Ans.	4	17	66	7	2	27	8 or 6
Ques.	55	56	57	58	59	60	61
Ans.	4	2	2	3	6	1	4