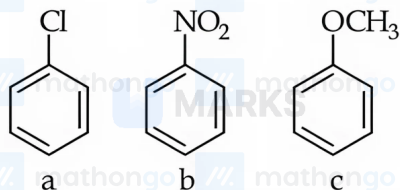


Q1. JEE Main 2026 (23 January Shift 1)

Consider the following compounds

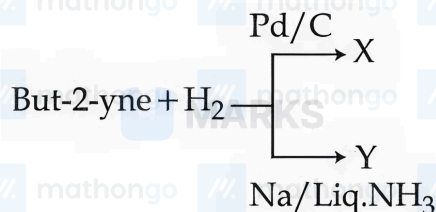


Arrange these compounds in the increasing order of reactivity with nitrating mixture.

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

Q2. JEE Main 2026 (23 January Shift 1)

But-2-yne and hydrogen (one mole each) are separately treated with (i) Pd/C and (ii) Na/liq. NH_3 to give the products X and Y respectively.



Identify the incorrect statements.

- A. *X* and *Y* are stereoisomers.
B. Dipole moment of *X* is zero.
C. Boiling point of *X* is higher than *Y*.
D. *X* and *Y* react with $\text{O}_3/\text{Zn} + \text{H}_2\text{O}$ to give different products.

Choose the correct answer from the options given below :

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

O3. JEE Main 2026 (28 January Shift 2)

Identify the correct statements : The presence of $-\text{NO}_2$ group in benzene ring

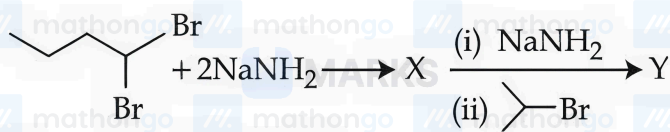
- A. activates the ring towards electrophilic substitutions.
B. deactivates the ring towards electrophilic substitutions.
C. activates the ring towards nucleophilic substitutions.
D. deactivates the ring towards nucleophilic substitutions.

Choose the correct answer from the options given below :

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

Q4. JEE Main 2026 (22 January Shift 2)

Consider the following reaction :



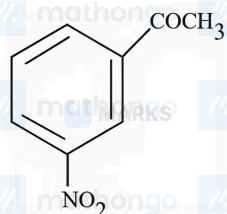
The product Y formed is :

- (1) 5-methylhex-2-yne (2) Isopropylbut-1-yne
(3) 2-methylhex-3-yne (4) 2-methylhex-2-yne

Q5. JEE Main 2026 (22 January Shift 1)

Given below are two statements:

Statement I: Benzene is nitrated to give nitrobenzene, which on further treatment with $\text{CH}_3\text{COCl}/\text{AlCl}_3$ will give



Statement II: $-\text{NO}_2$ group is a *m*-directing, and deactivating group.

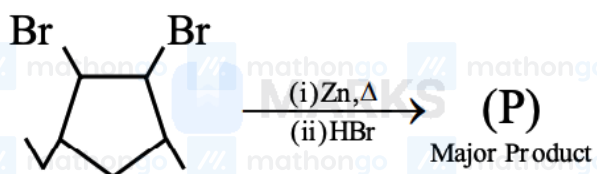
In the light of the above statements, choose the most appropriate answer from the options given below

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

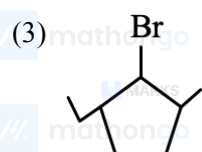
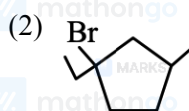
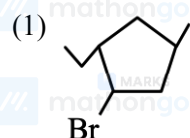
Q6. JEE Main 2026 (22 January Shift 1)

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 gmol^{-1} H : 1, C : 12, O : 16, Br : 80)

Q7. JEE Main 2026 (23 January Shift 2)

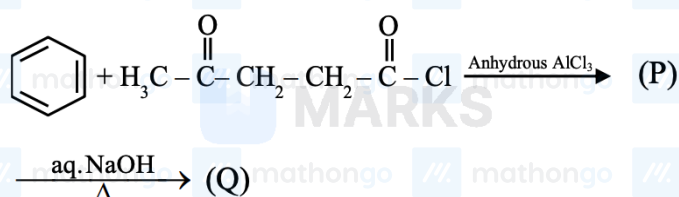


Identify (P)



Q8. JEE Main 2026 (23 January Shift 2)

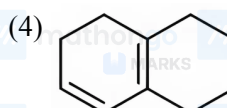
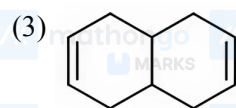
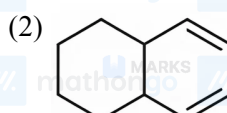
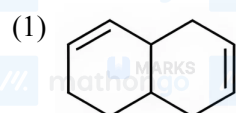
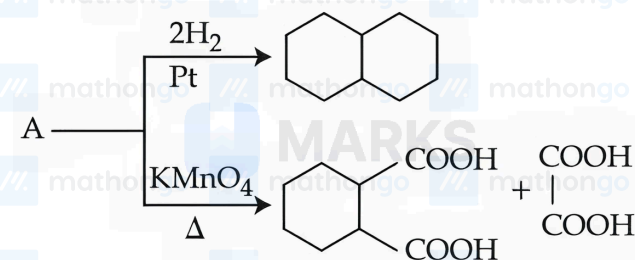
Consider the following reaction of benzene.

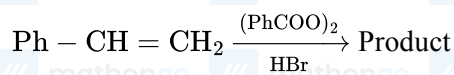


In compound (Q), the percentage of oxygen is ____ %. (Nearest integer)

Q9. JEE Main 2026 (21 January Shift 1)

Identify A in the following reaction.



Q10. JEE Main 2026 (28 January Shift 1)

Consider the above reaction

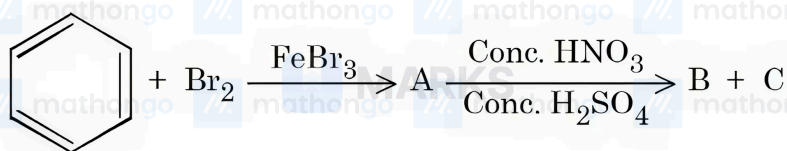
- A. The reaction proceeds through a more stable radical intermediate.
- B. The role of peroxide is to generate $\text{H}^\bullet$ (Hydrogen radical).
- C. During this reaction, benzene is formed as a byproduct.
- D. 1-Bromo-2-phenylethane is formed as the minor product.
- E. The same reaction in absence of peroxide proceeds via carbocation intermediate.

Identify the correct statements. Choose the correct answer from the options given below:

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

Q11. JEE Main 2026 (28 January Shift 1)

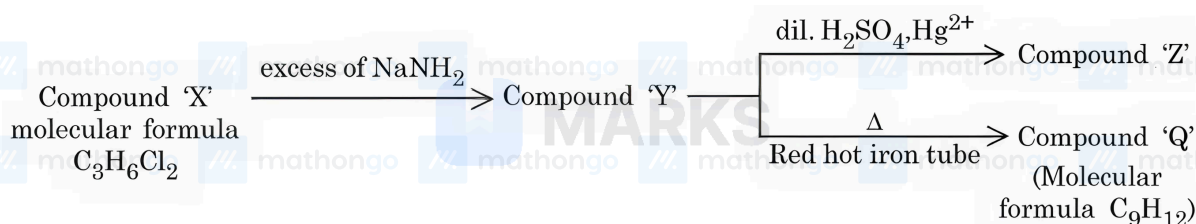
Method used for separation of mixture of products (B and C) obtained in the following reaction is



- (1) steam distillation
- (2) simple distillation
- (3) sublimation
- (4) fractional distillation

Q12. JEE Main 2026 (28 January Shift 1)

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:

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

ANSWERS AND SOLUTIONS

1. (2) 2. (1) 3. (2) 4. (3) 5. (1) 6. 66 7. (4) 8. 10
9. (2) 10. (3) 11. (4) 12. (3)

1. (2) Electrophilic aromatic nitration reactivity depends on the electronic effects of substituents.

Compound a (chlorobenzene) has a weakly deactivating chlorine group.

Compound b (nitrobenzene) has a strongly electron-withdrawing nitro group, making it significantly deactivated.

Compound c (anisole) has an electron-donating methoxy group, making it highly activated.

In order of increasing reactivity with nitrating mixture: nitrobenzene (b) is least reactive due to strong deactivation, chlorobenzene (a) is moderately reactive, and anisole (c) is most reactive due to activation.

The increasing order is $b < a < c$.

2. (1) But-2-yne ($CH_3 - C \equiv C - CH_3$) undergoes partial hydrogenation.

Reaction with Pd/C (Lindlar-like conditions for 1 mole H_2) gives cis-but-2-ene as product X.

Reaction with $Na/liq. NH_3$ (Birch reduction) gives trans-but-2-ene as product Y.

Statement A: X (cis) and Y (trans) are geometrical isomers, hence stereoisomers. This is correct.

Statement B: Cis-but-2-ene (X) has a non-zero dipole moment ($\mu \neq 0$) due to the additive nature of bond moments, while trans-but-2-ene (Y) has zero dipole moment ($\mu = 0$) due to symmetry. Thus, statement B is incorrect.

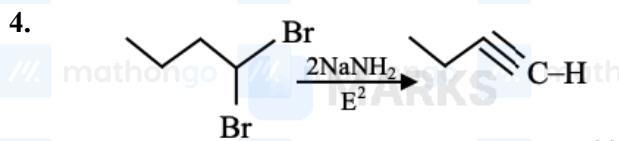
Statement C: Cis-isomers generally have higher boiling points than trans-isomers due to higher dipole-dipole interactions. So, B.P. of $X > Y$. This is correct.

Statement D: Reductive ozonolysis ($O_3/Zn, H_2O$) of both cis-but-2-ene and trans-but-2-ene yields the same product, ethanal (CH_3CHO). Thus, statement D is incorrect.

The incorrect statements are B and D.

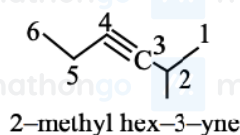
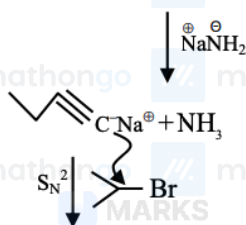
3. (2) Presence of NO_2 group in Benzene ring deactivate ring towards electrophilic substitution reaction due to $-M$ effective & activate ring towards nucleophilic substitution.

So, B & C are correct.



(3)

(x)



5. (1) Statement I: Benzene reacts with nitrating mixture (*conc.* HNO_3 + *conc.* H_2SO_4) to form nitrobenzene. However, nitrobenzene is highly deactivated due to the strong electron-withdrawing $-I$ and $-M$ effects of the $-NO_2$ group. Friedel-Crafts reactions (alkylation or acylation) do not occur on strongly deactivated rings like nitrobenzene. Thus, nitrobenzene will not react with $CH_3COCl/AlCl_3$ to give m-nitroacetophenone. Statement I is incorrect.

Statement II: The $-NO_2$ group is a meta-directing group because it withdraws electron density from the ortho and para positions more than from the meta position. It is also a deactivating group as it reduces the overall electron density of the benzene ring, making it less reactive towards electrophilic aromatic substitution. Statement II is correct.

Therefore, Statement I is incorrect but Statement II is correct.

6. (66) A cycloalkene (X) undergoes bromination with 1 mole of Br_2 , consuming 2 moles of Br atoms (addition to the double bond).

The product (Y) has C:Br ratio of 3:1.

With 2 Br atoms present, the number of C atoms is $2 \times 3 = 6$.

Therefore, product Y has composition $C_6H_{12}Br_2$ with molar mass

$$= 6(12) + 12(1) + 2(80) = 72 + 12 + 160 = 244 \text{ g/mol.}$$

$$\text{Percentage of Br} = (2 \times 80 / 244) \times 100 = (160 / 244) \times 100$$

$$= 65.57\%, \text{ which rounds to } 66\% \text{ (nearest integer).}$$

7. (4) The vicinal dibromide undergoes elimination with Zn/Δ to form cyclohexene.

Cyclohexene reacts with HBr. The secondary carbocation formed undergoes a 1,2-hydride shift to give a more

stable tertiary carbocation, which then combines with Br^- to give 1-bromocyclohexane (with Br at the more substituted position).

The major product (P) is 1-bromo-1-methylcyclohexane (tertiary alkyl bromide).

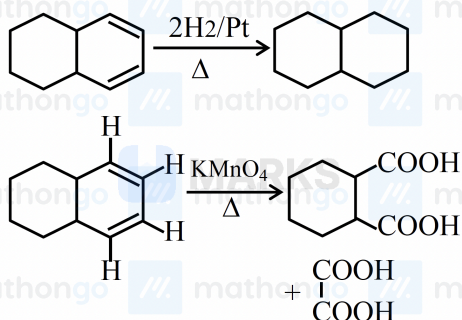
8. (10) Benzene reacts with $\text{CH}_3\text{-CO-CH}_2\text{-CH}_2\text{-CO-Cl}$ in the presence of anhydrous AlCl_3 (Friedel-Crafts acylation) to give product P (a keto-ketone).

P on treatment with aq. NaOH and heating undergoes intramolecular aldol condensation to give a cyclic enone Q.

Molecular mass of Q = 157

Percentage of oxygen in Q = $\frac{16}{157} \times 100 = 10.19\% \approx 10\%$

9.

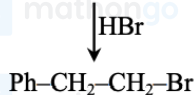
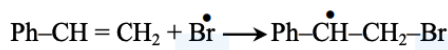
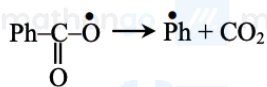
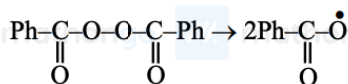


(2)

10. (3) $\text{Ph-CH=CH}_2 \xrightarrow[\text{HBr}]{(\text{PhCOO})_2} \text{Ph-CH}_2\text{-CH}_2\text{-Br}$

Anti Markovnikov addition

- Reaction follow radical addition in presence of peroxide
- In absence of peroxide follow carbocation mechanism
- Benzene also formed

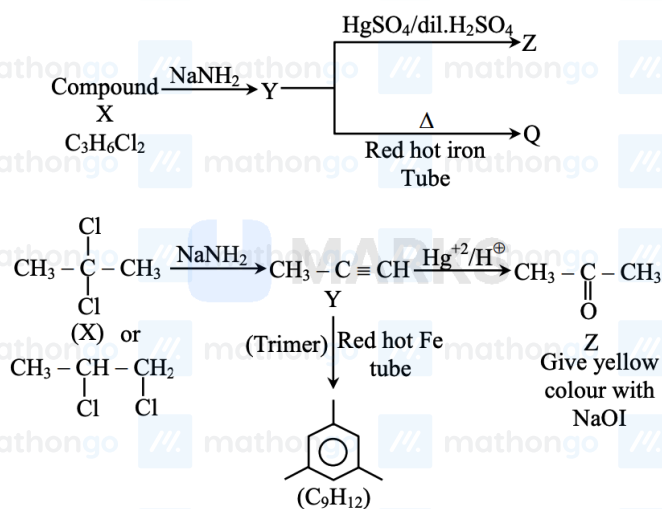


11. (4) Benzene reacts with Br_2 in the presence of FeBr_3 (Friedel-Crafts halogenation) to give bromobenzene.

Bromobenzene on nitration with $\text{HNO}_3/\text{H}_2\text{SO}_4$ gives a mixture of ortho-bromonitrobenzene and para-bromonitrobenzene (since $-\text{Br}$ is an ortho/para director).

The two products (B and C) are separated by fractional distillation method due to their different boiling points.

12.



(3)

Both Statement I and Statement II are true.