

CHEMISTRY · JEE MAIN

Hydrocarbons: Aromatic (Arenes)

Chapter-wise previous year questions, with answer key

51

PYQS

2020–2026

PAPERS

4

TOPICS

Aromaticity and Huckel's Rule

Directive Effects

Electrophilic Aromatic Substitution

Reactions of Side Chain

- 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.

Stuck on a question?

Free step-by-step solutions are on PrepWiser, where available: tap "Step-by-step solution" at the top right of a question.

Practise this chapter online with instant answer checking: prepwis.in/learn · No signup needed to browse

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 · Terms: prepwis.in/terms

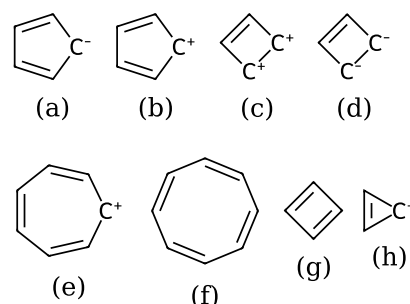
Aromaticity and Huckel's Rule · 17 PYQs

Q1 JEE Main 2025 · 2 Apr · Shift 1

[Step-by-step solution](https://www.prepwiser.in/questions/6Skfy3XnUj) · prepwiser.in/questions/6Skfy3XnUj

Designate whether each of the following compounds is aromatic or not aromatic.

- (A) *a, c, d, e, h* aromatic and *b, f, g* not aromatic
 (B) *b, e, f, g* aromatic and *a, c, d, h* not aromatic
 (C) *a, b, c, d* aromatic and *e, f, g, h* not aromatic
 (D) *e, g* aromatic and *a, b, c, d, f, h* not aromatic

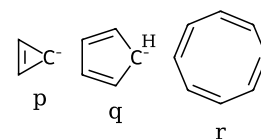


Q2 JEE Main 2025 · 23 Jan · Shift 1

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

The correct stability order of the following species/molecules is:

- (A) $q > r > p$ (B) $q > p > r$ (C) $p > q > r$ (D) $r > q > p$



Q3 JEE Main 2025 · 22 Jan · Shift 2 **NUMERICAL**

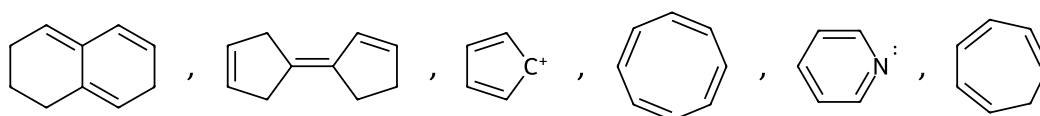
[Step-by-step solution](https://www.prepwiser.in/questions/FTDLs5Inr0) · prepwiser.in/questions/FTDLs5Inr0

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.

Q4 JEE Main 2024 · 8 Apr · Shift 2 **NUMERICAL**

[Step-by-step solution](https://www.prepwiser.in/questions/NUc9D1bzyO) · prepwiser.in/questions/NUc9D1bzyO

Total number of aromatic compounds among the following compounds is _____.

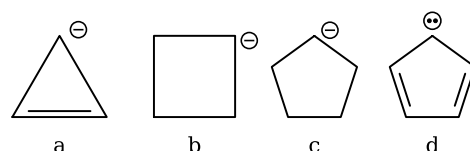


Q5 JEE Main 2024 · 4 Apr · Shift 2

[Step-by-step solution](https://www.prepwiser.in/questions/Dy92meKkDV) · prepwiser.in/questions/Dy92meKkDV

Correct order of stability of carbanion is:

- (A) $d > c > b > a$ (B) $c > b > d > a$
 (C) $d > a > c > b$ (D) $a > b > c > d$



Q6 JEE Main 2024 · 4 Apr · Shift 2 **NUMERICAL**

[Step-by-step solution](https://www.prepwiser.in/questions/C08IOTCZGt) · prepwiser.in/questions/C08IOTCZGt

Vanillin compound obtained from vanilla beans, has total sum of oxygen atoms and π electrons is _____.

Q7 JEE Main 2024 · 30 Jan · Shift 1

[Step-by-step solution](https://www.prepwiser.in/questions/oWXgEmHfz7) · prepwiser.in/questions/oWXgEmHfz7

Which of the following molecule/species is most stable?

- (A) (B) (C) (D)

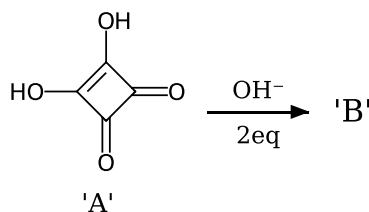
Q8 JEE Main 2023 · 13 Apr · Shift 1

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

Among the following compounds, the one which shows highest dipole moment is

- (A) (B) (C) (D)

Correct statements for the given reaction are:



- A. Compound 'B' is aromatic
- B. The completion of above reaction is very slow
- C. 'A' shows tautomerism
- D. The bond lengths of C-C in compound B are found to be same

Choose the correct answer from the options given below:

- (A) B, C and D only (B) A, C and D only (C) A, B and D only (D) A, B and C only

Given below are two statements, one is labelled as Assertion A and the other is labelled as Reason R

Assertion A : Benzene is more stable than hypothetical cyclohexatriene

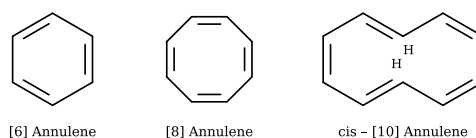
Reason R : The delocalised π electron cloud is attracted more strongly by nuclei of carbon atoms.

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

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

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

Assertion A: [6] Annulene, [8] Annulene and cis-[10] Annulene, are respectively aromatic, not-aromatic and aromatic.



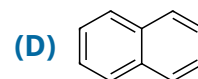
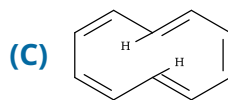
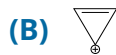
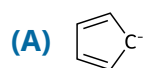
Reason R: Planarity is one of the requirements of aromatic systems.

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

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

Solve these online with step-by-step solutions > [prepwiser.in/learn/chapter/gP7tLmA63M/questions](https://www.prepwiser.in/learn/chapter/gP7tLmA63M/questions)

Which of the following compounds is not aromatic?



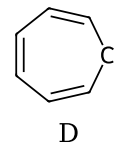
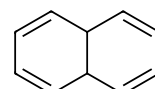
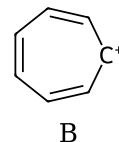
Which of the following structure are aromatic in nature?

(A) A, B, C, and D

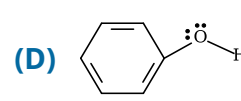
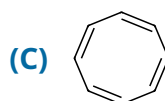
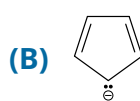
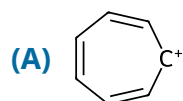
(B) Only A and B

(C) Only A and C

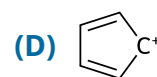
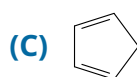
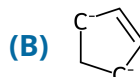
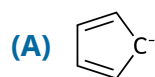
(D) Only B, C and D



Which one of the following compounds is not aromatic?



Which of the following is an aromatic compound?



Among the following, the aromatic compounds are:

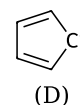
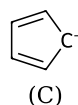
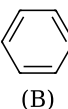
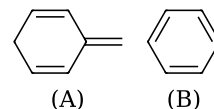
Choose the correct answer from the following options:

(A) (B), (C) and (D) only

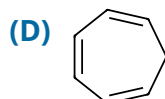
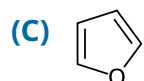
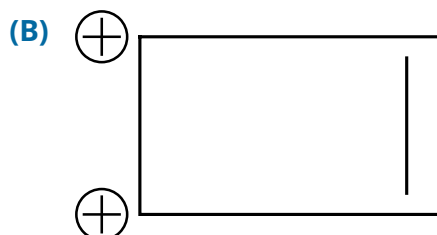
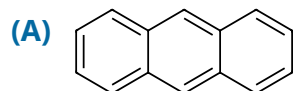
(B) (B) and (C) only

(C) (A), (B) and (C) only

(D) (A) and (B) only



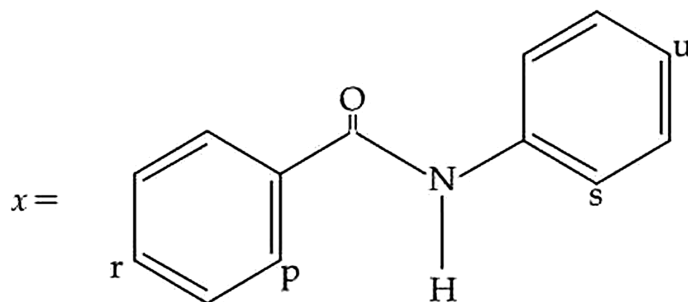
Which one of the following compounds is non-aromatic?



Q18 JEE Main 2026 · 2 Apr · Shift 1

[Step-by-step solution](#) › prepwiser.in/questions/Ge4tQh8amQ

For the given molecule, "x", the preferred site for the attack of the electrophile is:



(A) Predominantly at "r"

(B) "r" and "u"

(C) "p" and "s"

(D) Predominantly at "u"

Q19 JEE Main 2026 · 28 Jan · Shift 2

[Step-by-step solution](#) › prepwiser.in/questions/B90JSNB5W-

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:

(A) A and D Only

(B) B and D Only

(C) C and A Only

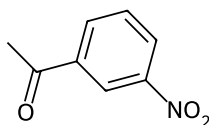
(D) B and C Only

Q20 JEE Main 2026 · 22 Jan · Shift 1

[Step-by-step solution](#) › prepwiser.in/questions/296HPxn8mg

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

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

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:

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

Isomeric hydrocarbons → negative Baeyer's test

(Molecular formula C_9H_{12})

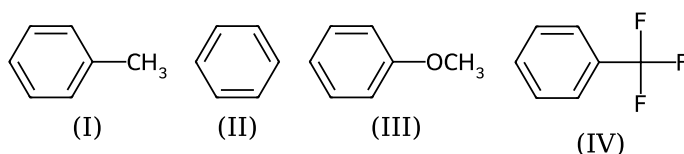
The total number of isomers from above with four different non-aliphatic substitution sites is -

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:

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



The correct arrangement for decreasing order of electrophilic substitution for above compounds is:

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

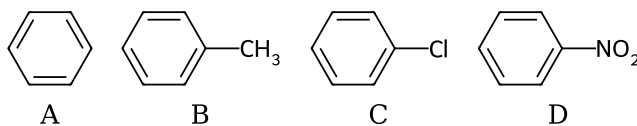
The set of meta directing functional groups from the following sets is:

- (A) $-\text{CN}$, $-\text{NH}_2$, $-\text{NHR}$, $-\text{OCH}_3$ (B) $-\text{CN}$, $-\text{CHO}$, $-\text{NHCOCH}_3$, $-\text{COOR}$
(C) $-\text{NO}_2$, $-\text{NH}_2$, $-\text{COOH}$, $-\text{COOR}$ (D) $-\text{NO}_2$, $-\text{CHO}$, $-\text{SO}_3\text{H}$, $-\text{COR}$

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



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



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

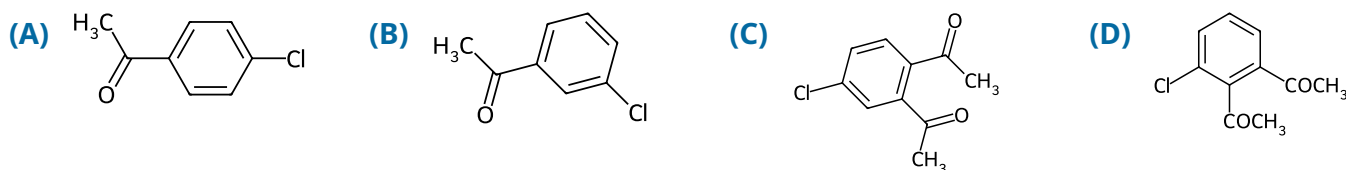
the arenium ion which is not involved in the bromination of Aniline is _____.



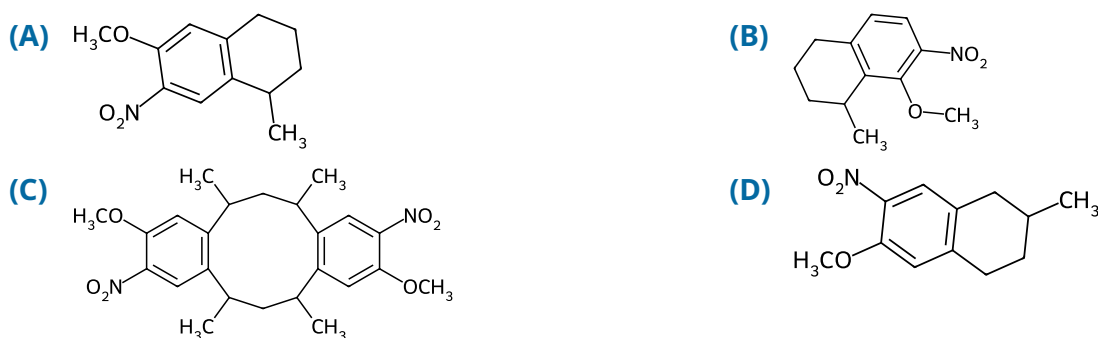
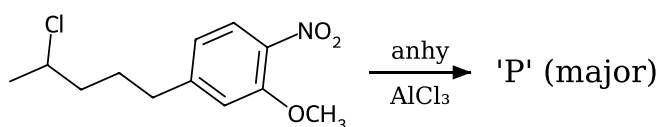
Among the following, total number of meta directing functional groups is (Integer based)

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

The major product formed in the Friedel-Craft acylation of chlorobenzene is



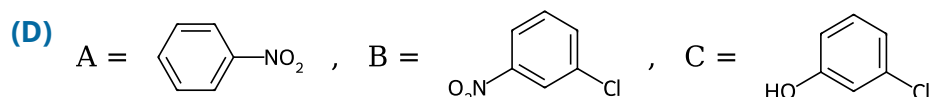
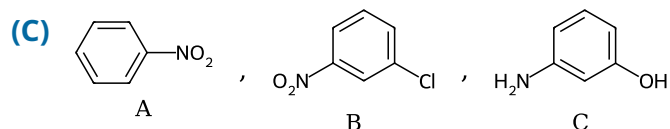
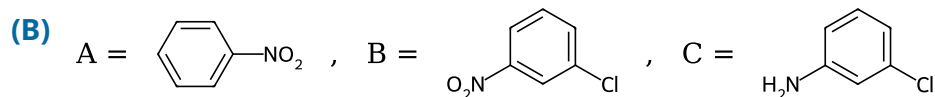
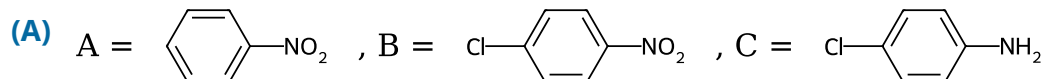
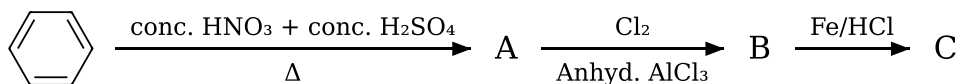
The major product 'P' formed in the given reaction is:



Halogenation of which one of the following will yield m-substituted product with respect to methyl group as a major product?



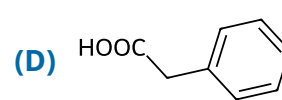
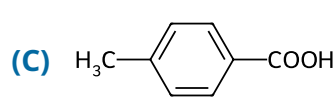
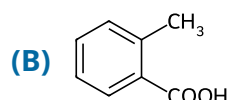
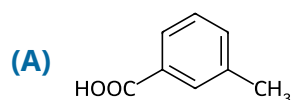
Identify correct A, B and C in the reaction sequence given below:



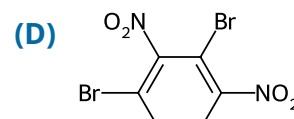
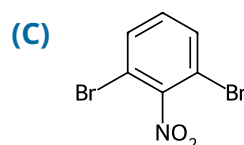
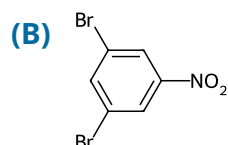
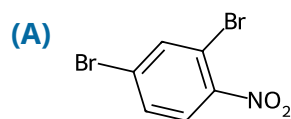
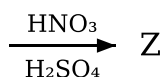
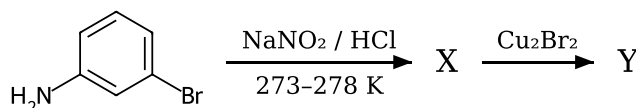
The correct sequence of reagents used in the preparation of 4-bromo-2-nitroethyl benzene from benzene is:

- (A) $\text{CH}_3\text{COCl} / \text{AlCl}_3, \text{Br}_2 / \text{AlBr}_3, \text{HNO}_3 / \text{H}_2\text{SO}_4, \text{Zn} / \text{HCl}$
 (B) $\text{CH}_3\text{COCl} / \text{AlCl}_3, \text{Zn} - \text{Hg} / \text{HCl}, \text{Br}_2 / \text{AlBr}_3, \text{HNO}_3 / \text{H}_2\text{SO}_4$
 (C) $\text{Br}_2 / \text{AlBr}_3, \text{CH}_3\text{COCl} / \text{AlCl}_3, \text{HNO}_3 / \text{H}_2\text{SO}_4, \text{Zn} / \text{HCl}$
 (D) $\text{HNO}_3 / \text{H}_2\text{SO}_4, \text{Br}_2 / \text{AlBr}_3, \text{CH}_3\text{COCl} / \text{AlCl}_3, \text{Zn} - \text{Hg} / \text{HCl}$

[P] on treatment with $\text{Br}_2 / \text{FeBr}_3$ in CCl_4 produced a single isomer $\text{C}_8\text{H}_7\text{O}_2\text{Br}$ while heating [P] with sodalime gave toluene. The compound [P] is



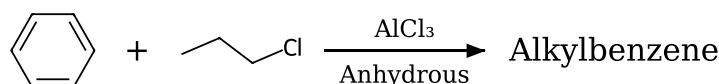
The major product Z obtained in the following reaction scheme is:



Q37 JEE Main 2026 · 5 Apr · Shift 1

[Step-by-step solution](https://www.prepwiser.in/questions/XpVNzdg-U_) · prepwiser.in/questions/XpVNzdg-U_

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



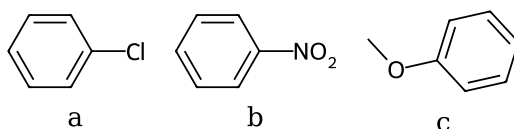
- A. Major product is n-propyl benzene.
B. iso-propyl carbocation intermediate is also generated.
C. Multiple substitution is inevitable.
D. Introducing electron-donating substituent on benzene will not produce any alkyl benzene.
Choose the correct answer from the options given below:

(A) A and D only (B) B and C only (C) A and C only (D) B and D only

Q38 JEE Main 2026 · 23 Jan · Shift 1

[Step-by-step solution](https://www.prepwiser.in/questions/84_tRr7h6t) · prepwiser.in/questions/84_tRr7h6t

Consider the following compounds



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

(A) $c < b < a$ (B) $b < c < a$ (C) $c < a < b$ (D) $b < a < c$

Q39 JEE Main 2024 · 9 Apr · Shift 2

NUMERICAL

[Step-by-step solution](https://www.prepwiser.in/questions/Xd8ypBzdb4) · prepwiser.in/questions/Xd8ypBzdb4

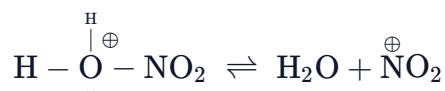
Number of compounds from the following which cannot undergo Friedel-Crafts reactions is: _____
toluene, nitrobenzene, xylene, cumene, aniline, chlorobenzene, *m*-nitroaniline, *m*-dinitrobenzene

Q40 JEE Main 2024 · 5 Apr · Shift 1

[Step-by-step solution](https://www.prepwiser.in/questions/sSDrNCF48I) · prepwiser.in/questions/sSDrNCF48I

Given below are two statements:

Statement I : Nitration of benzene involves the following step -



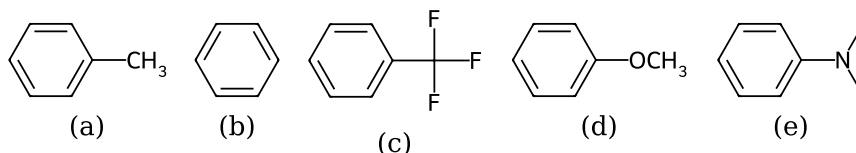
Statement II : Use of Lewis base promotes the electrophilic substitution of benzene.

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

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

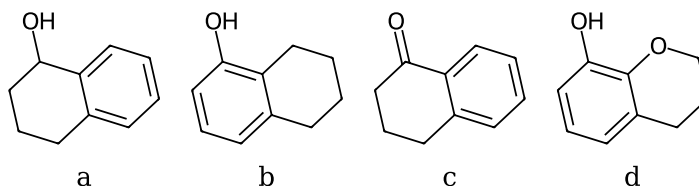
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Decreasing order of reactivity towards electrophilic substitution for the following compounds is:



- (A) $a > d > e > b > c$ (B) $d > a > e > c > b$ (C) $c > b > a > d > e$ (D) $e > d > a > b > c$

Arrange the following compounds in increasing order of rate of aromatic electrophilic substitution reaction



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

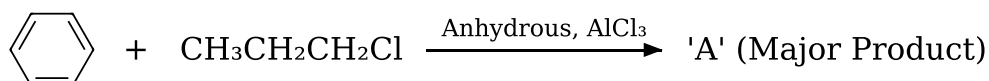
Arrange the following in increasing order of reactivity towards nitration

- A. p-xylene
B. bromobenzene
C. mesitylene
D. nitrobenzene
E. benzene

Choose the correct answer from the options given below

- (A) $C < D < E < A < B$ (B) $D < B < E < A < C$ (C) $D < C < E < A < B$ (D) $C < D < E < B < A$

In the presence of sunlight, benzene reacts with Cl_2 to give product, X. The number of hydrogens in X is _____.

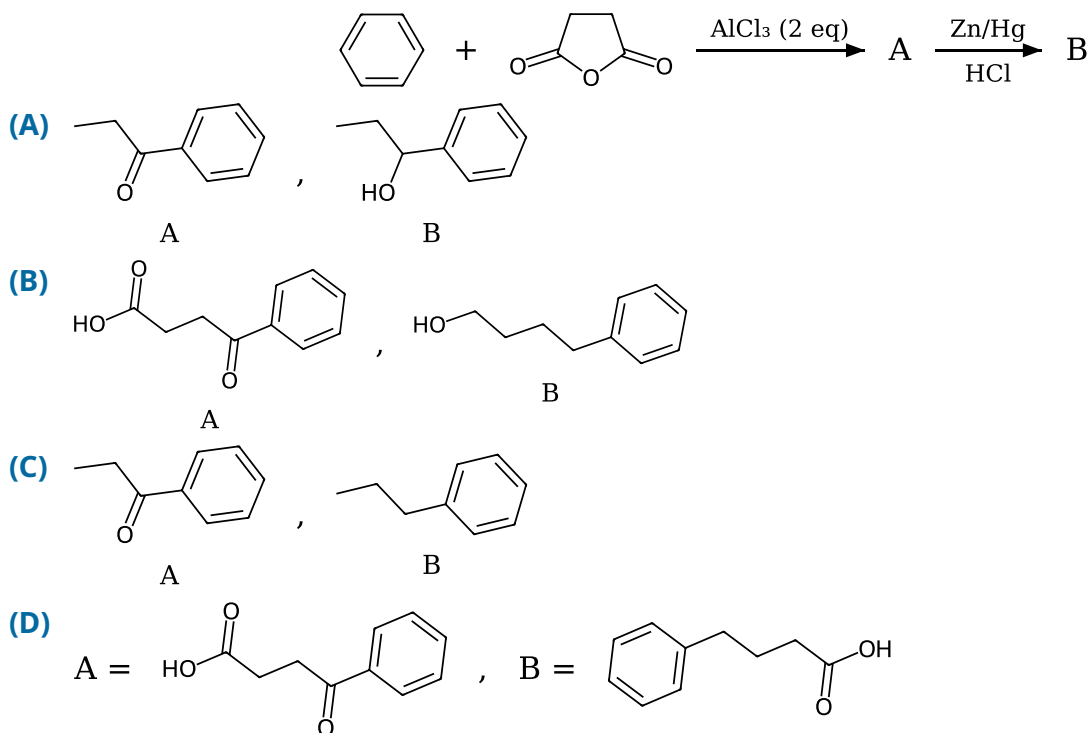


The stable carbocation formed in the above reaction is

- (A) $\text{CH}_3\text{CH}_2\overset{\oplus}{\text{C}}\text{H}_2$ (B) $\text{CH}_3\overset{\oplus}{\text{C}}\text{H}_2$
(C) $\text{CH}_3 - \overset{\oplus}{\text{C}}\text{H} - \text{CH}_3$ (D)

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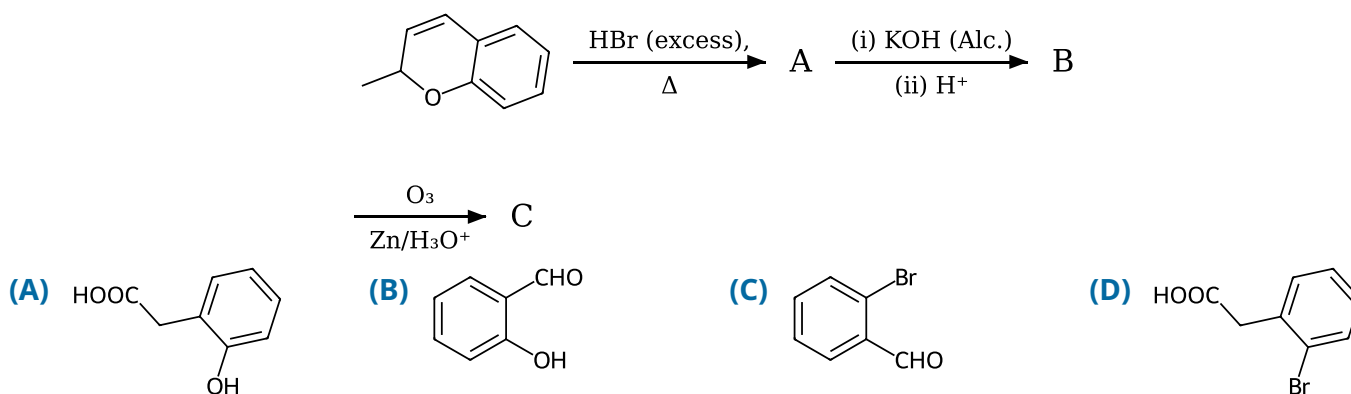
The structures A and B formed in the following reaction are : [Ph = $-\text{C}_6\text{H}_5$]



Benzene on nitration gives nitrobenzene in presence of HNO_3 and H_2SO_4 mixture, where:

- (A)** both H_2SO_4 and HNO_3 act as a bases
(B) HNO_3 acts as an acid and H_2SO_4 acts as a base
(C) both H_2SO_4 and HNO_3 act as an acids
(D) HNO_3 acts as a base and H_2SO_4 acts as an acid

The major aromatic product C in the following reaction sequence will be:



Which of these will produce the highest yield in Friedel Crafts reaction?



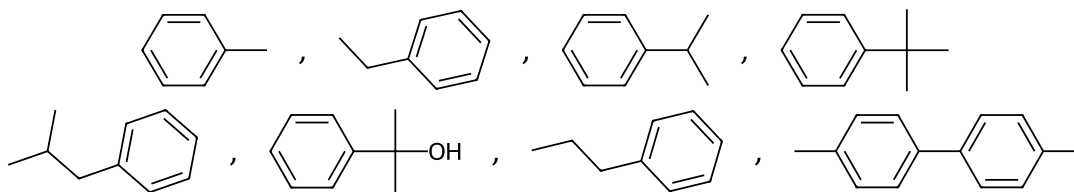
In the following sequence of reactions the maximum number of atoms present in molecule 'C' in one plane is _____.



(A is a lowest molecular weight alkyne)

Reactions of Side Chain · 1 PYQ

The total number of compounds from below when treated with hot KMnO_4 , giving benzoic acid is:



(A) 4

(B) 3

(C) 5

(D) 6

Answer key: Hydrocarbons: Aromatic (Arenes)

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1. A	2. A	3. 8	4. 1	5. A	6. 11	7. B	8. D	9. B	10. B
11. D	12. C	13. B	14. C	15. A	16. B	17. D	18. D	19. D	20. A
21. B	22. 2	23. A	24. B	25. D	26. 2	27. B	28. D	29. 4	30. A
31. A	32. C	33. B	34. B	35. C	36. A	37. B	38. D	39. 4	40. B
41. D	42. C	43. B	44. 6	45. C	46. D	47. D	48. B	49. A	50. 13
51. C									

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