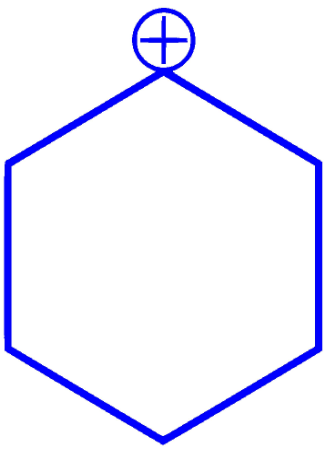
General Organic Chemistry

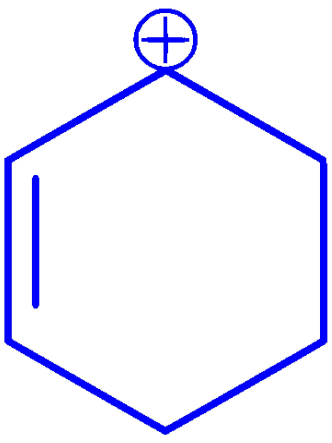
Question1

Identify the most stable carbocation from the following

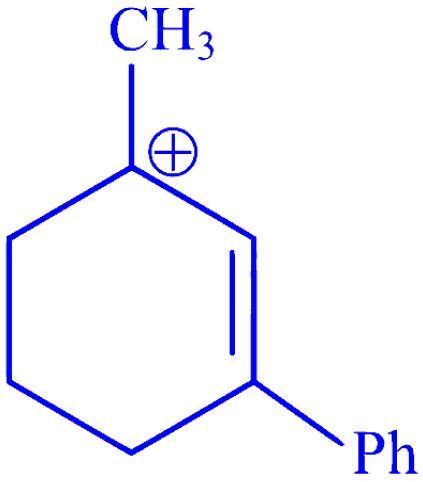
AP EAPCET 2025 - 26th May Evening Shift

Options:

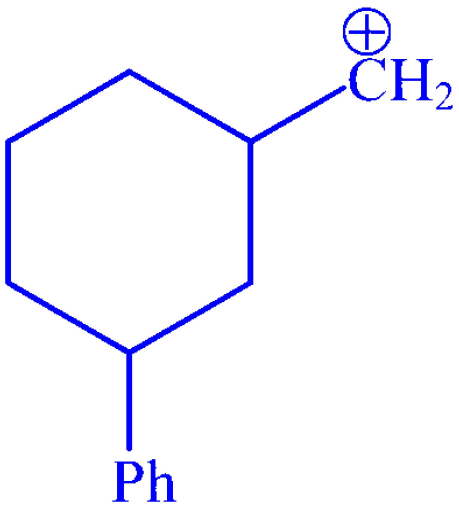
A. 

B. 

C.



D.



Answer: C

Solution:

A carbocation is stable when it thes resonance, hyperconjugation, I effect.

In option (c), Benzylic carbocation (resonance with phenyl ring) and methyl group (hyperconjugation) lead to more stability.

Question2

Observe the following substances.

Ethanol, acetic acid, ethylamine, trimethylamine, salicylic acid. ethanal.

In the above list, the number of substances with H -bonding is

AP EAPCET 2025 - 24th May Morning Shift

Options:

A.

4

B.

3

C.

5

D.

2

Answer: A

Solution:

Hydrogen bonding occurs when a molecule has a hydrogen atom bonded to a highly electronegative atom like **N, O, or F** — and there is a lone pair on another **N, O, or F** atom that can participate in bonding.

1. Ethanol (CH_3CH_2OH)

- Has an –OH group

✅ **Can form hydrogen bonds** (O–H···O)

2. Acetic acid (CH_3COOH)

- Has both C=O and –OH groups

✅ **Forms strong hydrogen bonds** (dimers, intramolecular and intermolecular H-bonding possible)

3. Ethylamine ($CH_3CH_2NH_2$)

- Has an $–NH_2$ group

✅ **Can form hydrogen bonds** (N–H···N or N–H···O with other molecules)

4. Trimethylamine ($(CH_3)_3N$)

- Has nitrogen with a lone pair but **no N–H bond**

❌ **Cannot form H-bonds as donor**, though it can accept them — but "having H-bonding" typically means being capable of *intermolecular H-bonding* as both donor and acceptor. Since it cannot donate an H, we generally **do not count it** as hydrogen-bonding on its own.

5. Salicylic acid (o-hydroxybenzoic acid)

- Has both –OH and –COOH groups; strong **intramolecular** hydrogen bond and intermolecular as well.

✅ **H-bonding present**

6. Ethanal (CH_3CHO)

- Has a C=O group only, no –OH or –NH–

❌ **Cannot form hydrogen bonds** with itself (can accept H bonds but not donate).

✅ Substances with H-bonding:

1. Ethanol
2. Acetic acid
3. Ethylamine
4. Salicylic acid

Total = 4

✅ **Correct Answer: Option A (4)**

Question3

In compound (X), hyperconjugation is present and in (Y), resonance effect is present. What are X and Y, respectively?

AP EAPCET 2025 - 24th May Morning Shift

Options:

A.

Toluene, prop-2-en-1-ol

B.

Aniline, 2-propenal

C.

Toluene, nitrobenzene

D.

1-bromopropane, phenol

Answer: C

Solution:

Toluene would be a suitable example of X and nitrobenzene for Y.

In toluene, the methyl group CH bond can participate in hyperconjugation with the pi system of benzene ring.

Nitrobenzene exhibit resonance due to the interaction of the lone pair on the oxygen atom of the nitrogroup with the pi electrons of the benzene ring.

Question4

The number of alicyclic compounds from the following is cyclohexene, anisole, pyridine, tetrahydrofuran, biphenyl.

AP EAPCET 2024 - 23th May Morning Shift

Options:

A. 2

B. 3

C. 1

D. 4

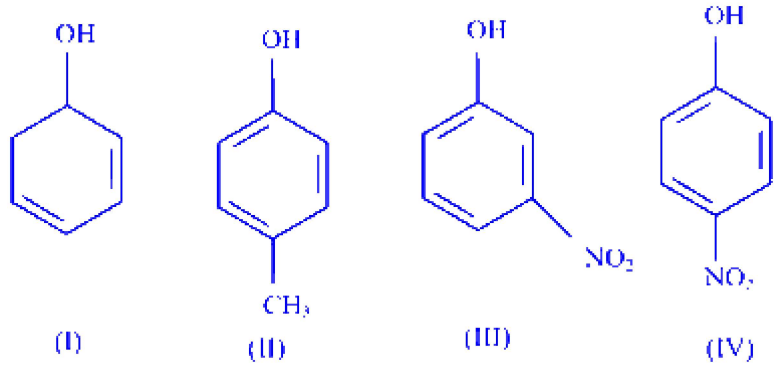
Answer: A

Solution:

Alicyclic compounds are those organic compounds that are both cyclic are aliphatic. These are saturated/unsaturated hydrocarbons containing non-aromatic rings of carbon atoms. It may contain one or more aliphatic side chain.Cyclohexene and tetrahydrofuran are alicyclic, while other are aromatic.

Question5

Arrange the following in the correct order of their acidic strength.



(I) (II) (III) (IV)

AP EAPCET 2024 - 22th May Morning Shift

Options:

A. III > IV > I > II

B. IV > III > I > II

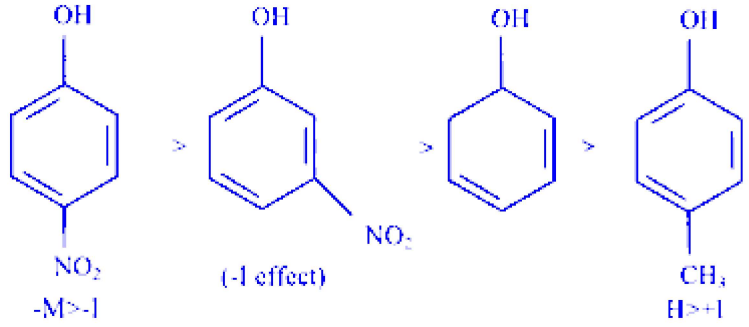
C. II > I > III > IV

D. I > IV > III > II

Answer: B

Solution:

The correct order of acidic strength is



Acidic character $\propto$ stability of conjugate base Stability of anion $\propto -M \propto -I$ effect and

$$\frac{1}{+I \text{ effect}} \propto \frac{1}{\text{hyperconjugation}}$$

Question6

Number of deactivating group of the following is $-Cl, -SO_3H, -OH, -NHC_2H_5, -COOCH_3, -CH_3$

AP EAPCET 2024 - 21th May Evening Shift

Options:

A. 4

B. 3

C. 2

D. 1

Answer: B

Solution:

A deactivating group attached to a benzene ring reduces the electron density within the ring, thereby slowing down and complicating electrophilic aromatic substitution reactions compared to reactions with benzene alone.

In the given list, the following are deactivating groups:

$-Cl$

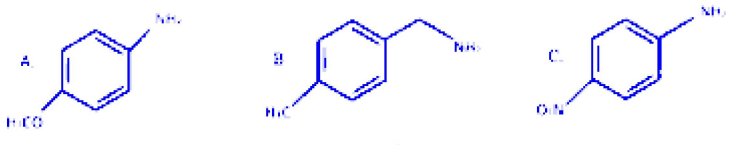
$-SO_3H$

$-COOCH_3$

These groups withdraw electron density from the benzene ring, making it less reactive to electrophiles.

Question7

Arrange the following in decreasing order of their basicity.



AP EAPCET 2024 - 21th May Morning Shift

Options:

A. $B > C > A$

B. $B > A > C$

C. $A > B > C$

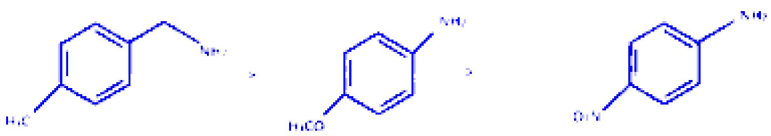
D. $A > C > B$

Answer: B

Solution:

The electron withdrawing group increases the basicity while electron donating group decreases the basicity. So , the correct order is

$B > A > C$



Question8

The number of nucleophiles in the following list is

$CH_3NH_2, CH_3CHO, C_2H_4, CH_3SH$

AP EAPCET 2024 - 20th May Morning Shift

Options:

A. 3

B. 2

C. 4

D. 1

Answer: B

Solution:

Nucleophiles are electron-rich species that donate an electron pair. In the given list:

CH_3NH_2 **(methylamine)**: This compound contains a nitrogen atom with a lone pair of electrons, making it an effective nucleophile.

CH_3SH **(methanethiol)**: The sulfur atom in this molecule also has a lone pair of electrons, allowing it to act as a nucleophile.

On the other hand, electrophiles are electron-deficient species that can accept an electron pair. In the list:

CH_3CHO **(acetaldehyde)**: This compound is an electrophile because the carbonyl carbon is electron-deficient and can accept electron pairs.

Lastly:

C_2H_4 **(ethylene)**: This acts as a substrate and is not typically considered a nucleophile.

Therefore, the number of nucleophiles in the list is two: CH_3NH_2 and CH_3SH.

Question9

Tropolone is an example for which of the following class of compounds?

AP EAPCET 2024 - 19th May Evening Shift

Options:

A. Benzenoid aromatic compound.

B. Non-benzenoid aromatic compound.

C. Alicylic compound.

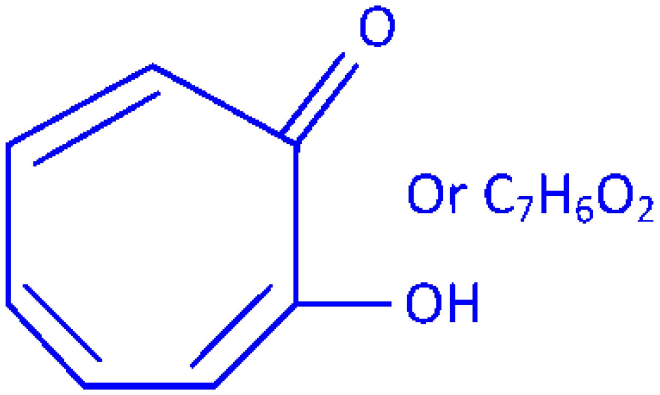
D. Heterocyclic aromatic compound.

Answer: B

Solution:

Tropolone is an example of non-benzenoid aromatic compound.

Tropolone is an organic compound that is pale yellow in colour. It is a seven-membered cyclic ring.



Question10

From the following identify the groups that exhibit negative resonance $(-R)$ effect when attached to conjugated system

Formyl	Amino	Alkoxy	Cyano	Nitro
A	B	C	D	E

AP EAPCET 2024 - 18th May Morning Shift

Options:

A. A, C, E only

B. B, C, D only

C. A, D, E only

D. B, D, E only

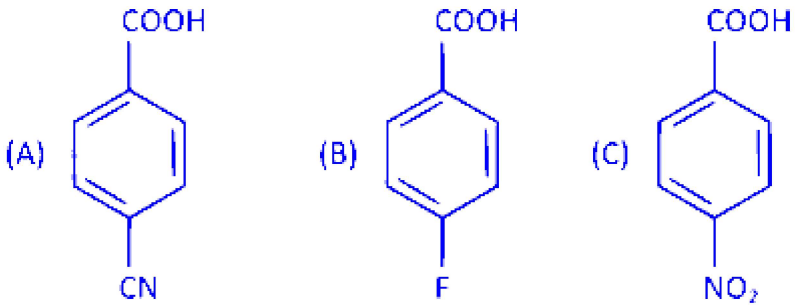
Answer: C

Solution:

The following three compound shows negative resonance $(-R)$ effect when attached to conjugate system. $A \rightarrow$ formyl, $D \rightarrow$ cyano, $E \rightarrow$ nitro. The negative resonance effect occurs when the groups withdraw the electrons from other molecules by delocalisation process.

Question11

Arrange the following in decreasing order of their acidity.



AP EAPCET 2024 - 18th May Morning Shift

Options:

A. C > B > A

B. C > A > B

C. B > C > A

D. B > A > C

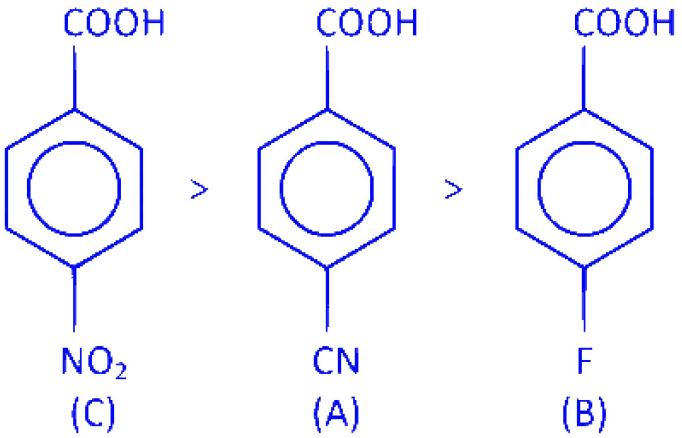
Answer: B

Solution:

The acidity of compound depends upon the strength of electron withdrawing group present in it. The order of $+I$ effect (electron withdrawing effect) is

$NO_2 > CN > F$

Hence, the order of acidity is



Question12

Identify the ortho and para-directing groups towards aromatic electrophilic substitution reactions from the following list

$$\underset{\text{I}}{-OH}\quad\underset{\text{II}}{-CN}\quad\underset{\text{III}}{-CO_2H}\quad\underset{\text{IV}}{-OCH_3}\quad\underset{\text{V}}{-NHCOCH_3}\quad\underset{\text{VI}}{-CHO}$$

AP EAPCET 2022 - 4th July Evening Shift

Options:

A. I, IV, V

B. II, III, VI

C. I, II, IV

D. IV, V, VI

Answer: A

Solution:

Electron rich groups act as ortho and para directing groups as they increases electron density at these two positions.

Out of the given groups, following are electron rich and deficient,

Electron rich $-OH$, $-OCH_3$, $-NHCOCH_3$

Electron deficient $-CN$, $-CO_2H$, $-CHO$

Hence, $-OH$, $-OCH_3$ and $-NHCOCH_3$ acts as ortho and para-directing groups towards electrophilic substitution reactions.

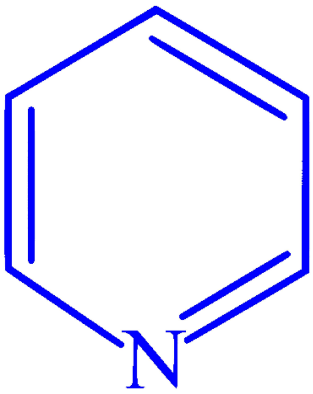
Question13

The compound or ion which is not aromatic in the following is

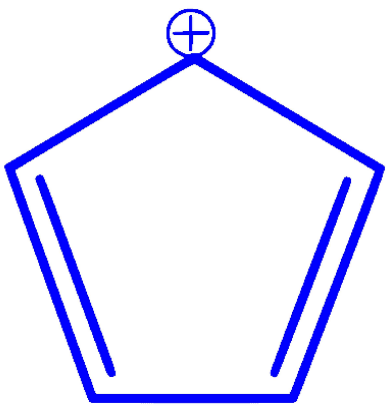
AP EAPCET 2022 - 4th July Morning Shift

Options:

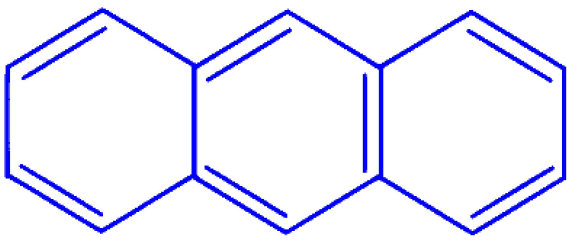
A.



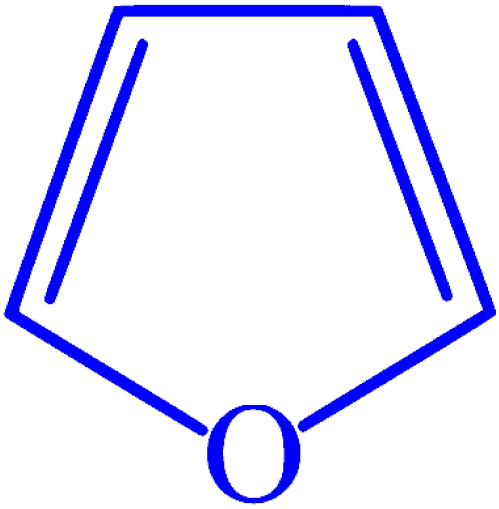
B.



C.

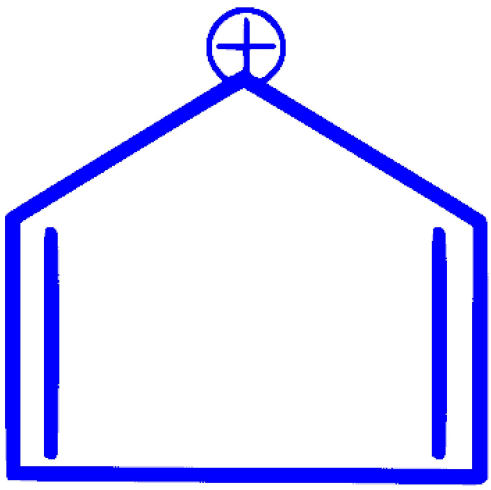


D.



Answer: B

Solution:



is not an aromatic compound as it has only 4π electrons. So, it follows 4n πe^- rule, which makes it anti-aromatic compound.

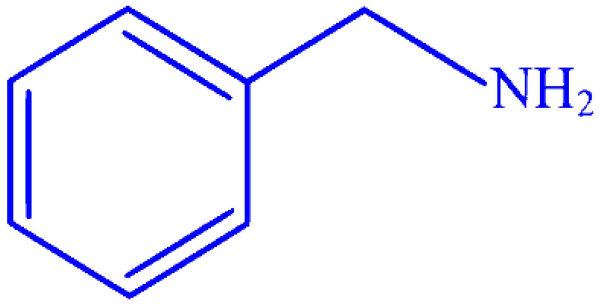
Question14

Arrange the following in decreasing order of their pK_b values

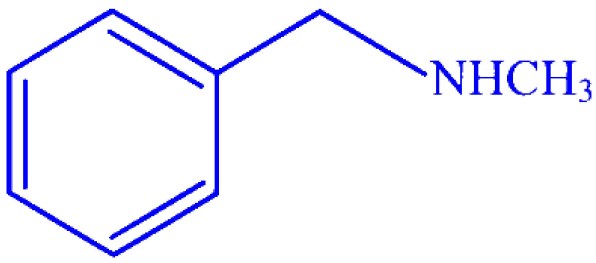
A. ,CH_3NH_2

B. $(CH_3)_3$ N

C.



D.



AP EAPCET 2022 - 4th July Morning Shift

Options:

A. D > A > C > B

B. A > B > D > C

C. D > C > B > A

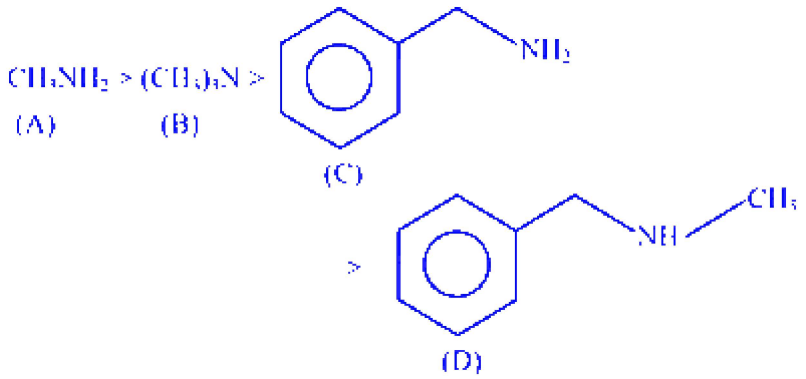
D. A > C > D > B

Answer: C

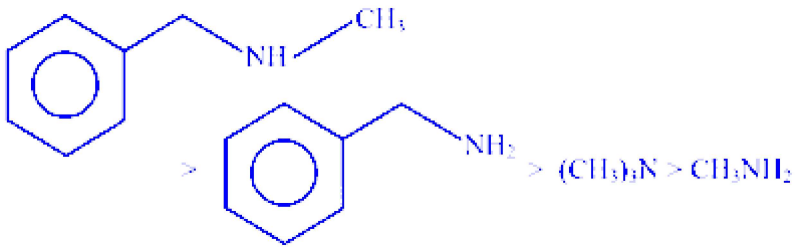
Solution:

$\mathrm{p}K_b \propto \frac{1}{\text{Basicity}}$

A and B are more basic than C and D due to $+I$-effect of methyl group A which is more basic than B. This is because of high/more steric hindrance in B due to three methyl groups. Out of C and D, C is more basic than D because of more steric hindrance in B. So, order of basicity is



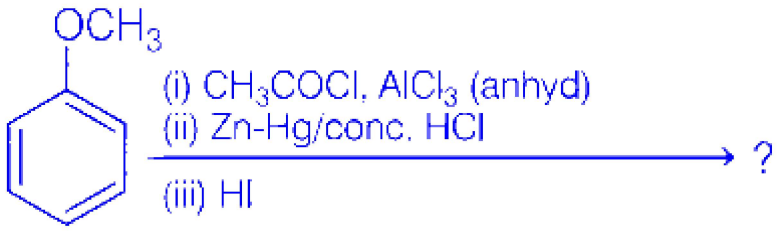
Thus, decreasing $\mathrm{pK_b}$ order of given compounds is



i.e. D > C > B > A.

Question15

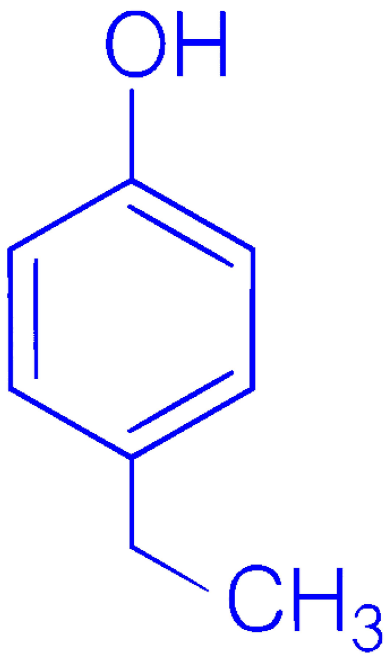
The major product of the following reactionsequence is



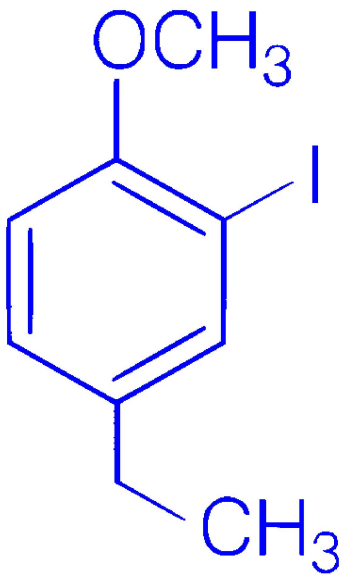
AP EAPCET 2021 - 20th August Evening Shift

Options:

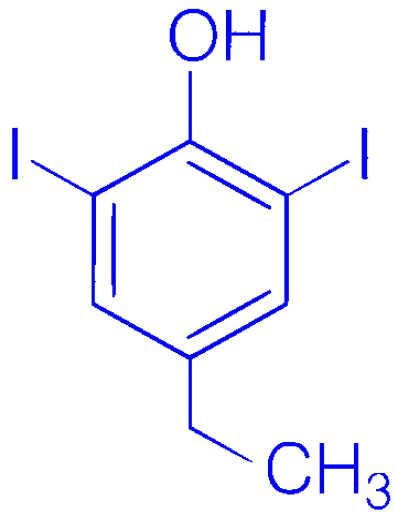
A.



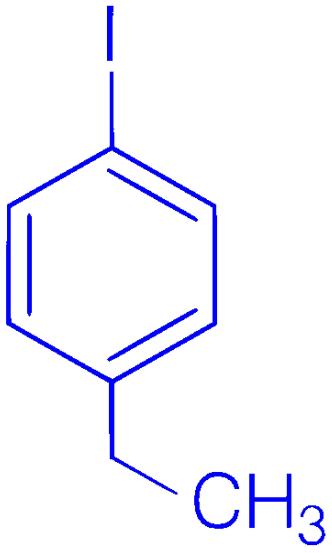
B.



C.

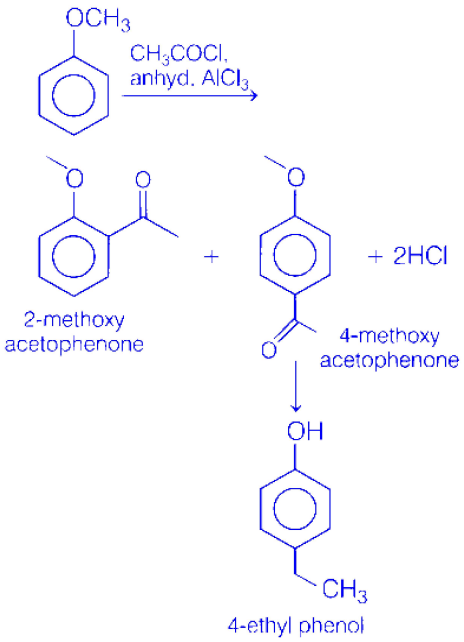


D.



Answer: A

Solution:



Methoxybenzene in the presence of anhydrousaluminium chloride (anhyd. $AlCl_3$) reacts withethanoyl chloride to form 2-methoxy acetophenoneand 4-methoxy acetophenone which is furtherconverted to 4-ethyl phenol.

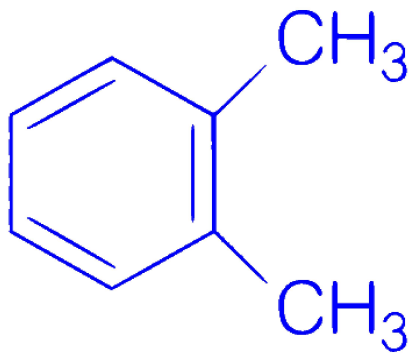
Question16

Which compound among the following ismost reactive towards electrophilic reagents?

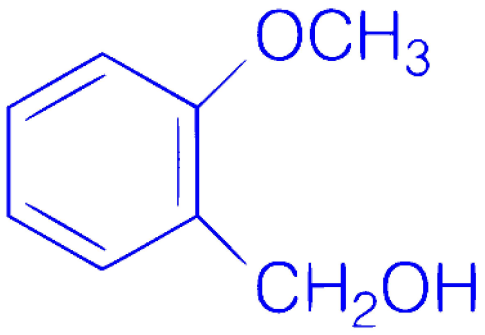
AP EAPCET 2021 - 20th August Morning Shift

Options:

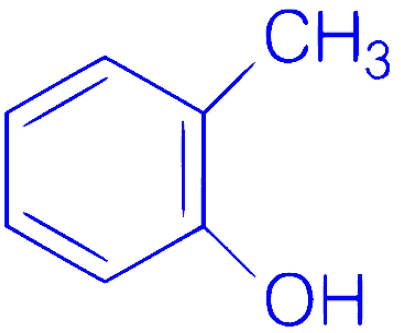
A.



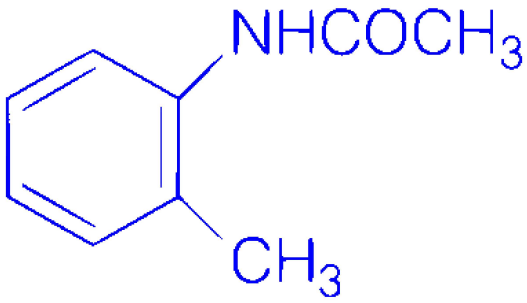
B.



C.

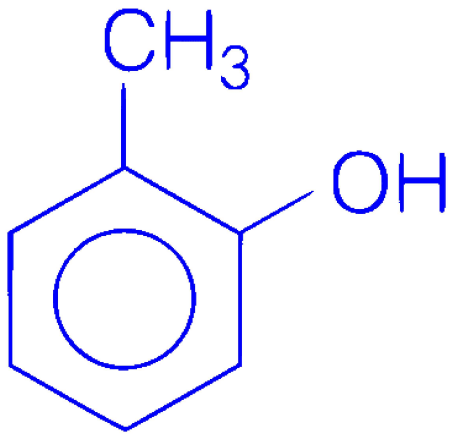


D.



Answer: C

Solution:



The most reactive towards electrophilic reagent is *o*-cresol.

The phenolic $(-\mathrm{OH})$ group increases the electron density on benzene ring through resonance. With increase in electron density, the reactivity towards electrophilic reagent increases. The decreasing order of activating influence of substituents towards electrophilic reagent is

$\mathrm{NR}_2 > -\mathrm{NH}R > -\mathrm{NH}_2 > -\mathrm{OH} > -\mathrm{OR} >$
$-\mathrm{NHCOR} > -\mathrm{ph} > -R$

Question17

Which of the following is not explained by hyperconjugation?

AP EAPCET 2021 - 20th August Morning Shift

Options:

A. Stability order of carbanions

B. Stability order of free radicals

C. Stability order of carbocations

D. Stability of alkenes

Answer: A

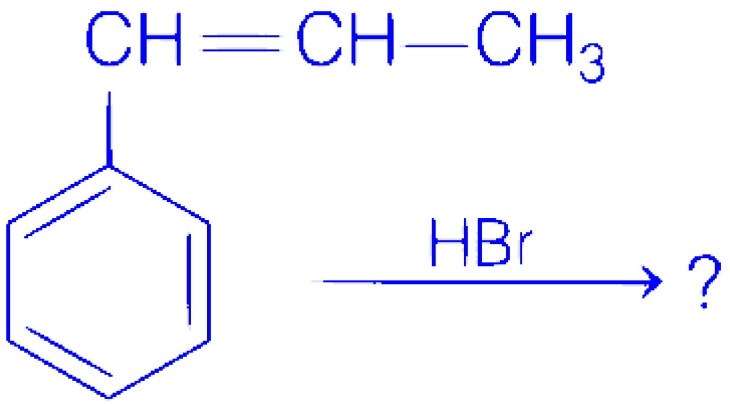
Solution:

Hyperconjugation is a stabilising interactionbetween one or more σ-bonds and one or more π-bonds.

It helps in explaining stability order of freeradicals, carbocations, alkanes but cannot explainstability of carbanion due to presence of vacantorbitals.

Question18

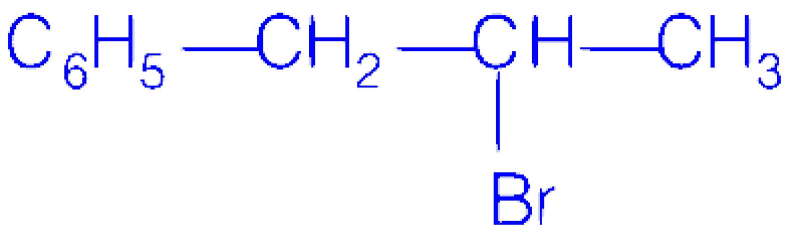
Identify the product of the following reaction.



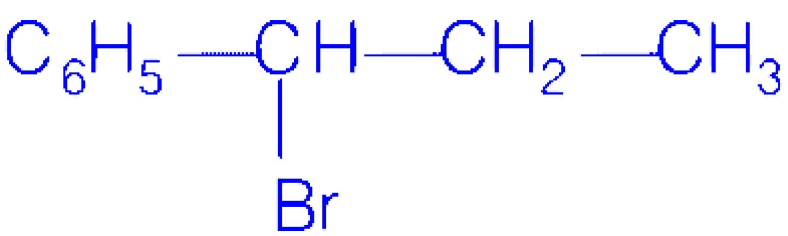
AP EAPCET 2021 - 20th August Morning Shift

Options:

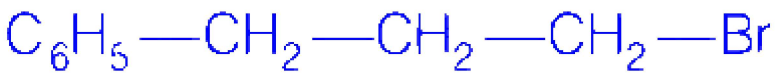
A.



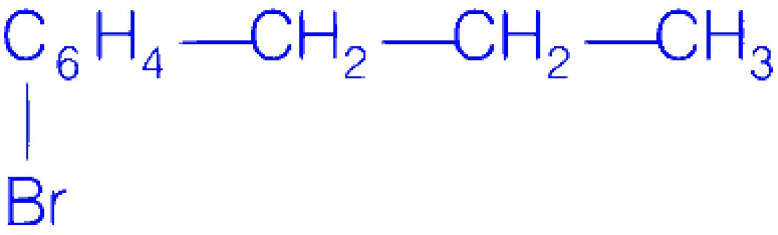
B.



C.

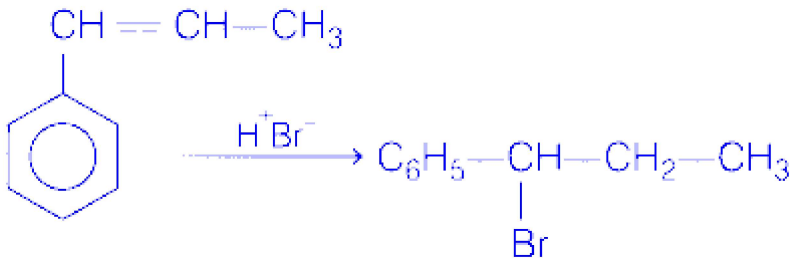


D.



Answer: B

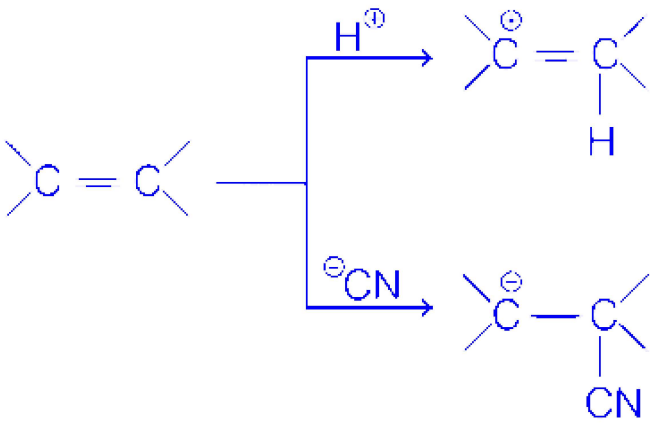
Solution:



According to Markownikov rule, in additionreaction of unsymmetrical alkenes, electron richcomponent of reagent add to carbon atom withfewer hydrogen atoms bonded to it.

Question19

The following effect is known as



AP EAPCET 2021 - 19th August Morning Shift

Options:

A. inductive effect

B. electrometric effect

C. resonance effect

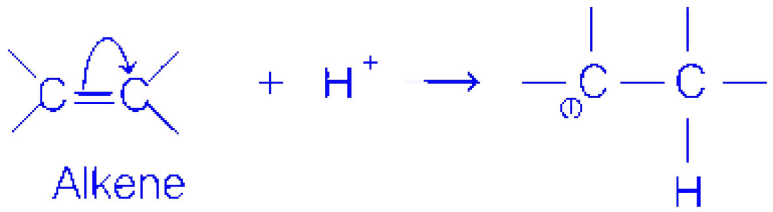
D. hyperconjugation

Answer: B

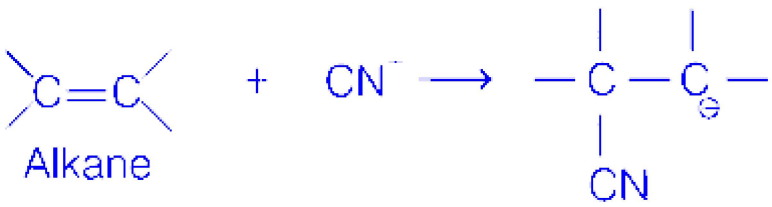
Solution:

The complete shifting of π-electron pair of amultiple bond to one of the bonded atoms inpresence of the attacking reagents is calledelectromeric effect.

Positive electromeric effect (+E)



Negative electromeric effect [−E]



In positive +E effect, π-electrons of the multiplebonds are transfered to that atom to which thereagent gets attached.

In negative −E effect, π-electrons of the multiplebonds are transferred to that atom to which theattacking reagent does not get attached.
