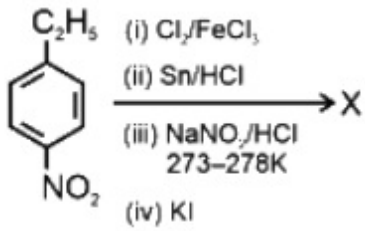
Organic Compounds Containing Nitrogen

Question1

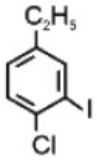
The major product X formed in the following reaction sequence is:



[NEET 2024 Re]

Options:

A.



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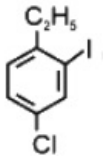
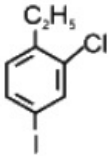
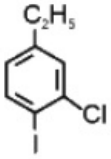


C.

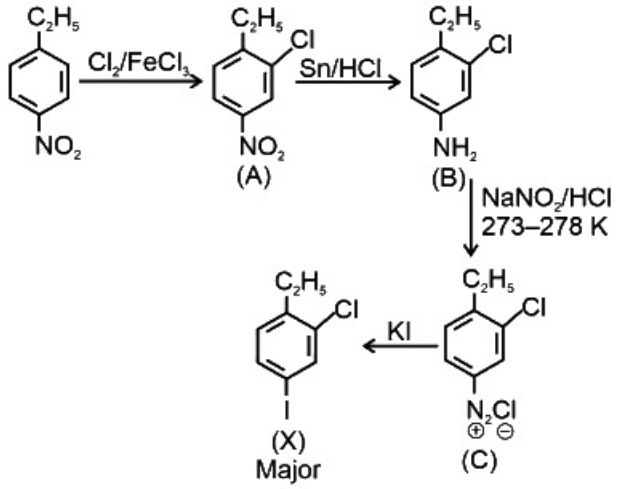


D.



Answer: C

Solution:



Question2

The compound that does not undergo Friedel-Crafts alkylation reaction but gives a positive carbylamine test is :

[NEET 2024 Re]

Options:

A.

Aniline

B.

Pyridine

C.

N -methylaniline

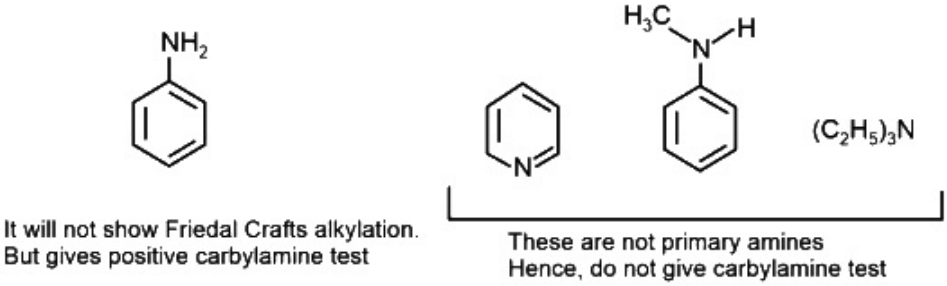
D.

Triethylamine

Answer: A

Solution:

For positive carbylamine test, there must be the presence of primary amine.



Question3

Given below are two statements:
Statement I : Aniline does not undergo Friedel-Crafts alkylation reaction.
Statement II : Aniline cannot be prepared through Gabriel synthesis.

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

[NEET 2024]

Options:

A.

Both statement I and Statement II are true

B.

Both Statement I and Statement II are false

C.

Statement I is correct but Statement II is false

D.

Statement I is incorrect but Statement II is true

Answer: A

Solution:

• Aniline does not undergo Friedel-Crafts alkylation reaction due to salt formation with aluminium chloride, the Lewis acid, which is used as a catalyst.

• Aniline (aromatic primary amine) cannot be prepared by Gabriel phthalimide synthesis because aryl halides do not undergo nucleophilic substitution with anion formed by phthalimide.

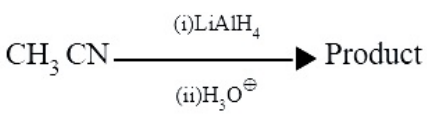
Question4

Which of the following reactions will NOT give primary amine as the product?

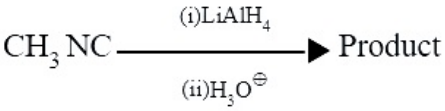
[NEET 2023]

Options:

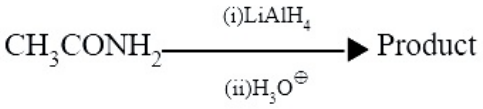
A.



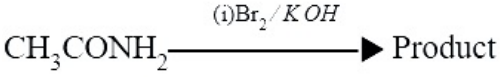
B.



C.

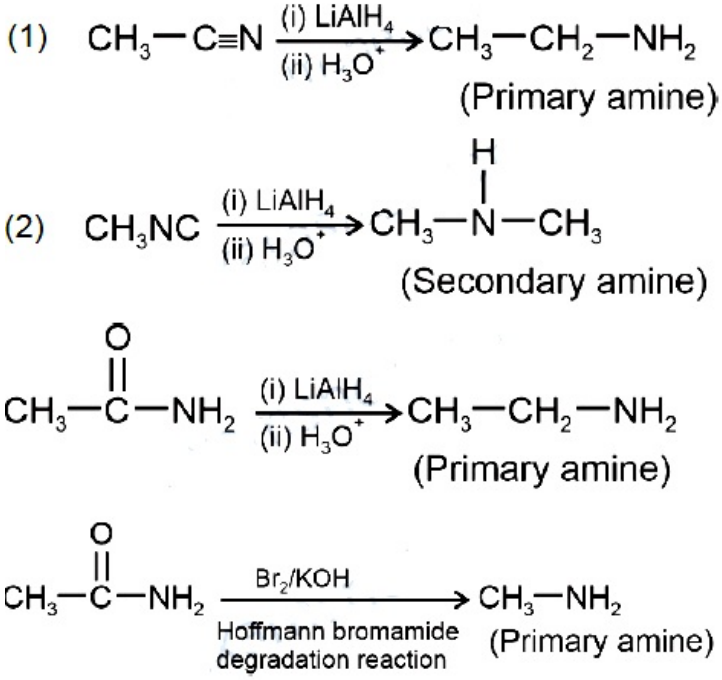


D.



Answer: B

Solution:



Question5

Given below are two statements

Statement I:
The acidic strength of monosubstituted nitrophenol is higher than phenol because of electron withdrawing nitro group.

Statement II:
o-nitrophenol, m-nitrophenol and p-nitrophenol will have same acidic strength as they have one nitro group attached to the phenolic ring.
In the light of the above statements, choose the most appropriate answer from the options given below:
[NEET-2022]

Options:

A. Both Statement I and Statement II are correct.

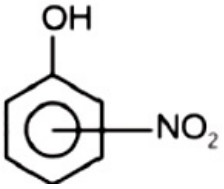
B. Both Statement I and Statement II are incorrect.

C. Statement I is correct but Statement II is incorrect.

D. Statement I is incorrect but Statement II is correct.

Answer: C

Solution:



- Nitro group has electron withdrawing tendency. It can withdraw electrons both by -1 effect and $-R$ effect. Thus the acidic strength of monosubstituted nitrophenol is higher than phenol.

- Nitro group present at o- and p-positions will have strong $-R$ effect while nitro group present at m position will influence only $-I$ effect hence acidity or o / p isomer will be more meta isomer.

Question6

Given below are two statements
Statement I:
Primary aliphatic amines react with HNO_2 to give unstable diazonium salts.
Statement II:
Primary aromatic amines react with HNO_2 to form diazonium salts which are stable even above 300K .
In the light of the above statements, choose the most appropriate answer from the options given below
[NEET-2022]

Options:

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.

Answer: C

Solution:

- Primary aliphatic amines react with HNO_2 and give unstable diazonium salt which turns into alcohol

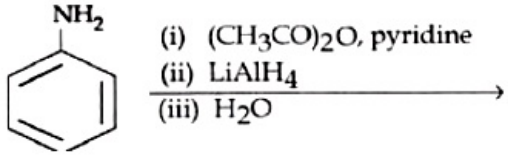
$$R-NH_2+HNO_2 \longrightarrow [R-N_2^{-}-Cl^{-}] \xrightarrow{H_2O} ROH+N_2+HCl$$

- Primary aromatic amines reacts with HNO_2 and give stable diazonium salt which are stable at 273 to $278K$.

$$C_6H_5-NH_2+HNO_2 \xrightarrow{273-278K} C_6H_5N_2^{+}Cl^{-}$$

Question7

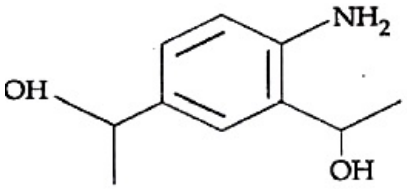
The product formed from the following reaction sequence is :



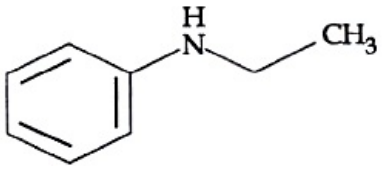
[NEET Re-2022]

Options:

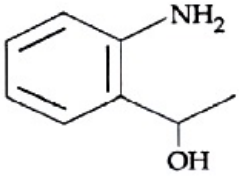
A.



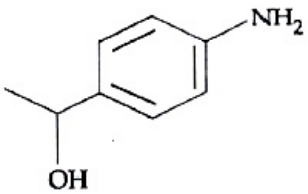
B.



C.

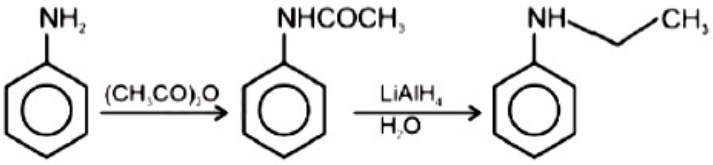


D.



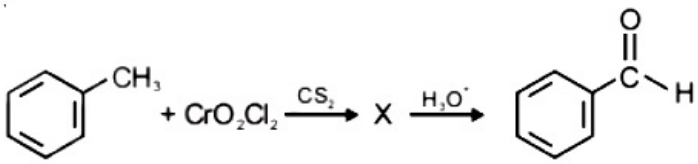
Answer: B

Solution:



Question8

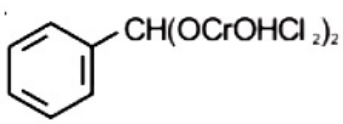
The intermediate compound 'X' in the following chemical reaction is:



[NEET 2021]

Options:

A.



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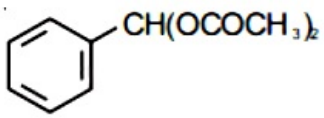
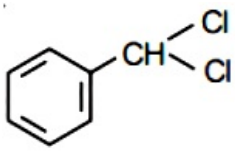
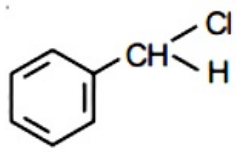


C.



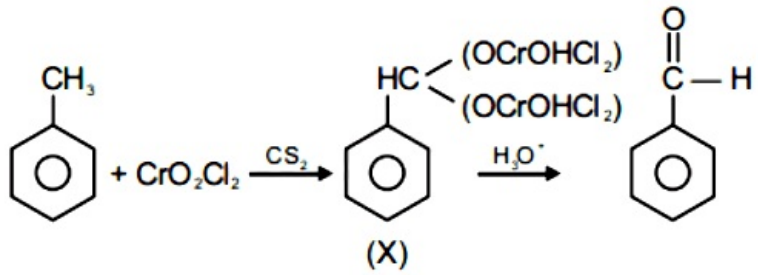
D.



Answer: A

Solution:

Etard's reaction

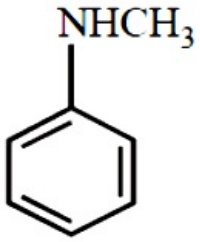


Question9

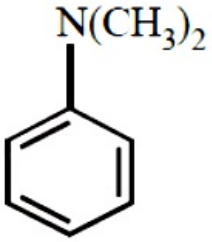
Which of the following amine will give the carbylamine test? [2020]

Options:

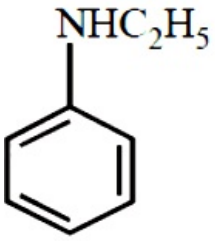
A.



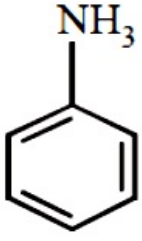
B.



C.



D.



Answer: D

Solution:

Aliphatic and aromatic primary amines give carbylamine reaction. Since aniline is primary aromatic amine, it gives carbylamine test.

Question10

The correct order of the basic strength of methyl substituted amines in aqueous solution is
(NEET 2019)

Options:

A. $CH_3NH_2 > (CH_3)_2NH > (CH_3)_3N$

B. $(CH_3)_2NH > CH_3NH_2 > (CH_3)_3N$

C. $(CH_3)_3N > CH_3NH_2 > (CH_3)_2NH$

D. $(CH_3)_3N > (CH_3)_2NH > CH_3NH_2$

Answer: B

Solution:

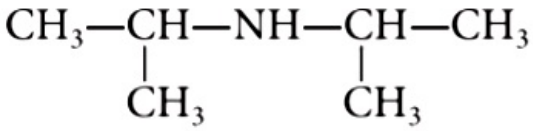
Solution:
The basicity of amines in aqueous solution depends on the stability of the ammonium cation or conjugate acid formed by accepting a proton from water which in turn depends on the $+I$ -effect of alkyl group, extent of hydrogen bonding and steric factor.
All these factors are favourable for $2°$ amines.
Therefore, $2°$ amines are the strongest bases. If the alkyl group is small i.e., CH_3 then there is no steric hindrance to H-bonding.
Thus, the stability due to hydrogen bonding predominates over the stability due to $+I$ -effect of CH_3 group and hence primary amine is a stronger base than $3°$ amine.
Hence, overall decreasing basic strength for methylamines in aqueous solution is $(CH_3)_2NH > CH_3NH_2 > (CH_3)_3N$

Question11

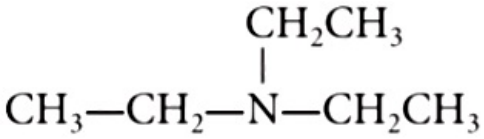
The amine that reacts with Hinsberg's reagent to give an alkali insoluble product is
(Odisha NEET 2019)

Options:

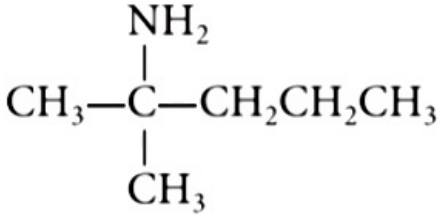
A.



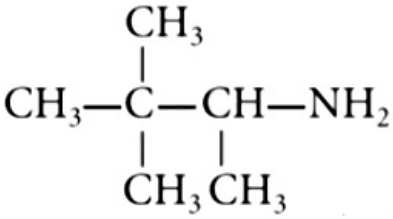
B.



C.



D.



Answer: A

Solution:

Secondary amines on reaction with Hinsberg's reagent gives N, N -dialkylbenzene sulphonamide which does not contain any hydrogen atom attached to N -atom, it is not acidic and hence insoluble in alkali. Tertiary amines do not react with Hinsberg's reagent. Primary amines gives products which are soluble in alkali.

Question12

Nitration of aniline in strong acidic medium also gives m -nitroaniline because
(NEET 2018)

Options:

A. inspite of substituents nitro group always goes to only m -position

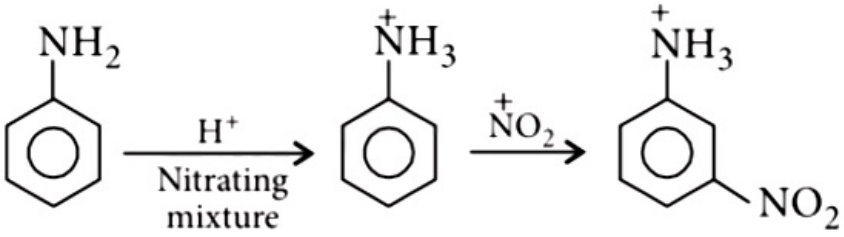
B. in electrophilic substitution reactions amino group is meta directive

C. in absence of substituents nitro group always goes to m -position

D. in acidic (strong) medium aniline is present as anilinium ion.

Answer: D

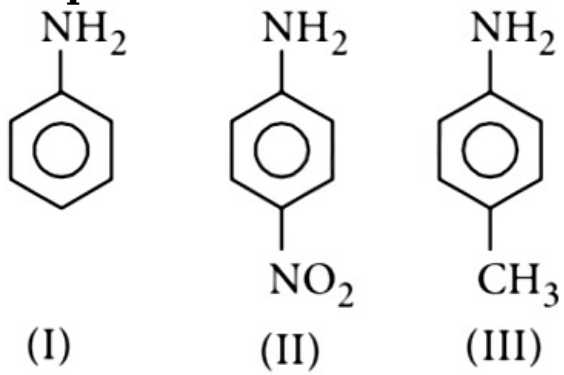
Solution:



The reason for formation of an unexpected amount of m -nitroaniline is that under strongly acidic condition of nitration, most of the aniline is converted into anilinium ion and since, $-\overset{+}{\mathrm{N}}\mathrm{H}_3$ is a m -directing group, therefore, a large amount of m -nitroaniline is also obtained.

Question13

The correct increasing order of basic strength for the following compounds is



(NEET 2017)

Options:

A. III < I < II

B. III < II < I

C. II < I < III

D. II < III < I

Answer: C

Question14

Which of the following reactions is appropriate for converting acetamide to methanamine?
(NEET 2017)

Options:

A. Hoffmann hypobromamide reaction

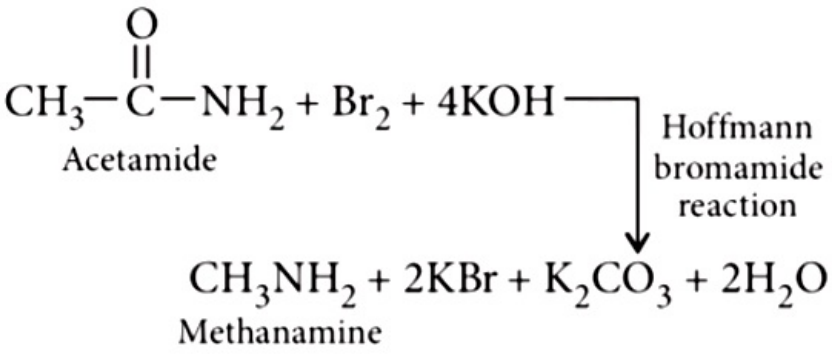
B. Stephen's reaction

C. Gabriel phthalimide synthesis

D. Carbylamine reaction

Answer: A

Solution:

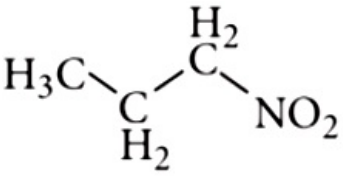


Question15

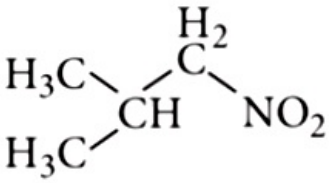
Which one of the following nitro-compounds does not react with nitrous acid?
(NEET-II 2016)

Options:

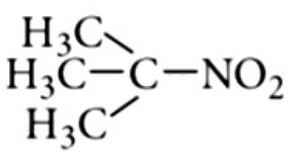
A.



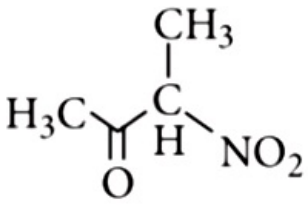
B.



C.



D.



Answer: C

Solution:

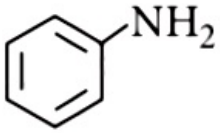
Tertiary nitroalkanes do not react with nitrous acid as they do not contain α -hydrogen atom.

Question16

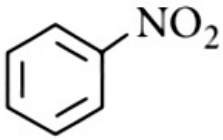
A given nitrogen-containing aromatic compound 'A' reacts with Sn / HCl, followed by HNO_2 to give an unstable compound 'B'. 'B', on treatment with phenol, forms a beautiful coloured compound 'C' with the molecular formula $C_{12}H_{10}N_2O$. The structure of compound 'A' is (NEET-II 2016)

Options:

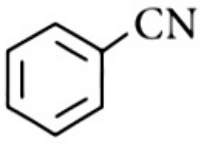
A.



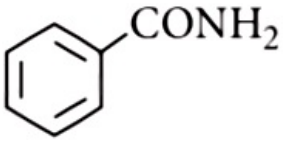
B.



C.

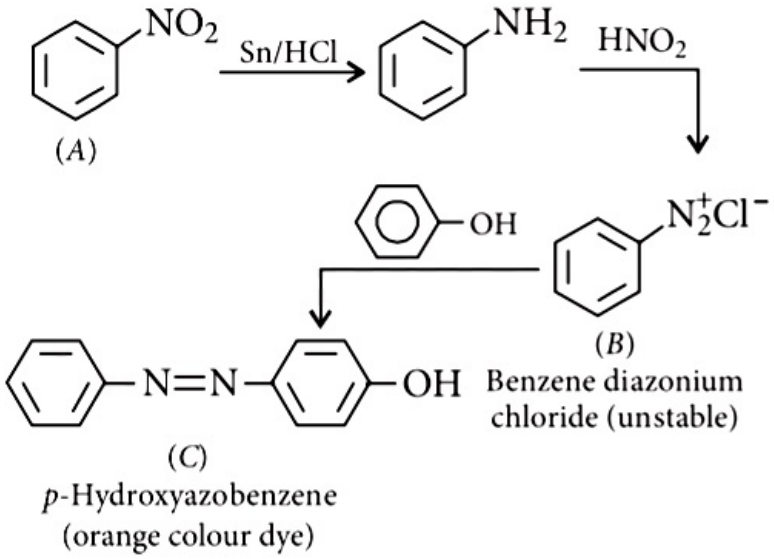


D.



Answer: B

Solution:



Question17

The correct statement regarding the basicity of arylamines is (NEET-I 2016)

Options:

A. arylamines are generally more basic than alkylamines because of aryl group

B. arylamines are generally more basic than alkylamines, because the nitrogen atom in arylamines is sp - hybridised

C. arylamines are generally less basic than alkylamines because the nitrogen lone-pair electrons are delocalised by interaction with the aromatic ring π -electron system

D. arylamines are generally more basic than alkylamines because the nitrogen lone-pair electrons are not delocalised by interaction with the aromatic ring π -electron system.

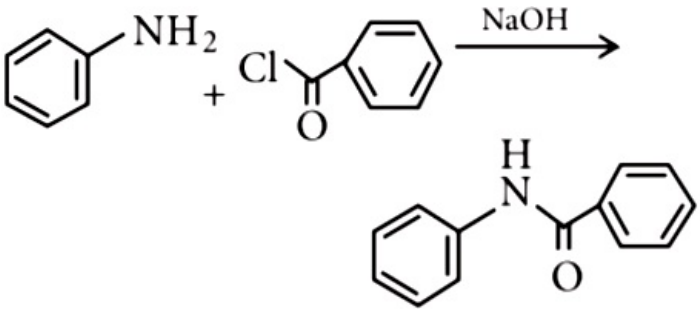
Answer: C

Solution:

Solution:
In arylamines, lone pair of electrons on nitrogen atom is delocalised over the benzene ring, thus, not available for donation. So, arylamines are less basic than alkylamines.

Question18

The following reaction



is known by the name
(2015)

Options:

A. Perkin's reaction

B. Acetylation reaction

C. Schotten-Baumann reaction

D. Friedel-Crafts reaction.

Answer: C

Solution:

Solution:
Benzoylation of compounds containing an active hydrogen atom such as alcohols, phenols and amines with benzoyl chloride in the presence of dilute aq. NaOH solution is called Schotten- Baumann reaction.

Question19

Method by which aniline cannot be prepared is
(2015)

Options:

A. degradation of benzamide with bromine in alkaline solution

B. reduction of nitrobenzene with H_2/Pd in ethanol

C. potassium salt of phthalimide treated with chlorobenzene followed by hydrolysis with aqueous NaOH solution

D. hydrolysis of phenylisocyanide with acidic solution.

Answer: C

Solution:

Solution:
Aniline cannot be prepared by this method because aryl halides do not undergo nucleophilic substitution reaction with potassium phthalimide under mild conditions.

Question20

The electrolytic reduction of nitrobenzene in strongly acidic medium produces
(2015 Cancelled)

Options:

A. azobenzene

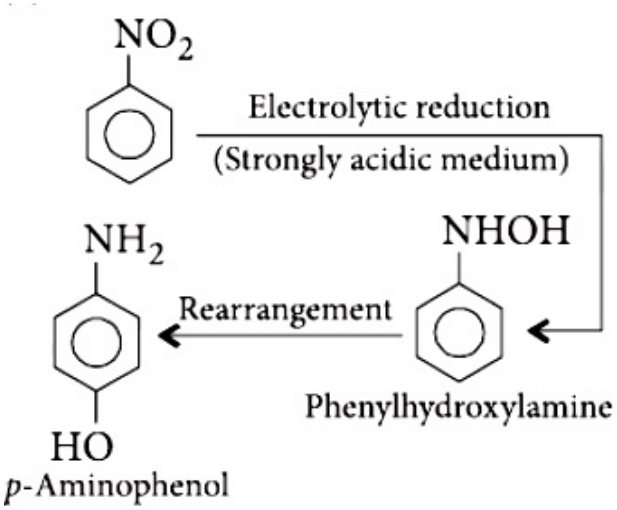
B. aniline

C. p-aminophenol

D. azoxybenzene.

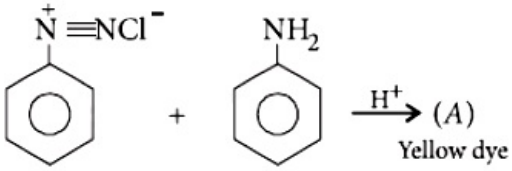
Answer: C

Solution:



Question21

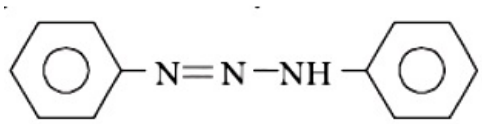
In the following reaction, the product (A)



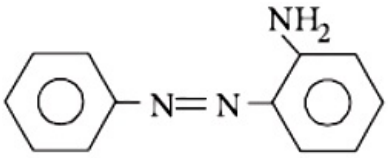
(2014)

Options:

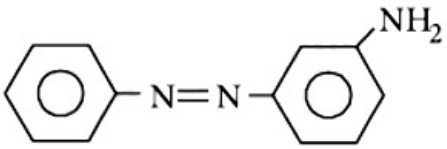
A.



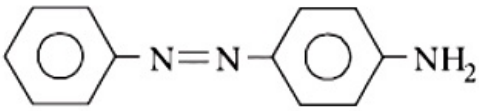
B.



C.

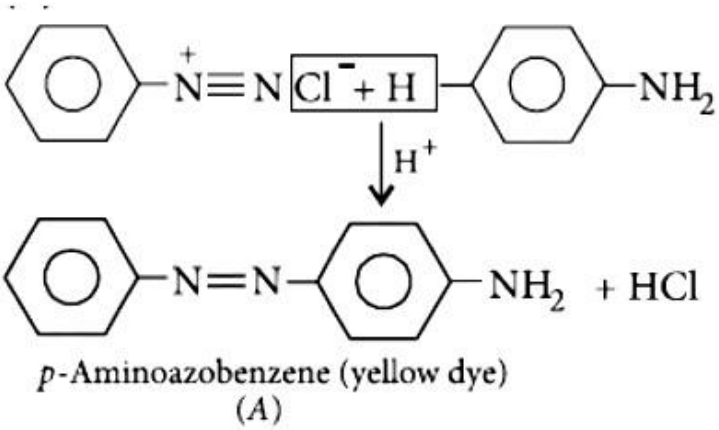


D.



Answer: D

Solution:



p-Aminoazobenzene (yellow dye)
(*A*)

Question22

Which of the following will be most stable diazonium salt RN_2^+X ? (2014)

Options:

A. $CH_3N_2^+X^-$

B. $C_6H_5N_2^+X$

C. $CH_3CH_2N_2^+X^-$

D. $C_6H_5CH_2N_2^+X^-$

Answer: B

Solution:

Aromatic diazonium salts are more stable due to dispersal of the positive charge in benzene ring.

Question23

Nitrobenzene on reaction with conc.HNO_3/H_2SO_4 at 80-100°C forms which one of the following products?
(2013 NEET)

Options:

A. 1, 4-Dinitrobenzene

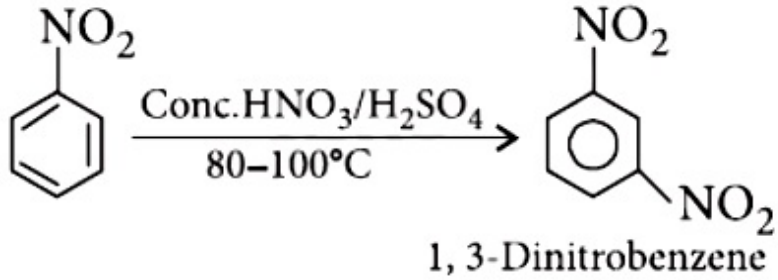
B. 1, 2, 4-Trinitrobenzene

C. 1, 2-Dinitrobenzene

D. 1, 3-Dinitrobenzene

Answer: D

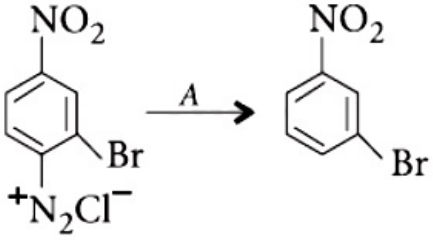
Solution:



1, 3-Dinitrobenzene

Question24

In the reaction



(2013 NEET)

Options:

A. H_3PO_2 and H_2O

B. H^+/H_2O

C. $HgSO_4/H_2SO_4$

D. $CuCl_2$

Answer: A

Solution:

H_3PO_2 and H_2O reduces the $-\overset{+}{N}_2\overline{Cl}$ to $-H$

Question25

On hydrolysis of a "compound", two compounds are obtained. One of which on treatment with sodium nitrite and hydrochloric acid gives a product which does not respond to iodoform test. The second one reduces Tollens' reagent and Fehling's solution. The "compound" is (Karnataka NEET 2013)

Options:

A. $CH_3CH_2CH_2NC$

B. $CH_3CH_2CH_2CN$

C. $CH_3CH_2CH_2ON = O$

D. $CH_3CH_2CH_2CON(CH_3)_2$

Answer: A

Solution:

$$\underset{\text{I}}{CH_3CH_2CH_2NC} + 2H_2O \xrightarrow{H+} \underset{\text{I}}{CH_3CH_2CH_2NH_2} + \underset{\text{II}}{HCOOH}$$

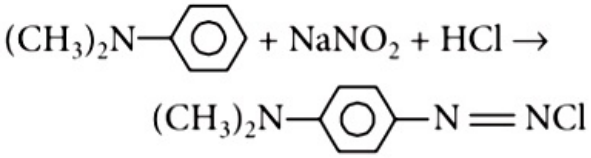
II (HCOOH) reduces Tollens'reagent and Fehling's solution.

Question26

Some reactions of amines are given. Which one is not correct? (Karnataka NEET 2013)

Options:

A.



B. $CH_3CH_2NH_2 + HNO_2 \rightarrow CH_3CH_2OH + N_2$

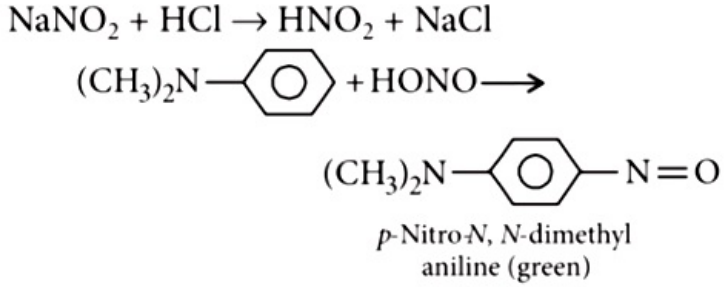
C. $CH_3NH_2 + C_6H_5SO_2Cl \rightarrow CH_3NHSO_2C_6H_5$

D. $(CH_3)_2NH + NaNO_2 + HCl \rightarrow (CH_3)_2N - N = O$

Answer: A

Solution:

Aromatic tertiary amines undergo electrophilic substitution with nitrosonium ion at p -position of the phenyl ring to form green coloured p -nitrosoamines.

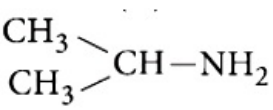


Question27

An organic compound (C_3H_9N)(A) when treated with nitrous acid, gave an alcohol and N_2 gas was evolved. (A) on warming with $CHCl_3$ and caustic potash gave (C) which on reduction isopropylmethylamine. Predict the structure of (A).
(2012 Mains)

Options:

A.



B. $CH_3CH_2 - NH - CH_3$

C. $CH_3 - \underset{\underset{CH_3}{|}}{N} - CH_3$

D. $CH_3CH_2CH_2 - NH_2$

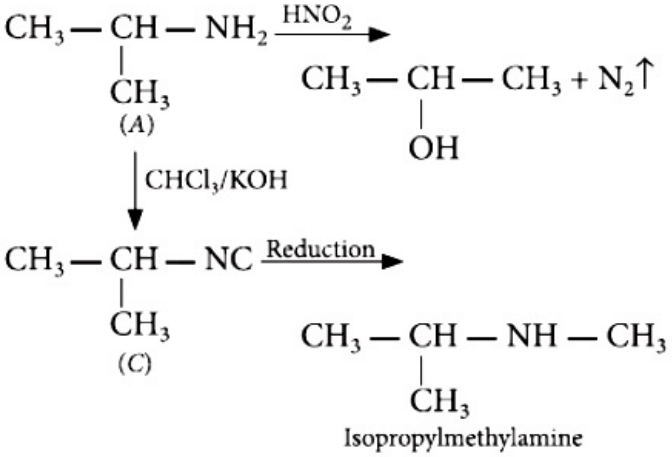
Answer: A

Solution:

As A gives alcohol on treatment with nitrous acid thus it should be primary amine. C_3H_9N has two possible structures with $-NH_2$ group

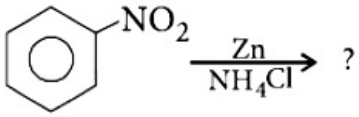
$CH_3-CH_2-CH_2-NH_2$ or $CH_3-\underset{CH_3}{\overset{|}{C}}H-NH_2$

As it gives isopropyl methylamine thus it should be isopropyl amine not n-propyl amine.



Question28

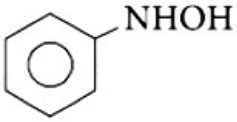
What is the product obtained in the following reaction ?



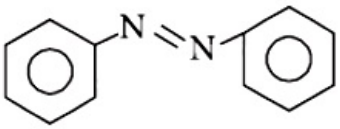
(2011)

Options:

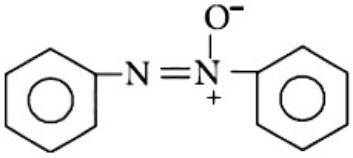
A.



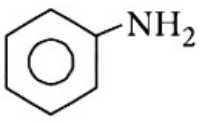
B.



C.

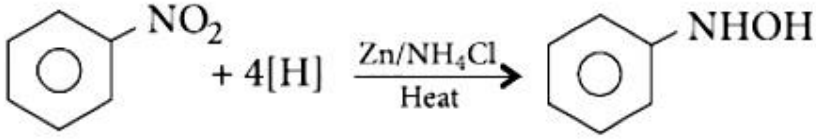


D.



Answer: A

Solution:



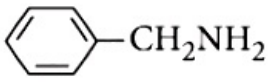
Question29

Which of the following compounds is most basic? (2011 Mains)

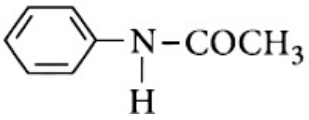
Options:

A.

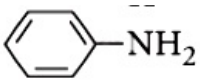
B.



C.



D.



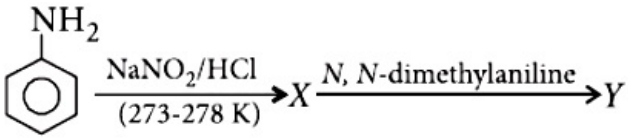
Answer: B

Solution:

In benzylamine the electron pair present on the nitrogen is not delocalised with the benzene ring.

Question30

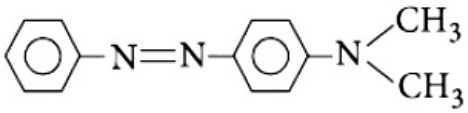
Aniline in a set of the following reactions yielded a coloured product Y . The structure of ' Y would be



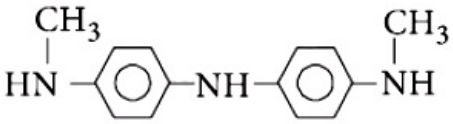
(2008,2010)

Options:

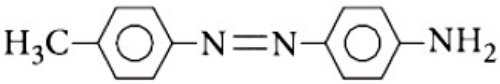
A.



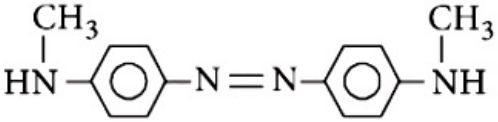
B.



C.



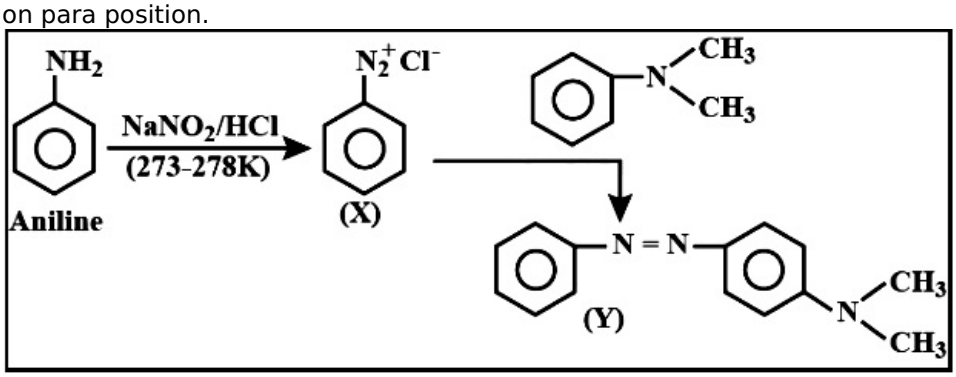
D.



Answer: A

Solution:

Solution:
The first step is diazotization reaction which form [X] which on further reaction with N , $\mathrm{N}-$ dimethylaniline gives product Y
It attached to the para position as $(\mathrm{N}-(\mathrm{CH}_3)_2)$ group is ortho-para activating group. Electrophilic addition takes place on para position.



Question31

Which of the following statements about primary amines is false? (2010)

Options:

A. Alkyl amines are stronger bases than aryl amines

B. Alkyl amines react with nitrous acid to produce alcohols.

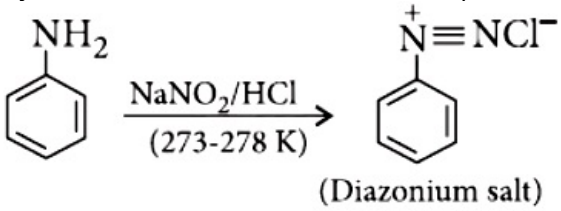
C. Aryl amines react with nitrous acid to produce phenols

D. Alkyl amines are stronger bases than ammonia.

Answer: C

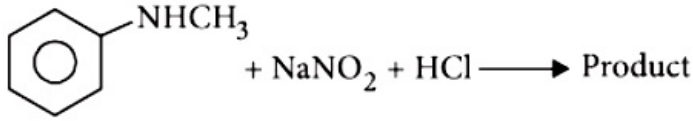
Solution:

Aryl amines react with nitrous acid to produce diazonium salts.



Question32

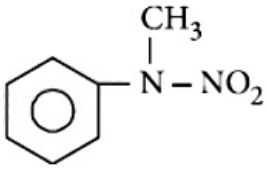
Predict the product



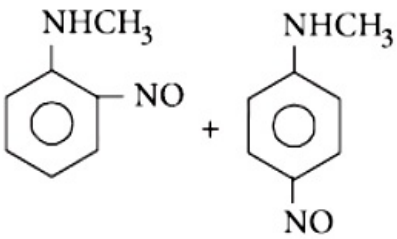
(2009)

Options:

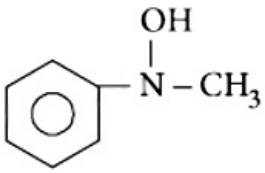
A.



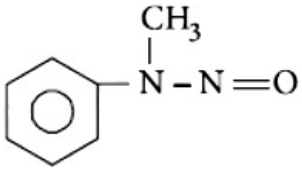
B.



C.



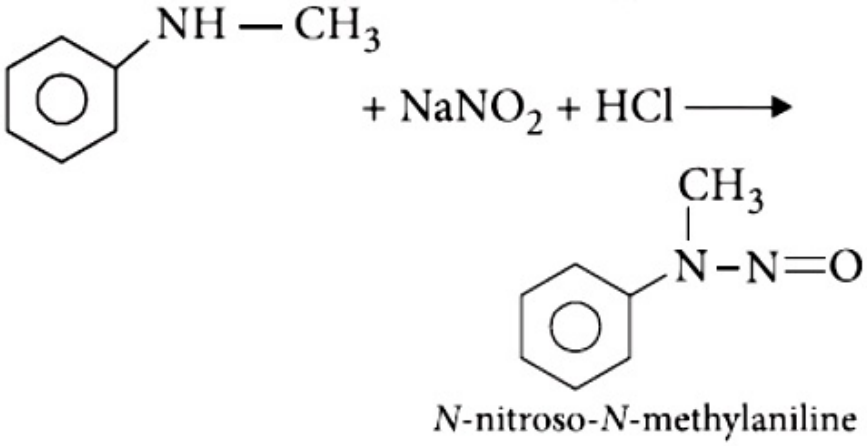
D.



Answer: D

Solution:

2° aliphatic and aromatic amines react with nitrous acid to form N-nitrosoamine.



N-nitroso-*N*-methylaniline

Question33

Nitrobenzene can be prepared from benzene by using a mixture of conc.H N O_3 and conc.H $_2SO_4$.In the mixture ,nitric acid acts as a/an (2009)

Options:

A. acid

B. base

C. catalyst

D. reducing agent

Answer: B

Solution:

$$\underset{(\text{from } H_2SO_4)}{H^+} + H\ddot{\underset{\cdot\cdot}{O}} - NO_2 \rightarrow [H_2O^+ - NO_2] \rightarrow NO_2^+ + H_2O$$

Question34

Which one of the following on reduction with lithium aluminium hydride yields a secondary amine?
(2007)

Options:

A. Methyl isocyanide

B. Acetamide

C. Methyl cyanide

D. Nitroethane.

Answer: A

Solution:

$$\underset{\text{Alkyl isocynaide}}{R - N \overset{\rightarrow}{=} C} + [H] + \xrightarrow{LiAlH_4} \underset{\text{Secondry amine}}{RNHCH_3}$$

$$\underset{\text{Methyl isocyanide}}{H_3C - N \overset{\rightarrow}{=} C} + 4[H] \xrightarrow{LiAlH_4} \underset{\text{Dimethylamine}}{H_3C - NH - CH_3}$$

Question35

Which of the following is more basic than aniline?
(2006)

Options:

A. Benzylamine

B. Diphenylamine

C. Triphenylamine

D. p-Nitroaniline

Answer: A

Solution:

Any group which when present on benzene ring has electron withdrawing ($-NO_2 - CN$, $-SO_3H$, $-COOH$, $-Cl$, $-C_6H_5$, etc) group decreases basicity of aniline, e.g. aniline is more basic than nitroaniline. Lone pair electrons are more delocalised in diphenylamine and triphenylamine, thus these are less basic than aniline. In benzylamine the electron pair present on nitrogen is not delocalised with the benzene ring hence it is more basic than aniline.

Question36

Electrolytic reduction of nitrobenzene in weakly acidic medium gives (2005)

Options:

A. N -phenylhydroxylamine

B. nitrosobenzene

C. aniline

D. p -hydroxyaniline.

Answer: C

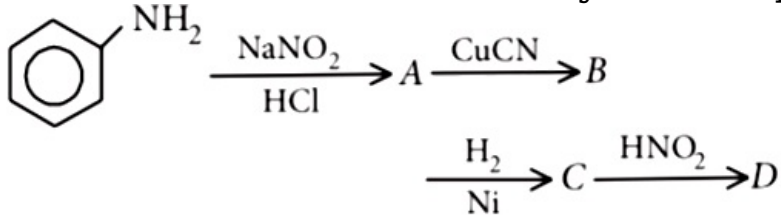
Solution:

Electrolytic reduction of nitrobenzene in weakly acidic medium gives aniline but in strongly acidic medium it gives p -aminophenol through the acid-catalysed rearrangement of the initially formed phenylhydroxylamine.

$$\underset{\text{Nitrobenzene}}{C_6H_5NO_2} \xrightarrow[\text{(Weakly acidic medium)}]{\text{Electrolytic reduction}} \underset{\text{Aniline}}{C_6H_5NH_2}$$

Question37

Aniline in a set of reactions yielded a product D.



The structure of the product D would be (2005)

Options:

A. C_6H_5NHOH

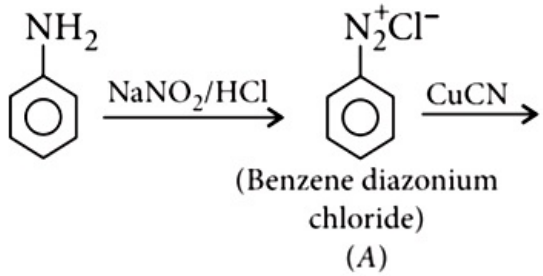
B. $C_6H_5NHCH_2CH_3$

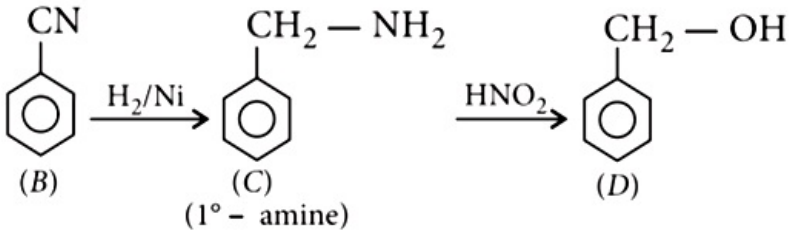
C. $C_6H_5CH_2NH_2$

D. $C_6H_5CH_2OH$

Answer: D

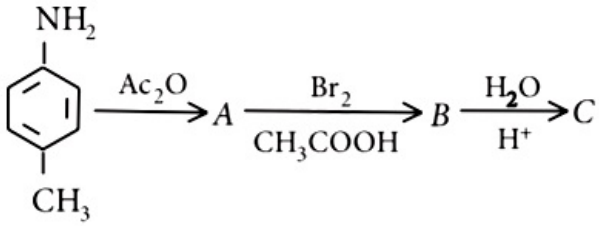
Solution:





Question38

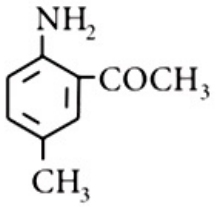
The final product C, obtained in the given reaction would be :



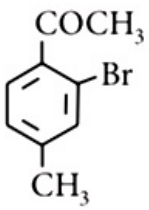
(2003)

Options:

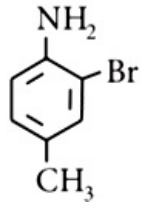
A.



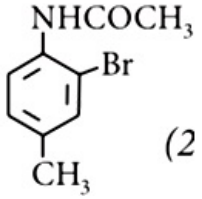
B.



C.

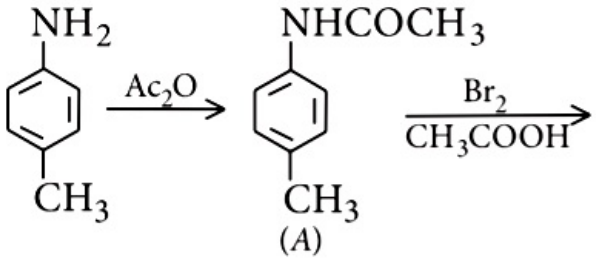


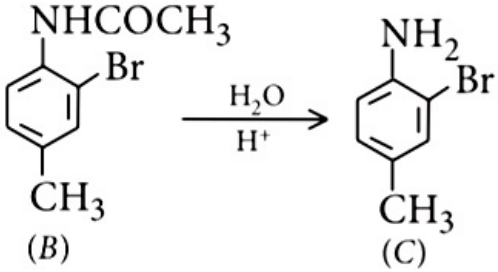
D.



Answer: C

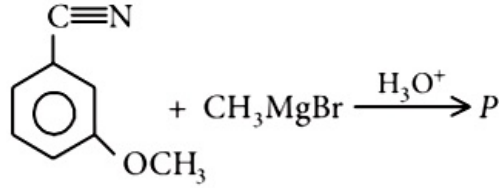
Solution:





Question39

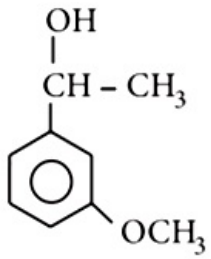
Product 'P' in the above reaction is



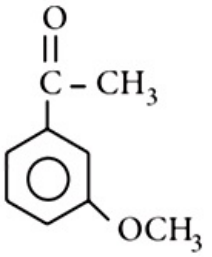
(2002)

Options:

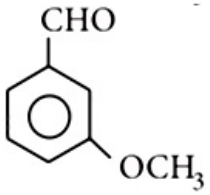
A.



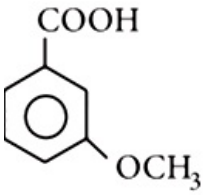
B.



C.

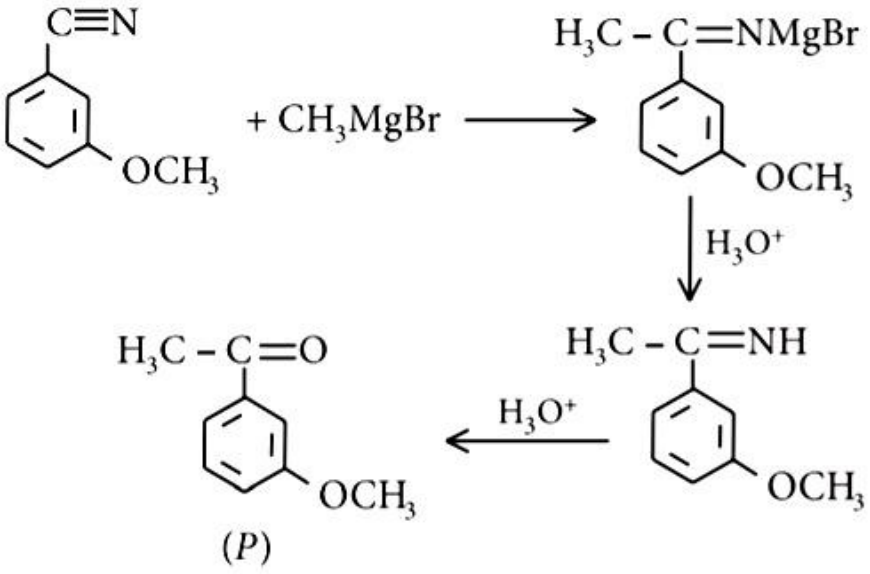


D.



Answer: B

Solution:



Question40

Intermediates formed during reaction of $RCONH_2$ with Br_2 and KOH are (2001)

Options:

A. $RCONHBr$ and $RNCO$

B. $RNHCOBr$ and $RNCO$

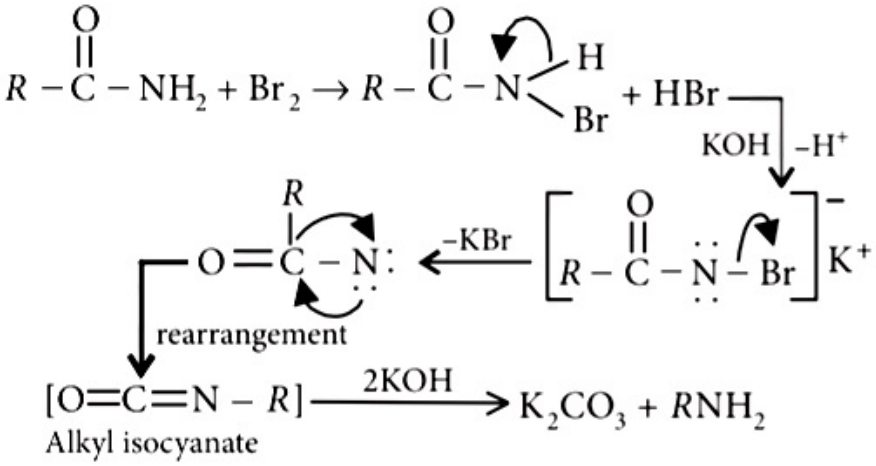
C. $RNH-Br$ and $RCONHBr$

D. $RCONBr_2$

Answer: A

Solution:

The reaction, $RCONH_2 + Br_2 + KOH \rightarrow RNH_2$ is known as Hoffmann-bromamide reaction.
The mechanism of the reaction is



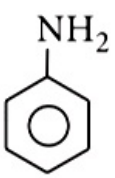
This reaction is used to descent the series, i.e., for preparing a lower homologue from a higher one.

Question41

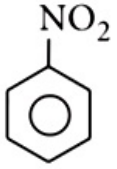
$A \xrightarrow{\text{reduction}} B \xrightarrow{CHCl_3 / KOH} C \xrightarrow{\text{reduction}} N-$ methylaniline, then A is (2000)

Options:

A.



B.



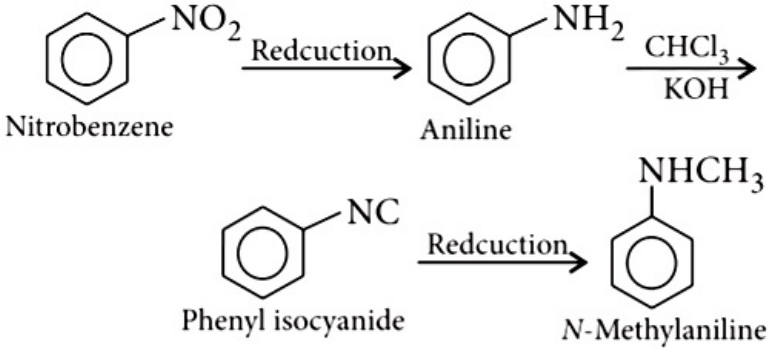
C. CH_3NH_2

D.

Answer: B

Solution:

Solution:
'C' must be an isocyanide and obtained from a 1° amine by carbylamine reaction ($CHCl_3$ + KOH). Further 1° amine must be obtained by reduction of nitro compounds. So 'A' is nitrobenzene.



Question42

Amides may be converted into amines by a reaction named after (1999)

Options:

A. Hoffmann

B. Claisen

C. Perkin

D. Kekule.

Answer: A

Solution:

$$\underset{\text{Acid amide}}{R-\overset{\overset{O}{||}}{C}-NH_2} + Br_2 + 4\,KOH \rightarrow \underset{1^\circ \text{ amine}}{R-NH_2} + K_2CO_3 + 2\,KBr + 2H_2O$$

This reaction is called Hoffmann bromamide reaction.

Question43

Phenyl isocyanides are prepared by which of the following reaction? (1999)

Options:

A. Reimer-Tiemann reaction

B. Carbylamine reaction

C. Rosenmund's reaction

D. Wurtz reaction

Answer: B

Solution:

$$C_6H_5-NH_2 + CHCl_3 + 3\,KOH \rightarrow C_6H_5-NC + 3\,KCl + 3H_2O$$

The above reaction is called as carbylamine reaction, which is a specific reaction of 1° -amine.

Question44

Aniline is reacted with bromine water and the resulting product is treated with an aqueous solution of sodium nitrite in presence of dilute hydrochloric acid. The compound so formed is converted into a tetrafluoroborate which is subsequently heated to dry. The final product is (1998)

Options:

A. p -bromoaniline

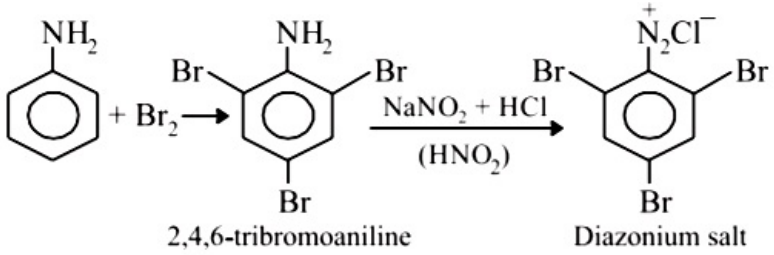
B. p -bromofluorobenzene

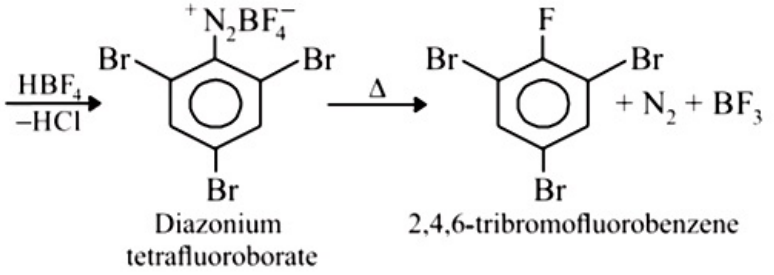
C. 1,3,5 -tribromobenzene

D. 2,4,6 -tribromofluorobenzene.

Answer: D

Solution:





Question45

The compound obtained by heating a mixture of ethylamine and chloroform with ethanolic potassium hydroxide (KOH) is (1997)

Options:

A. an amide

B. an amide and nitro compound

C. an ethyl isocyanide

D. an alkyl halide.

Answer: C

Solution:

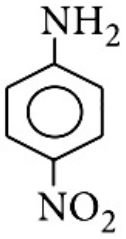
$$\underset{\text{Ethyl amine}}{CH_3CH_2NH_2} + \underset{\text{Chloroform}}{CHCl_3} + 3\,KOH \rightarrow \underset{\text{Ethyl isocyanide}}{CH_3CH_2NC} + 3\,KCl + 3H_2O$$

Question46

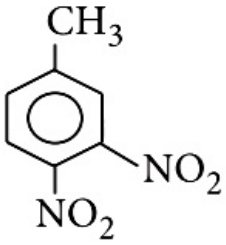
An aniline on nitration gives (1996)

Options:

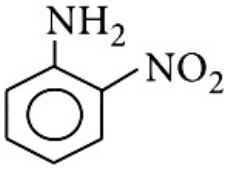
A.



B.



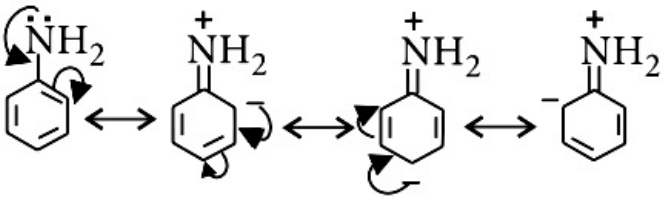
C.



D. both (a) and (c)

Answer: D

Solution:



As, NO_2^+ electrophile can attack both ortho and para positions, therefore both (a) and (c) product will be obtained.

Question47

Which product is formed, when acetonitrile is hydrolysed partially with cold concentrated HCl?
(1995)

Options:

A. Methyl cyanide

B. Acetic anhydride

C. Acetic acid

D. Acetamide

Answer: D

Solution:

$$\underset{\text{Acetonitrile}}{CH_3 - C \equiv N} \xrightarrow[H_2O]{\text{conc . HCl}} \underset{\text{Acetamide}}{CH_3 - CONH_3}$$

Question48

The action of nitrous acid on an aliphatic primary amine gives (1994)

Options:

A. secondary amine

B. nitro alkane

C. alcohol

D. alkyl nitrite.

Answer: C

Solution:

$$\underset{\text{Primary amine}}{R - NH_2} + \underset{\text{Nitrous acid}}{HNO_2} \rightarrow \underset{\text{Alcohol}}{ROH} + N_2 + H_2O$$

Question49

Which one of the following order is wrong, with respect to the property indicated? (1994)

Options:

A. Benzoic acid > phenol > cyclohexanol (acid strength)

B. Aniline > cyclohexylamine > benzamide (basic strength)

C. Formic acid > acetic acid > propanoic acid (acid strength)

D. Fluoroacetic acid > chloroacetic acid > bromoacetic acid (acid strength)

Answer: B

Solution:

Basic strength decreases as, cyclohexylamine > aniline > benzamide.
Lesser basicity in aniline and benzamide is due to participation of lone pair of electron of - NH_2 group in resonance.

Question50

For carbylamine reaction, we need hot alcoholic KOH and
(1992)

Options:

A. any primary amine and chloroform

B. chloroform and silver powder

C. a primary amine and an alkyl halide

D. a monoalkylamine and trichloromethane.

Answer: A

Solution:

In carbylamine reaction, primary amines on heating with chloroform in presence of alcoholic KOH form isocyanides (or carbylamines). It is used to distinguish 1° amines from 2° and 3° amines.
$R-NH_2 + CHCl_3 + 3\,KOH \rightarrow RNC + 3\,KCl + 3H_2O$

Question51

Indicate which nitrogen compound amongst the following would undergo Hoffmann reaction (i.e., reaction with Br_2 and strong KOH) to furnish the primary amine ($R-NH_2$)?
(1989)

Options:

A. $RCONHCH_3$

B. $RCOONH_4$

C. $RCONH_2$

D. $R-CO-NHOH$

Answer: C

Solution:

The amide ($-CONH_2$) group is converted into primary amino group ($-NH_2$) by Hoffmann's bromamide reaction.

$RCONH_2 + Br_2 + 4\,KOH \xrightarrow{\Delta} R-NH_2 + KBr + K_2CO_3 + 2H_2O$
