



# CHEMISTRY

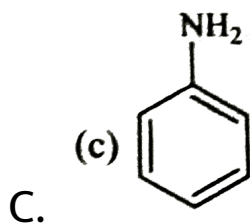
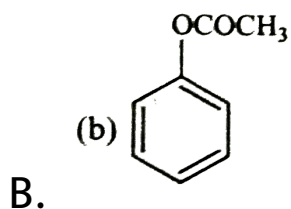
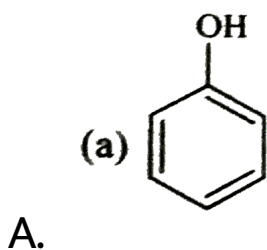
## BOOKS - IIT-JEE PREVIOUS YEAR

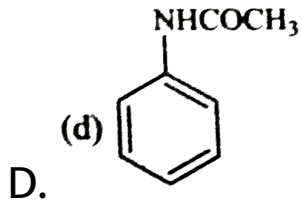
### (CHEMISTRY)

# AROMATIC COMPOUNDS CONTAINING NITROGEN

**Jee Main And Advanced**

1. Which of the following compounds will give significant amount of meta- product during mononitration reaction?

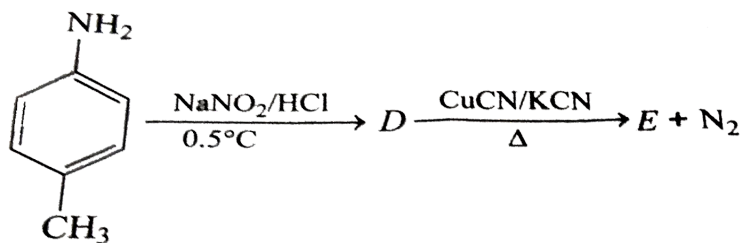


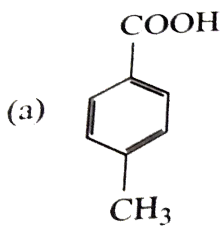


Answer: (c)

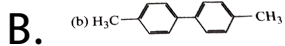
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2. In the reaction,

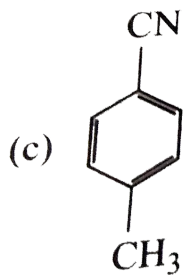




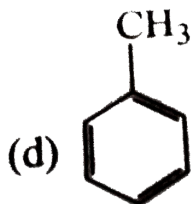
A.



B.



C.



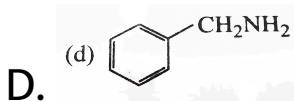
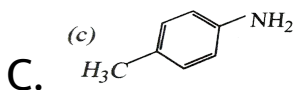
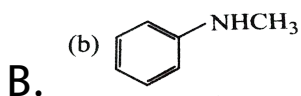
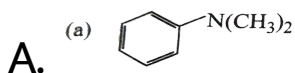
D.

**Answer: (c)**



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3. Amongst the compounds gives, the one that would form a brilliant colored dye on treatment with  $NaNO_2$  in dil.  $HCl$  followed by addition to an alkaline solution of  $\beta$  - naphthol is



**Answer: (c)**



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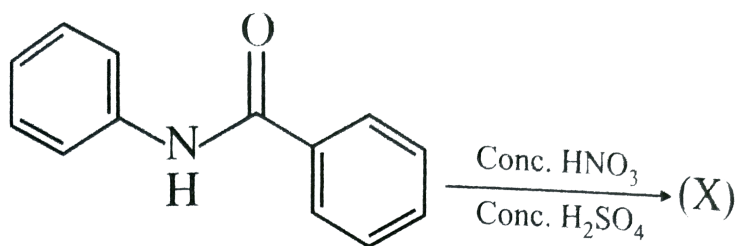
**4. The species having pyramidal shape is**



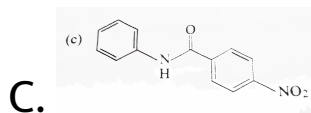
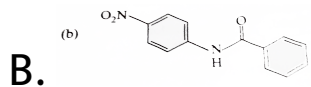
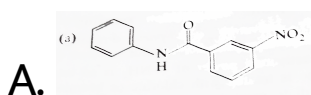
**Answer: (d)**



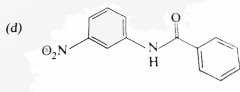
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In the following reaction, the structure of the major product (X) is:



D.



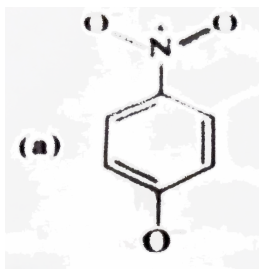
**Answer: (b)**



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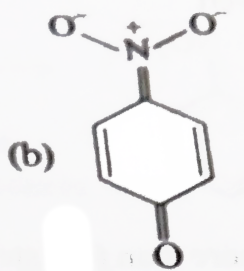
6. The most unlikely representation of resonance structures of p-nitrophenoxide ion is:

A.

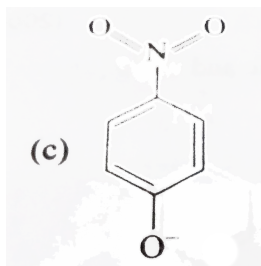




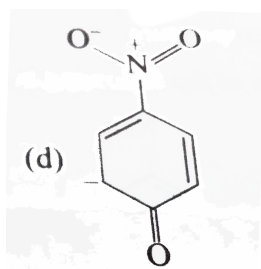
B.



C.



D.



**Answer: (c)**



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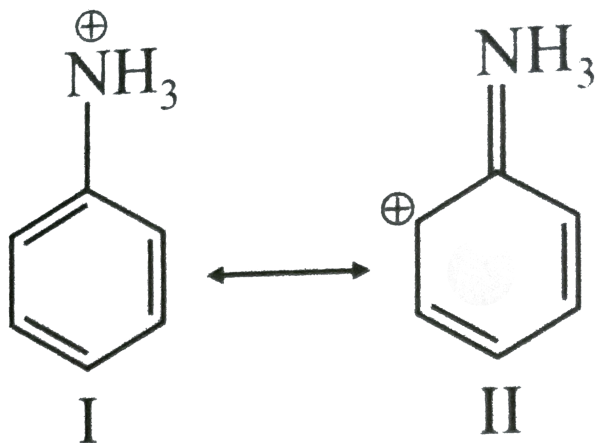
7. Benzene diazonium chloride on reaction with phenol in a basic medium gives:

- A. diphenyl ether
- B. p-hydroxy azobenzene
- C. chlorobenzene
- D. benzene

**Answer: (b)**



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8.

Examine the following two structures for the anilinium ion and choose the correct statement from the ones given below:

A. II is not an acceptable canonical structure because carbonium ions are less stable than ammonium ions

B. II is not an acceptable canonical structure because it is non-aromatic

C. II is not an acceptable canonical structure because the nitrogen has 10 valence electrons

D. II is not acceptable canonical structure

**Answer: (c)**



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9. Chlorobenzene can be prepared by reacting aniline with

A. hydrochloric acid

B. cuprous chloride

C. chlorine in the presence of anhyd  $AlCl_3$

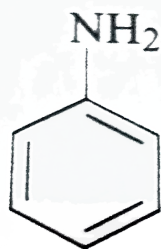
D. nitrous acid followed by heating with  
cuprous chloride

**Answer: (d)**



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10. The product (s) of the following reaction sequence is (are)



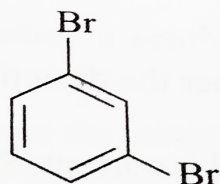
(i) Acetic anhydride/Pyridine

(ii) KBrO<sub>3</sub>/Br

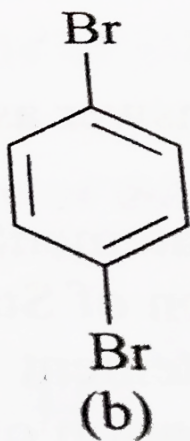
(iii) H<sub>3</sub>O<sup>+</sup>, Heat

(iv) NaNO<sub>2</sub>/HCl, 273-278 K

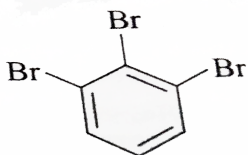
(v) Cu/HBr



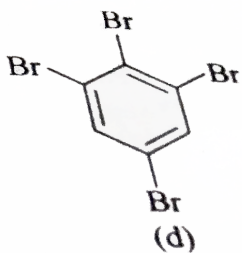
A. (a)



B.



C.



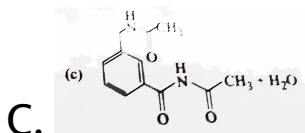
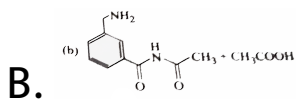
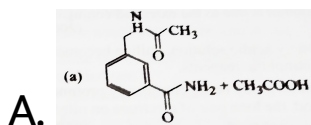
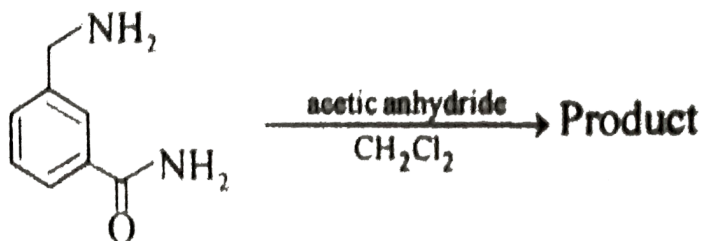
D.

Answer: (b)



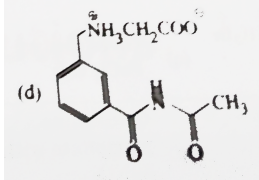
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11. In this reaction shown below, the major product(s) formed is //are





D.



**Answer: (a)**



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**12.** *p* – chloroaniline and anilinium hydrogen chloride can be distinguished by

A. Sandmeyer reaction

B.  $NaHCO_3$

C.  $AgNO_3$

D. Carbylamine test

**Answer: (c,d)**



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**13.** When nitrobenzene is treated with  $Br_2$  in presence of  $FeBr_3$ , the major product formed is  $m$  - bromo - nitrobenzene. Statement which is related to obtain the  $m$  - isomer is

A. the electron density on meta carbon is more than that on ortho and para positions

B. the intermediate carbonium ion formed after initial attack of  $Br^+$  at the meta position is less destabilised

C. loss of aromaticity when  $Br^+$  attacks at the ortho and para positions and not at meta position

D. easier loss of  $H^+$  to regain aromaticity

from meta position than from ortho and

para positions

**Answer: (a,b)**



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**14.** Statement I: Aniline on reaction with  $NaNO_2HCl$  at  $0^\circ C$  followed by coupling with  $\beta$ -naphthol gives a dark blue coloured precipitate.

Statement II: The colour of the compound formed in the reaction of aniline with  $NaNO_2/HCl$  at  $0^\circ C$  followed by coupling with  $\beta$ -naphthol is due to extended conjugation.

A. Statement I is correct , Statement II is coorrect , Statement II is the correct explanation of Statement I.

B. Statement I is correct , Statement II is coorrect , Statement II is not the correct explanation of Statement I.

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

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

**Answer: (d)**



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**15.** Statement I: In strongly acidic solutions , aniline becomes more reactive towards electrophilic reagents Statement II: The amino

group being completely protonated in strongly acidic solution, the lone pair of electrons on nitrogen is no longer available for resonance.

A. Statement I is correct , Statement II is coorrect , Statement II is the correct explanation of Statement I.

B. Statement I is correct , Statement II is coorrect , Statement II is not the correct explanation of Statement I.

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

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

**Answer: (d)**



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**16.** The high following points and insolubility in organic solvents of sulphamic acid are due to its .....structure





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17. In acidic medium, ..... Behaves as the strongest base. (nitrobenzene, aniline, phenol)

A. nitrobenzene

B. aniline

C. phenol

D. Both A and B

**Answer: B**

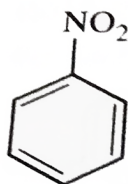


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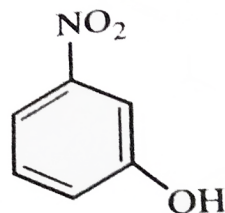
18.

Convert

Convert



to

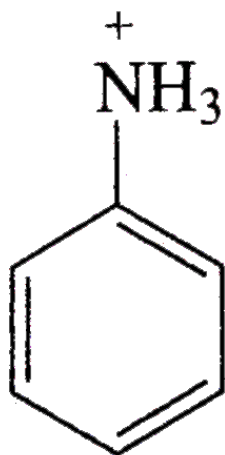


in not more than four steps. Also mention the reaction conditions and temperature.

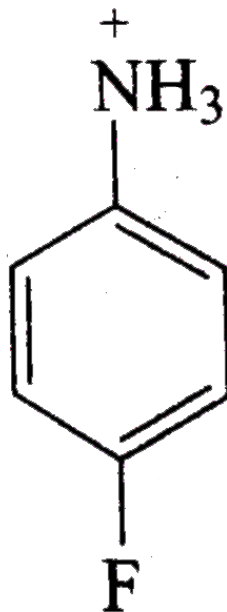


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19. Which of the following is more acidic and why?

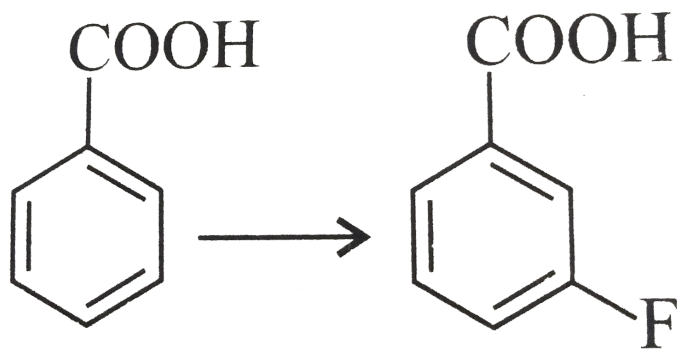


or



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20. Convert the following (in not more than three steps):



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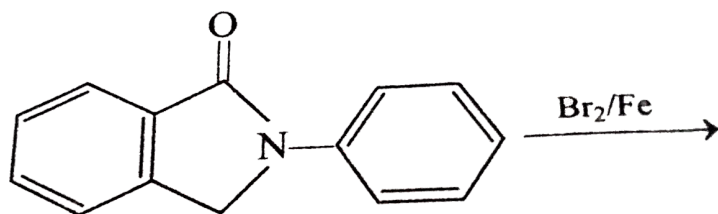
21. There is a solution of p-hydroxybenzoic acid and p-amino benzonoc acid. Discuss one method by which we can separate them and

also write down the confirmatory test of the functional group present.



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22. What would be the major product in the following reaction?



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23. How would you bring about the following conversion (in three steps) ?

Aniline  $\rightarrow$  Benzylamine .



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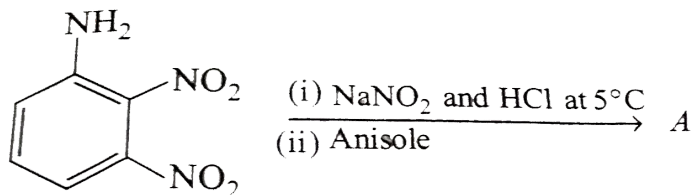
24. The following reaction gives two products.

Write the structures of these products.



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25. Complete the following with appropriate structure :



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26. How will you bring about the following conversion ?

'Benzamide from nitrobenzene'.



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27. How will you bring about the following conversions ? '4-nitrobenzaldehyde from benzene'



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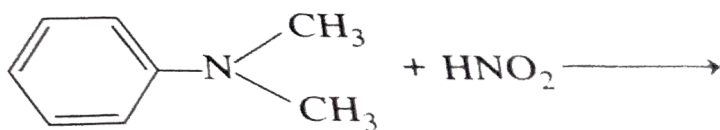
28. Outline a synthesis of p-bromonitrobenzene from benzene in two steps .



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29. Write the structure of the about major organic product expected from the following reaction.



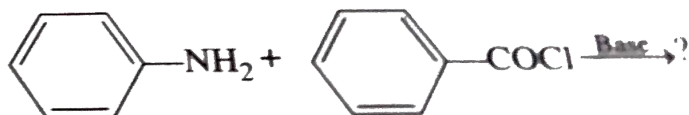
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30. How will you bring about the following conversion ? "4-nitro aniline to 1,2,3-tribromo benzene"



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31. Complete the following with appropriate structures :



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32. How would you convert ?

'Aniline to chlorobenzene' .



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**33.** State the conditions under which the preparation of alumina from aluminium is carried out. Give the necessary equations which need not be balanced.



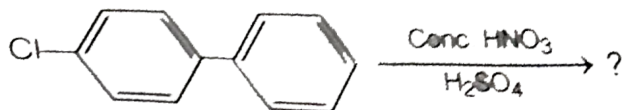
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**34.** State the equation for the preparation of following compound.

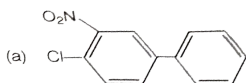
Chlorobenzene from aniline (in 2 steps).



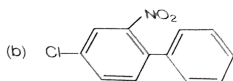
35. Predominant product of nitration of the following compound is



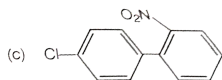
A.



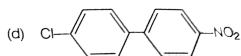
B.



C.



D.



**Answer: (d)**



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**36.** One of the completions A to D is incorrect.

Choose the letter corresponding to the incorrect completion.

In the nitration of benzene by concentrated sulphuric and concentrated nitric acid

A. the reaction is irreversible .

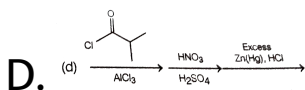
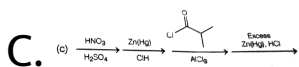
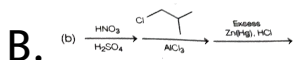
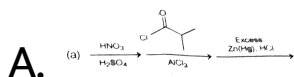
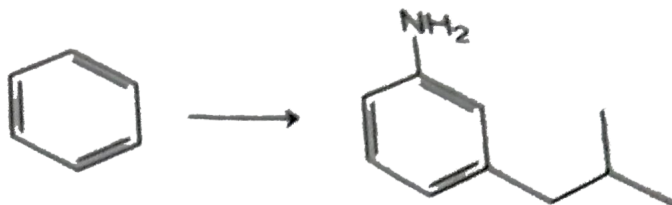
- B. the rate determining step is the removal of  $H^+$  from the intermediate
- C. the attacking electrophile is  $NO_2^+$
- D. the second nitro group enters the benzene ring meta to the first nitro group

**Answer: (b)**



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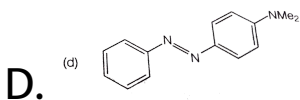
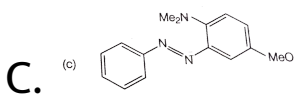
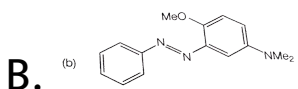
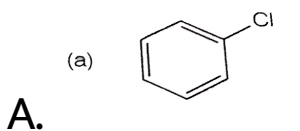
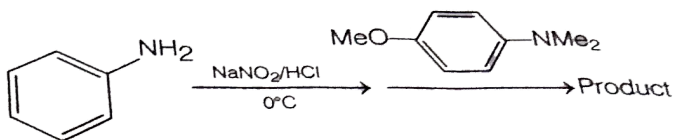
37. Select the best reaction sequence to accomplish the following transformation



Answer: (d)



38. What could be the product for the following reaction ?



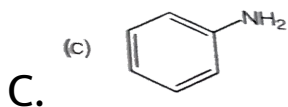
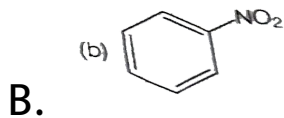
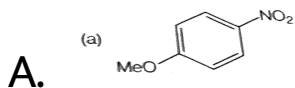


Answer: (c)

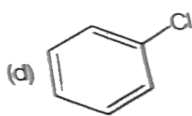


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39. Which of the following compounds fail in Friedel-Crafts alkylation reaction ?



D.

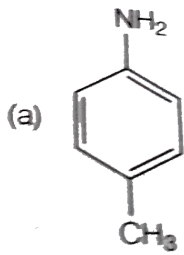


**Answer: (b,c)**

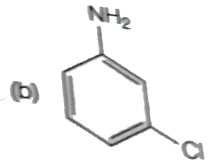


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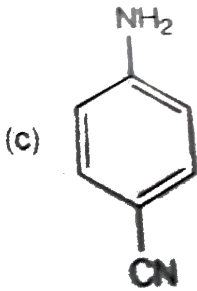
**40.** Diazonium salt of which of the following substituted aromatic amine undergo faster coupling with phenol than benzenediazonium chloride ?



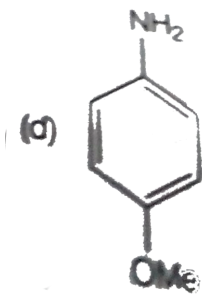
A.



B.



C.



D.

**Answer: (b,c)**



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**41.** Assertion Diazotization of aniline can be used for its identification reaction.

Reason Diazonium salt of aniline forms various coloured azo dyes via coupling with suitable reagent.

A. Both assertion and reason are correct and reason is the correct explanation of the assertion.

B. Both assertion and reason are correct but reason is not the correct explanation of assertion.

C. Assertion is correct but reason is incorrect.

D. Assertion is incorrect but reason is correct.

**Answer: (a)**



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**42.** Assertion - Aniline can be estimated by treatment with excess of bromine water solution.

Reason - Aniline reacts quantitatively with excess of bromine water solution forming insoluble, 2,4,6-tribromoaniline.

A. Both assertion and reason are correct and reason is the correct explanation of the assertion.

B. Both assertion and reason are correct but reason is not the correct explanation of assertion.

C. Assertion is correct but reason is incorrect.

D. Assertion is incorrect but reason is correct.

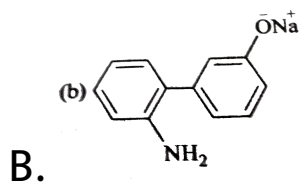
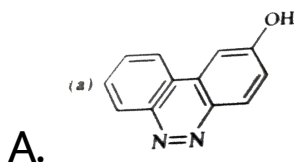
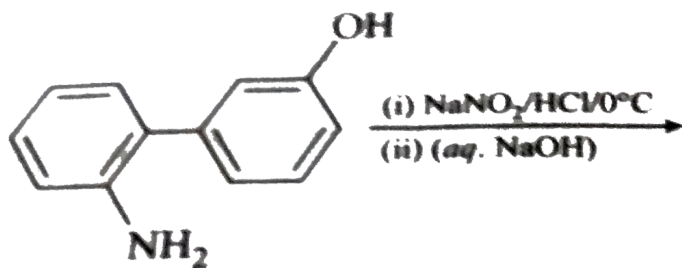
**Answer: (a)**



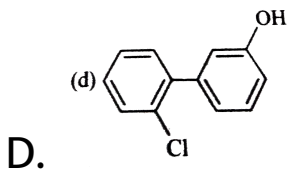
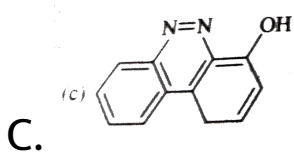
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# Objective Questions I

1. The major product of the following reaction is

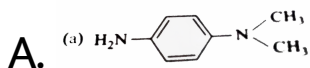
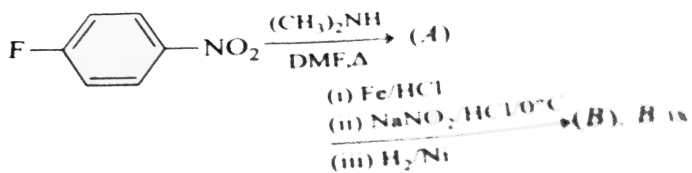


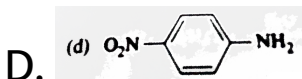
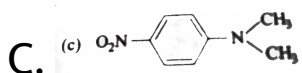
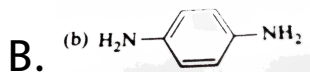




Answer: (a)

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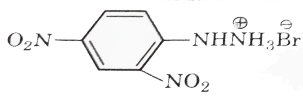
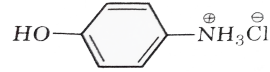
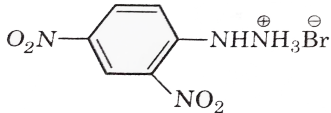


**Answer: (a)**

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## Objective Questions II

1. Match the compounds in Column I with their characteristic test (s) reaction (Os) given in

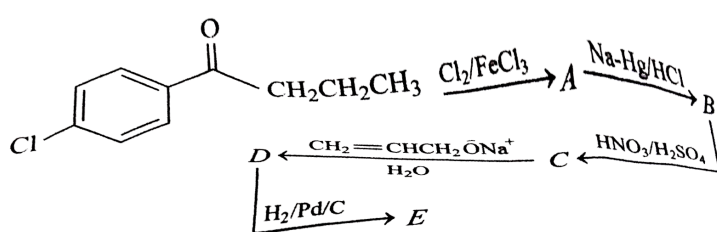
Column I	Column II
(A) $H_2N-\overset{\oplus}{N}H_3\overset{\ominus}{Cl}$	(p) Sodium fusion extract of the compound gives Prussian blue colour with $FeSO_4$
(B) 	(q) Gives positive $FeCl_3$ test
(C) 	(r) Gives white precipitate with $AgNO_3$
(D) 	(s) Reacts with aldehydes to form the corresponding hydrazone derivative



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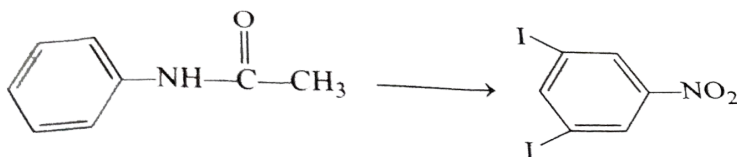
## Subjective Questions II

1. Write structures of the products A,B,C,D and E in the following scheme



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2. Complete the following reactions with appropriate reagents



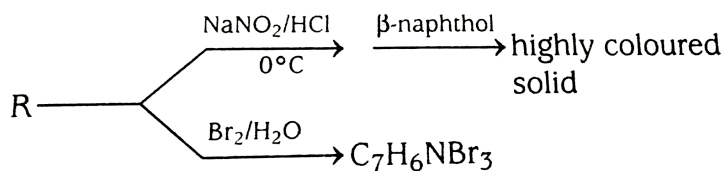
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## Chapter Test

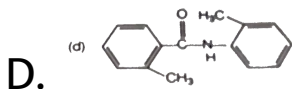
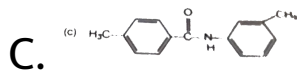
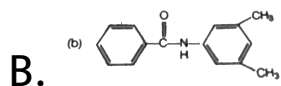
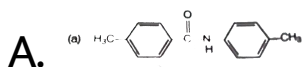
1. A solid organic compound (P). Of formula  $C_{15}H_{15}OH$  was found to be insoluble in water, dilute  $HCl$  or dilute  $NaOH$  in cold. After prolonged heating of  $P$  with aqueous  $NaOH$ , a liquid R was found to be floating on the surface of alkaline mixture. R did not solidified on cooling to room temperature, it was steam distilled and separated. Also acidification of alkaline mixture with  $HCl$  caused precipitation of a white solid

$S(C_8H_8O_2)$ . Some additional information are

given below



$S$  on treatment with  $Br_2 / FeBr_3$  in  $CCl_4$  produced a single isomer  $C_8H_7O_2Br$  while heating 'S' with soda lime gave toluene.



**Answer: (c)**



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