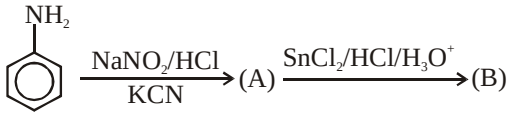
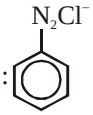
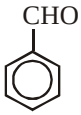
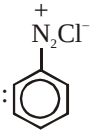
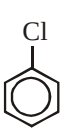
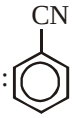
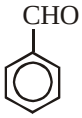
AROMATIC COMPOUND

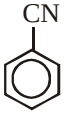
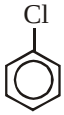
1. 'A' and 'B' in the following reactions are :



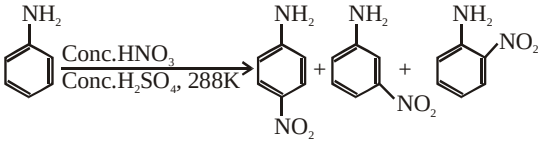
(1) (A) :  (B) : 

(2) (A) :  (B) : 

(3) (A) :  (B) : 

(4) (A) :  (B) : 

2. In the following reaction the reason why meta-nitro product also formed is :



[A] 51% [B] 47% [C] 2%

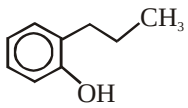
(1) low temperature

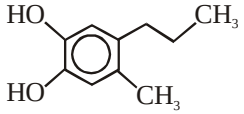
(2) $-NH_2$ group is highly meta-directive

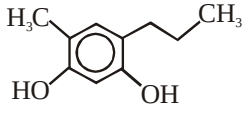
(3) Formation of anilinium ion

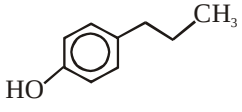
(4) $-NO_2$ substitution always takes place at meta-position

3. Which of the following compound gives pink colour on reaction with phthalic anhydride in conc. H_2SO_4 followed by treatment with NaOH ?

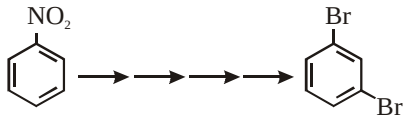
(1) 

(2) 

(3) 

(4) 

4. What is the correct sequence of reagents used for converting nitrobenzene into *m*-dibromobenzene ?



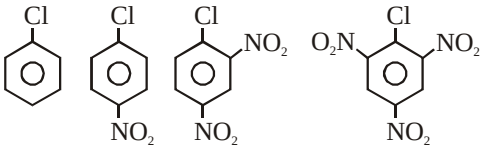
(1) $\xrightarrow{NaNO_2}/\xrightarrow{HCl}/\xrightarrow{KBr}/\xrightarrow{H^+}$

(2) $\xrightarrow{Br_2/Fe}/\xrightarrow{Sn/HCl}/\xrightarrow{NaNO_2/HCl}/\xrightarrow{CuBr/HBr}$

(3) $\xrightarrow{Sn/HCl}/\xrightarrow{KBr}/\xrightarrow{Br_2}/\xrightarrow{H^+}$

(4) $\xrightarrow{Sn/HCl}/\xrightarrow{Br_2}/\xrightarrow{NaNO_2}/\xrightarrow{NaBr}$

5. The correct order of the following compounds showing increasing tendency towards nucleophilic substitution reaction is :-



(i) (ii) (iii) (iv)

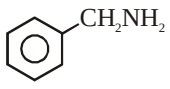
(1) (iv) < (iii) < (ii) < (i)

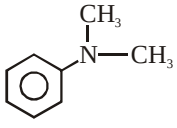
(2) (iv) < (i) < (ii) < (iii)

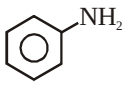
(3) (iv) < (i) < (iii) < (ii)

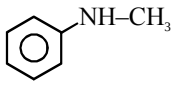
(4) (i) < (ii) < (iii) < (iv)

6. The diazonium salt of which of the following compounds will form a coloured dye on reaction with β-Naphthol in NaOH ?

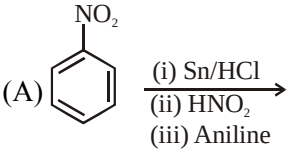
(1) 

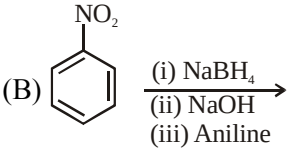
(2) 

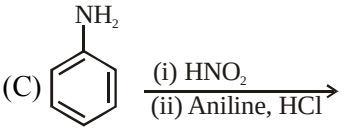
(3) 

(4) 

7. Which of the following reaction/s will not give p-aminoazobenzene?

(A) 

(B) 

(C) 

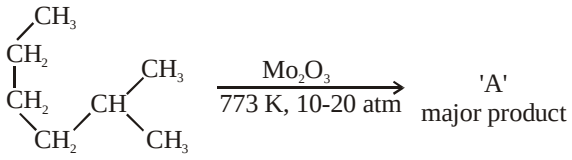
(1) A only

(2) B only

(3) C only

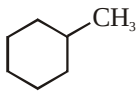
(4) A and B

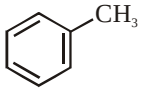
8. Identify A in the given chemical reaction.



(1) 

(2) 

(3) 

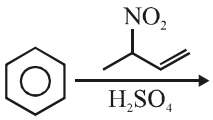
(4) 

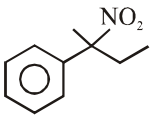
9. Consider the following chemical reaction.

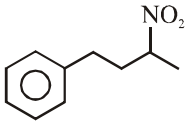
$$CH \equiv CH \xrightarrow[(2)\ CO,\ HCl,\ AlCl_3]{(1)\ \text{Red hot Fe tube, 873 K}} \text{Product}$$

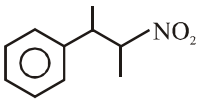
The number of sp^2 hybridized carbon atom(s) present in the product is _____.

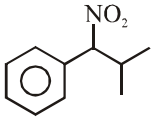
10. The major product of the following reaction is:



(1) 

(2) 

(3) 

(4) 

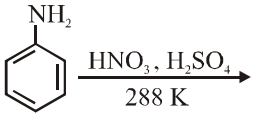
11. The correct sequence of reagents used in the preparation of 4-bromo-2-nitroethyl benzene from benzene is :

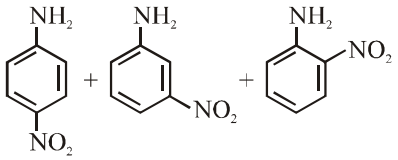
(1) HNO_3/H_2SO_4, $Br_2/AlCl_3$, $CH_3COCl/AlCl_3$, Zn-Hg/HCl

(2) $Br_2/AlBr_3$, $CH_3COCl/AlCl_3$, HNO_3/H_2SO_4, Zn/HCl

(3) $CH_3COCl/AlCl_3$, $Br_2/AlBr_3$, HNO_3/H_2SO_4, Zn/HCl

(4) $CH_3COCl/AlCl_3$, Zn-Hg/HCl, $Br_2/AlBr_3$, HNO_3/H_2SO_4

12. 



(A) (B) (C)

Correct statement about the given chemical reaction is :

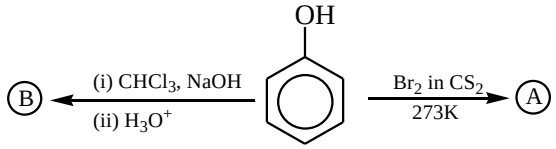
(1) $-\ddot{N}H_2$ group is *ortho* and *para* directive, so product (B) is not possible.

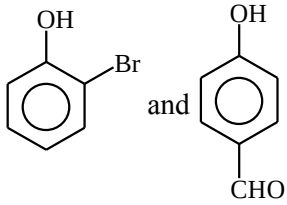
(2) Reaction is possible and compound (B) will be the major product.

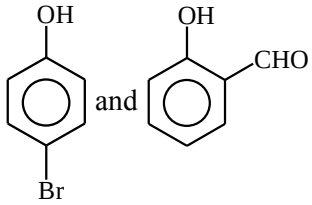
(3) The reaction will form sulphonated product instead of nitration.

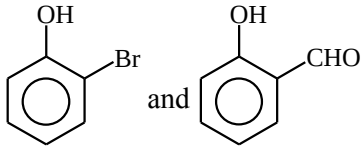
(4) Reaction is possible and compound (A) will be major product.

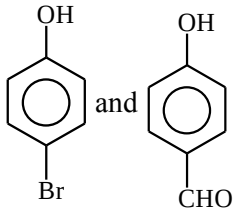
13. Identify the major products A and B respectively in the following reactions of phenol.



(1) 

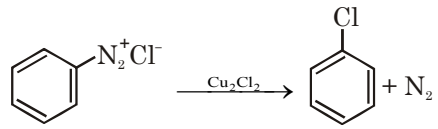
(2) 

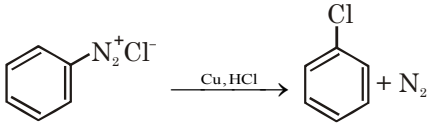
(3) 

(4) 

14. Match List-I with List-II

List-I

(a) 

(b) 

(c) $2CH_3CH_2Cl + 2Na \xrightarrow{Ether} C_2H_5–C_2H_5+2NaCl$

(d) $2C_6H_5Cl + 2Na \xrightarrow{Ether} C_6H_5–C_6H_5 + 2NaCl$

List-II

(i) Wurtz reaction

(ii) Sandmeyer reaction

(iii) Fittig reaction

(iv) Gatterman reaction

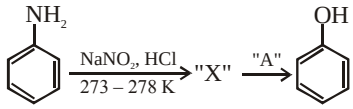
Choose the correct answer from the options given below :

(1) (a) → (iii), (b) → (i), (c) → (iv), (d) → (ii)

(2) (a) → (ii), (b) → (i), (c) → (iv), (d) → (iii)

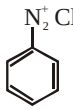
(3) (a) → (ii), (b) → (iv), (c) → (i), (d) → (iii)

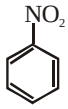
(4) (a) → (iii), (b) → (iv), (c) → (i), (d) → (ii)

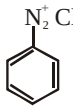
15. 

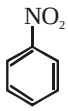
Major Product

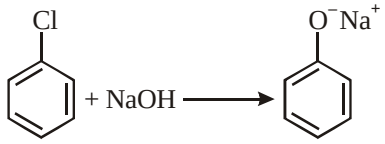
In the above chemical reaction, intermediate "X" and reagent/condition "A" are :

(1) X-  ; A- H_2O/NaOH

(2) X-  ; A- H_2O/Δ

(3) X-  ; A- H_2O/Δ

(4) X-  ; A- H_2O/NaOH

16. 

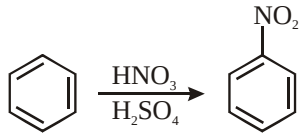
The above reaction requires which of the following reaction conditions?

(1) 573 K, Cu, 300 atm

(2) 623 K, Cu, 300 atm

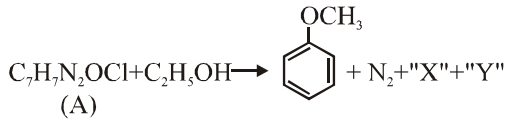
(3) 573 K, 300 atm

(4) 623 K, 300 atm

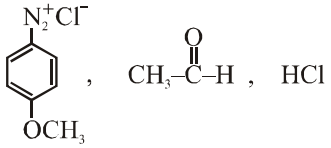
17. 

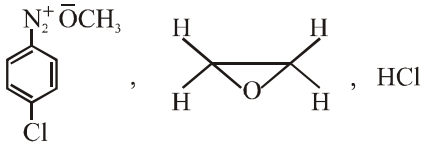
In the above reaction, 3.9 g of benzene on nitration gives 4.92 g of nitrobenzene. The percentage yield of nitrobenzene in the above reaction is _____ %. (Round off to the Nearest Integer).

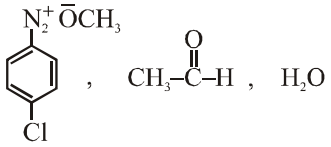
(Given atomic mass : C : 12.0 u, H : 1.0u, O : 16.0 u, N : 14.0 u)

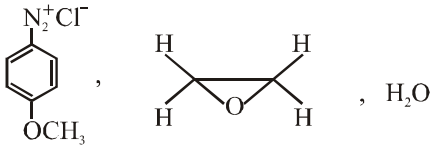
18. 

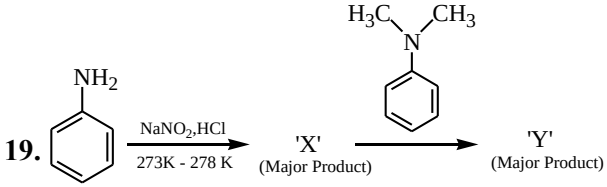
In the above reaction, the structural formula of (A), "X" and "Y" respectively are :

(1) 

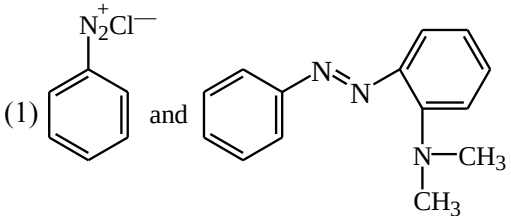
(2) 

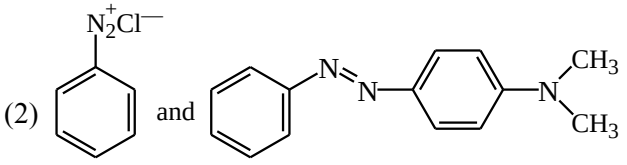
(3) 

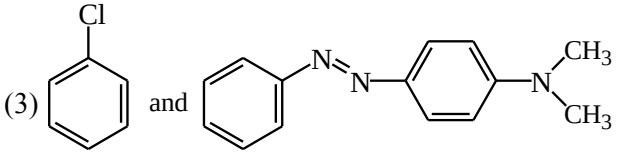
(4) 

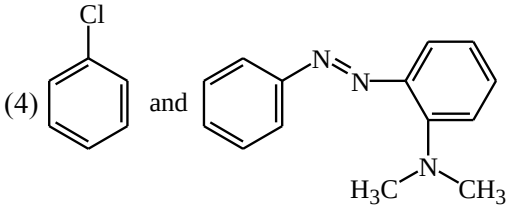
19. 

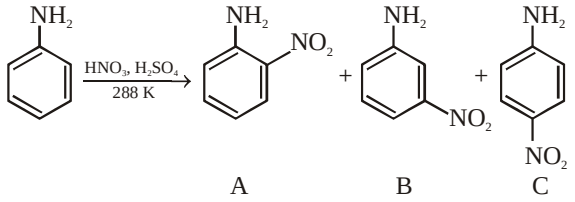
Considering the above reaction, X and Y respectively are :

(1) 

(2) 

(3) 

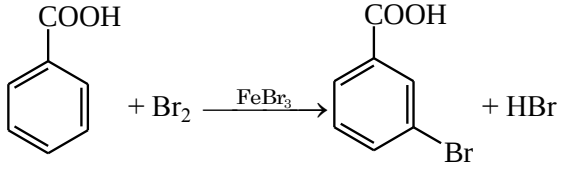
(4) 

20. 

Consider the given reaction, percentage yield of :

(1) C > A > B (2) B > C > A

(3) A > C > B (4) C > B > A

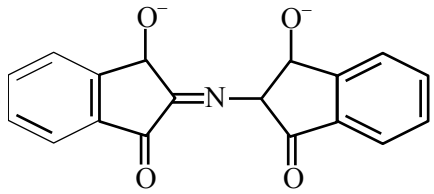
21. 

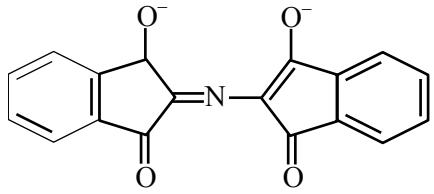
Consider the above reaction where 6.1 g of benzoic acid is used to get 7.8 g of m-bromo benzoic acid. The percentage yield of the product is_____.

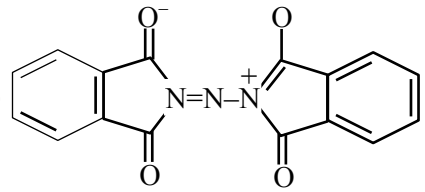
(Round off to the Nearest integer)

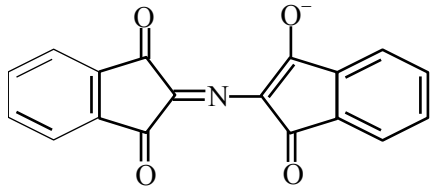
[Given : Atomic masses : C = 12.0u, H : 1.0u, O : 16.0u, Br = 80.0 u]

22. The correct structure of Rhumann's Purple, the compound formed in the reaction of ninhydrin with proteins is :

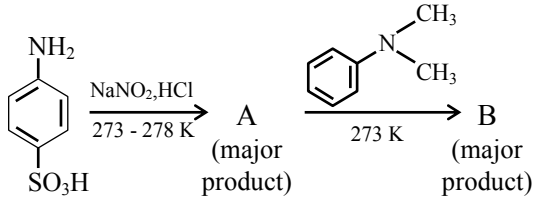
(1) 

(2) 

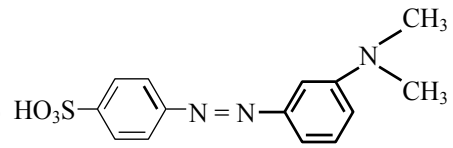
(3) 

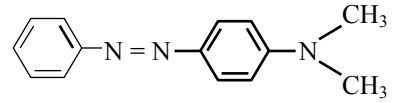
(4) 

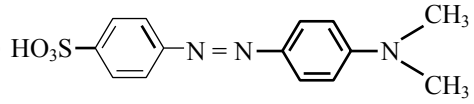
23. Benzene on nitration gives nitrobenzene in presence of HNO_3 and H_2SO_4 mixture, where :
(1) both H_2SO_4 and HNO_3 act as a bases
(2) HNO_3 acts as an acid and H_2SO_4 acts as a base
(3) both H_2SO_4 and HNO_3 act as an acids
(4) HNO_3 acts as a base and H_2SO_4 acts as an acid

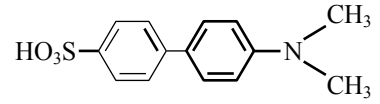
24. 

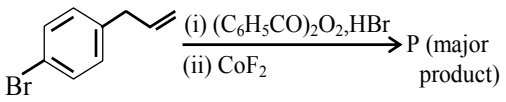
Consider the above reaction, compound B is :

(1) 

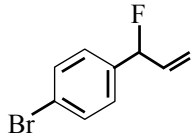
(2) 

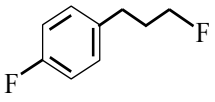
(3) 

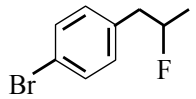
(4) 

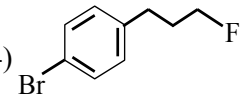
25. 

Major product P of above reaction, is :

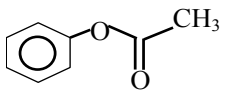
(1) 

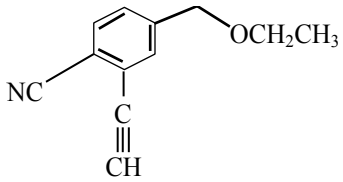
(2) 

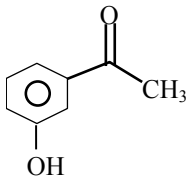
(3) 

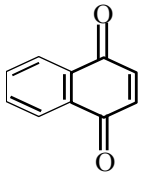
(4) 

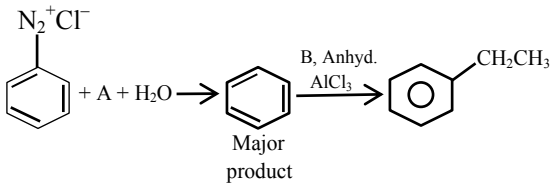
26. Which of the following compounds will provide a tertiary alcohol on reaction with excess of CH_3MgBr followed by hydrolysis?

(1) 

(2) 

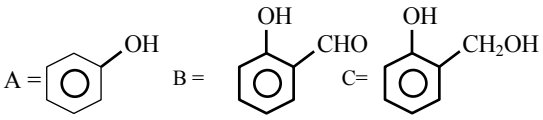
(3) 

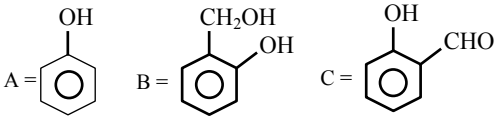
(4) 

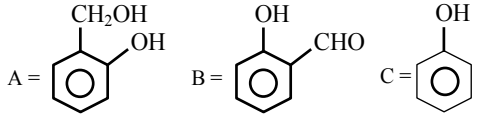
27. 

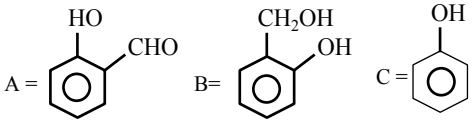
In the chemical reactions given above A and B respectively are :
(1) H_3PO_2 and CH_3CH_2Cl
(2) CH_3CH_2OH and H_3PO_2
(3) H_3PO_2 and CH_3CH_2OH
(4) CH_3CH_2Cl and H_3PO_2

28. An organic compound A (C_6H_6O) gives dark green colouration with ferric chloride. On treatment with $CHCl_3$ and KOH, followed by acidification gives compound B. Compound B can also be obtained from compound C on reaction with pyridinium chlorochromate (PCC). Identify A, B and C .

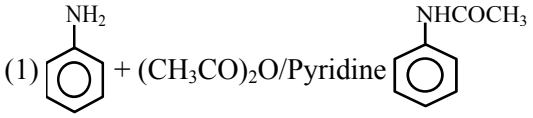
(1) 

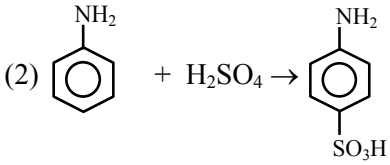
(2) 

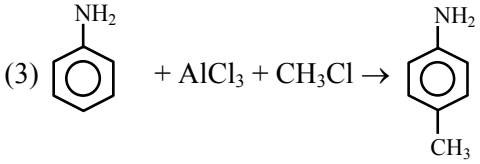
(3) 

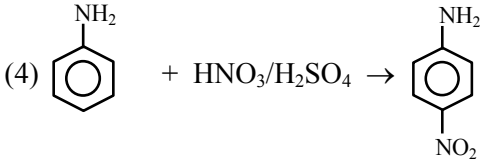
(4) 

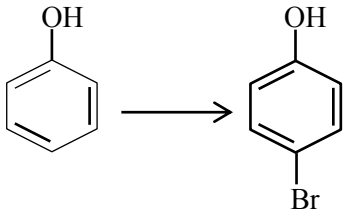
29. Which one of the following reactions does not occur ?

(1) 

(2) 

(3) 

(4) 

30. 

(Major product)

The given reaction can occur in the presence of :

(a) Bromine water (b) Br_2 in CS_2, 273 K

(c) $Br_2/FeBr_3$ (d) Br_2 in $CHCl_3$, 273 K

Choose the correct answer from the options given below :

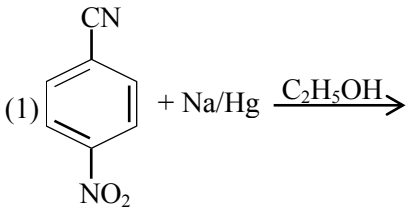
(1) (b) and (d) only

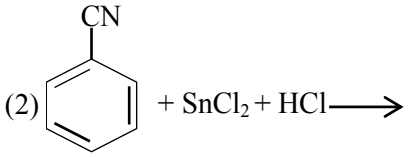
(2) (a) and (c) only

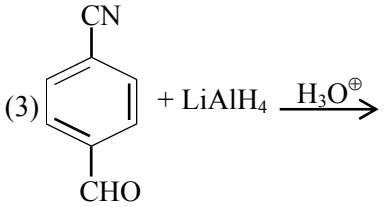
(3) (b), (c) and (d) only

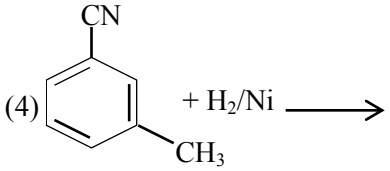
(4) (a), (b) and (d) only

31. Which one of the products of the following reactions **does not** react with Hinsberg reagent to form sulphonamide?

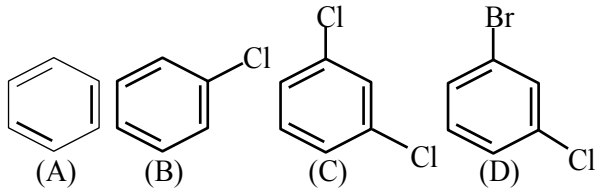
(1) 

(2) 

(3) 

(4) 

32. The correct decreasing order of densities of the following compounds is :

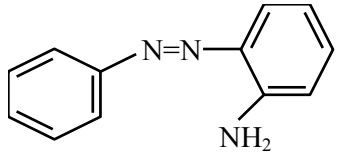


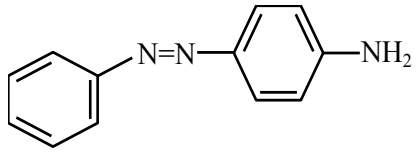
(A) (B) (C) (D)

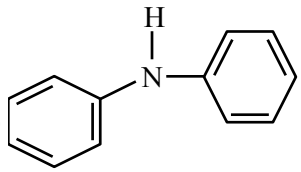
(1) (D) > (C) > (B) > (A)
(2) (C) > (D) > (A) > (B)
(3) (C) > (B) > (A) > (D)
(4) (A) > (B) > (C) > (D)

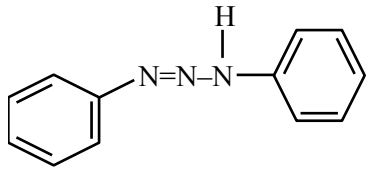
33. $C_6H_5NO_2 \xrightarrow{Sn + HCl}$ "A" $\xrightarrow[H^{\oplus}]{C_6H_5\overset{\oplus}{N_2}\overset{\ominus}{Cl}}$ P (Yellow coloured compound)

Consider the above reaction, the Product "P" is :

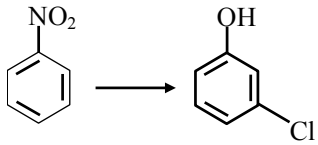
(1) 

(2) 

(3) 

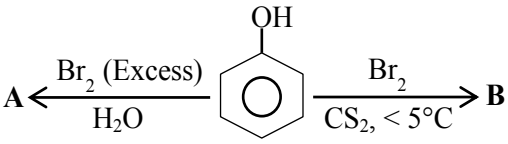
(4) 

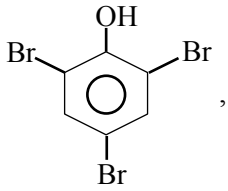
34. The correct sequence of correct reagents for the following transformation is :-

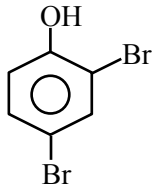


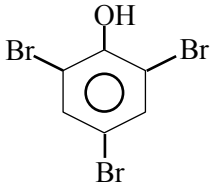
(1) (i) Fe, HCl (ii) Cl_2, HCl, (iii) $NaNO_2$, HCl, 0°C (iv) H_2O/H^+
(2) (i) Fe, HCl (ii) $NaNO_2$, HCl, 0°C (iii) H_2O/H^+ (iv) Cl_2, $FeCl_3$
(3) (i) Cl_2, $FeCl_3$ (ii) Fe, HCl (iii) $NaNO_2$, HCl, 0°C (iv) H_2O/H^+
(4) (i) Cl_2, $FeCl_3$ (ii) $NaNO_2$, HCl, 0°C (iii) Fe, HCl (iv) H_2O/H^+

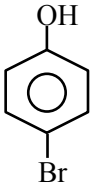
35. The correct options for the products **A** and **B** of the following reactions are :

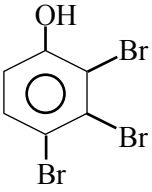


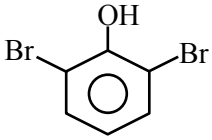
(1) **A**= 

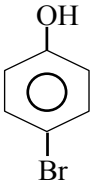
, **B**= 

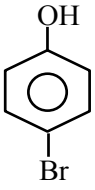
(2) **A**= 

, **B**= 

(3) **A**= 

, **B**= 

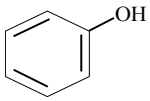
(4) **A**= 

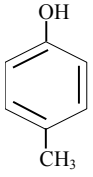
, **B**= 

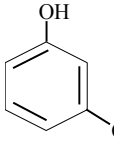
36. The correct sequential addition of reagents in the preparation of 3-nitrobenzoic acid from benzene is:

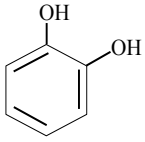
(1) $Br_2/AlBr_3$, HNO_3/H_2SO_4, Mg/ether, CO_2, H_3O^+
(2) $Br_2/AlBr_3$, NaCN, H_3O^+, HNO_3/H_2SO_4
(3) $Br_2/AlBr_3$, HNO_3/H_2SO_4, NaCN, H_3O^+
(4) HNO_3/H_2SO_4, $Br_2/AlBr_3$, Mg/ether, CO_2, H_3O^+

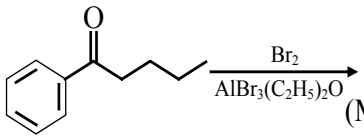
37. Which one of the following phenols does not give colour when condensed with phthalic anhydride in presence of conc. H_2SO_4 ?

(1) 

(2) 

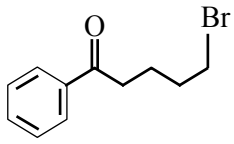
(3) 

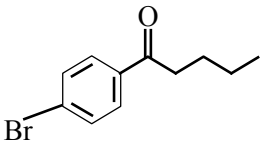
(4) 

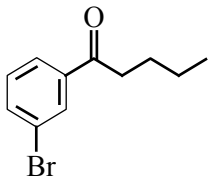
38. 

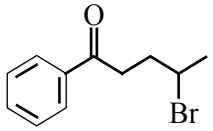
'A' (Major product)

Consider the given reaction, the product **A** is:

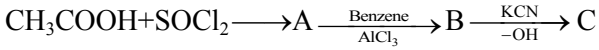
(1) 

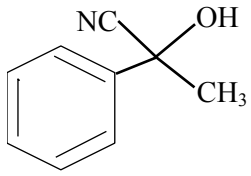
(2) 

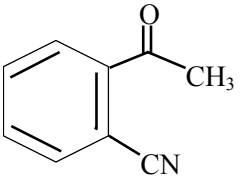
(3) 

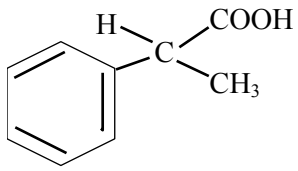
(4) 

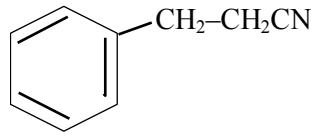
39. The structure of product C, formed by the following sequence of reactions is :



(1) 

(2) 

(3) 

(4) 

40. The total number of reagents from those given below, that can convert nitrobenzene into aniline is _____. (Integer answer)

I. Sn – HCl

II. $Sn - NH_4OH$

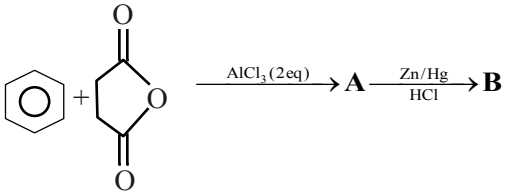
III. Fe – HCl

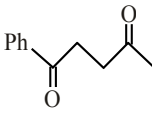
IV. Zn – HCl

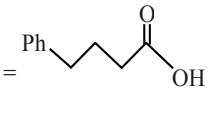
V. $H_2 - Pd$

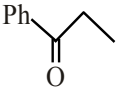
VI. H_2 – Raney Nickel

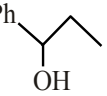
41. The structures of **A** and **B** formed in the following reaction are : [Ph = $-C_6H_5$]

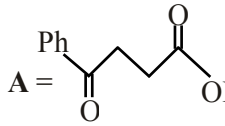


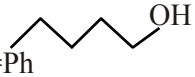
(1) **A** = 

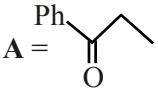
, **B** = 

(2) **A** = 

, **B** = 

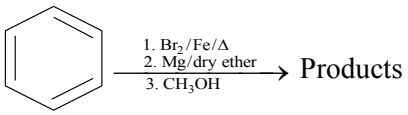
(3) **A** = 

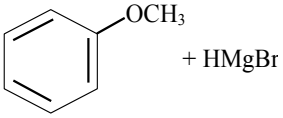
, **B** = 

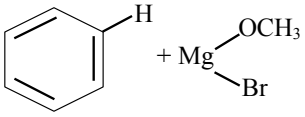
(4) **A** = 

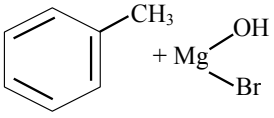
, **B** = 

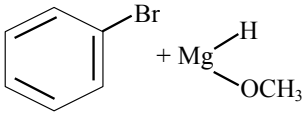
42. For the following :



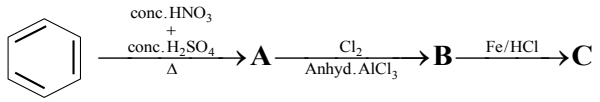
(1) 

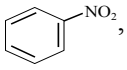
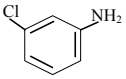
(2) 

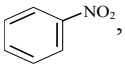
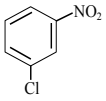
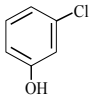
(3) 

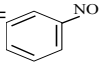
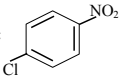
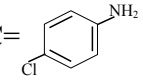
(4) 

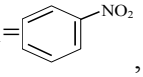
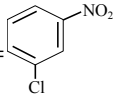
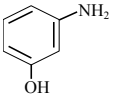
43. Identify correct **A, B** and **C** in the reaction sequence given below :



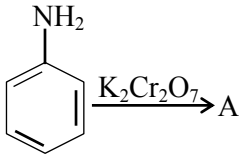
(1) **A**=  , **B**=  ,**C**= 

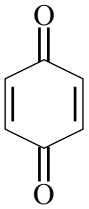
(2) **A**=  , **B** =  , **C** = 

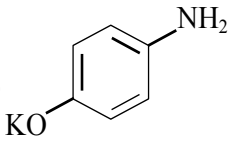
(3) **A**=  , **B**=  , **C**= 

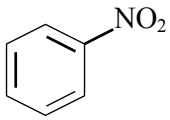
(4) **A**=  , **B** =  , **C** = 

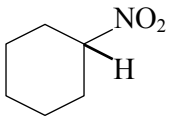
44. Identify A in the following reaction.



(1) 

(2) 

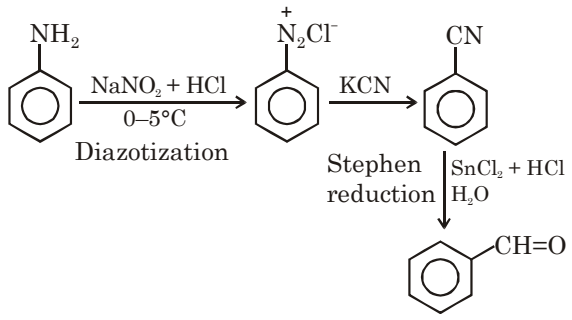
(3) 

(4) 

SOLUTION

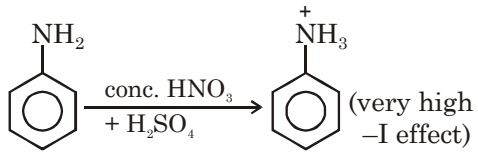
1. Official Ans. by NTA (3)

Sol.



2. Official Ans. by NTA (3)

Sol.

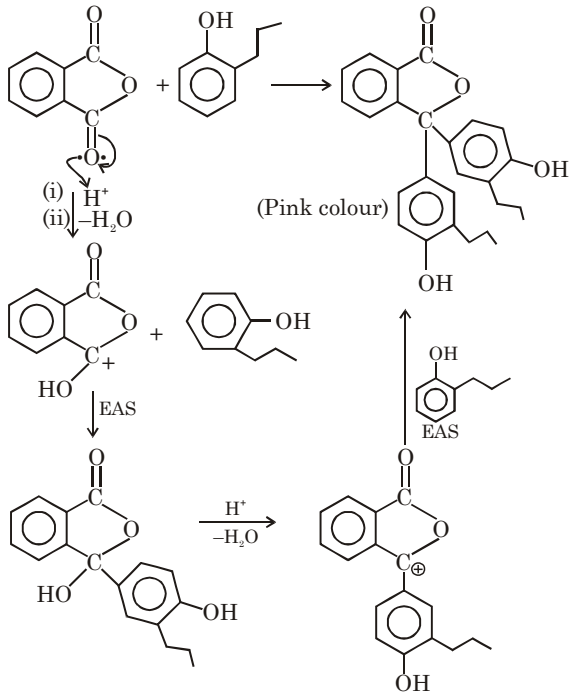


(Anilinium ion)

Aniline on protonation gives anilinium ion which is meta directing. So considerable amount of meta product is formed.

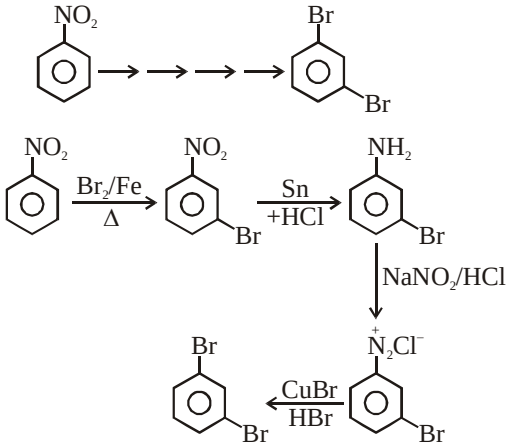
3. Official Ans. by NTA (1)

Sol.



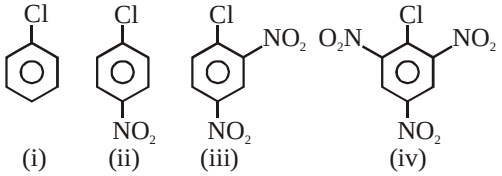
4. Official Ans. by NTA (2)

Sol. Correct sequence of reagents for the following conversion.



5. Official Ans. by NTA (4)

Sol. For nucleophile substitution in aromatic halides



(i) (ii) (iii) (iv)

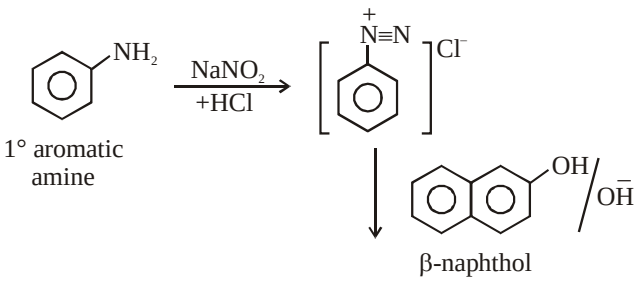
Correct order is :

(i) < (ii) < (iii) < (iv)

More No. of NO_2 substituted aromatic halide, increase the rate of nucleophile substitution reaction in aromatic halides.

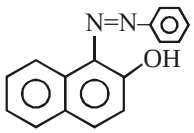
6. Official Ans. by NTA (3)

Sol.



1° aromatic amine

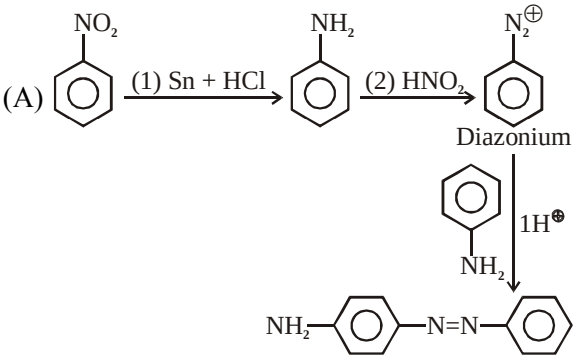
β-naphthol

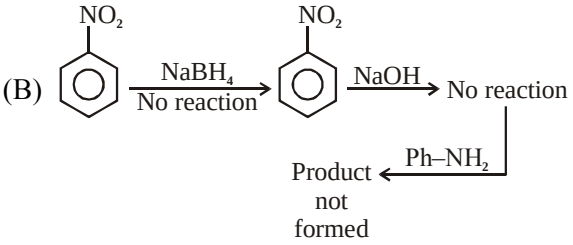


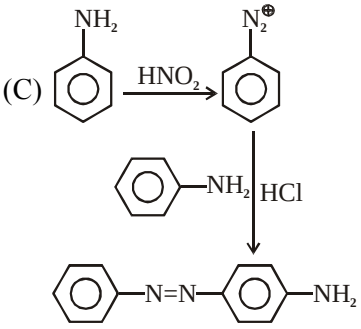
Orange-Red. dye

7. Official Ans. by NTA (2)

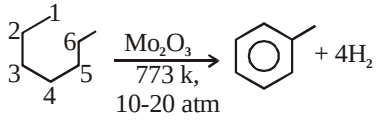
Sol. In basic or neutral medium N–N coupling favourable while in slightly acidic medium C–N coupling favourable.







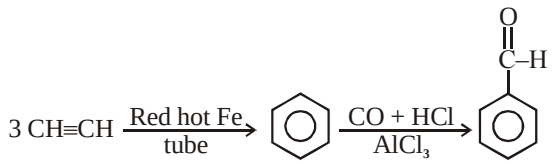
8. Official Ans. by NTA (4)

Sol. 

Mo_2O_3 at 773 K temperature and 10-20-atm pressure is aromatising agent.

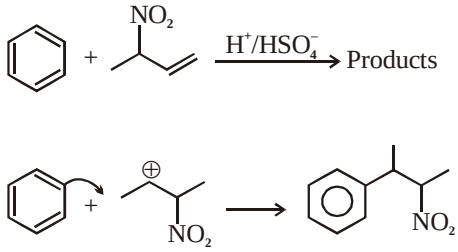
9. Official Ans. by NTA (7)

Sol.

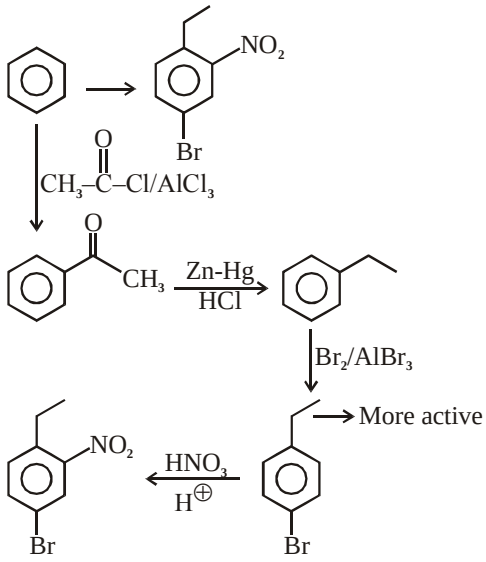


In benzaldehyde total number of sp^2 'C' are 7.

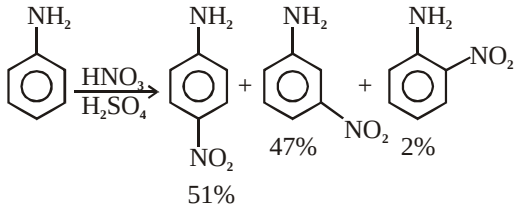
10. Official Ans. by NTA (3)

Sol. 

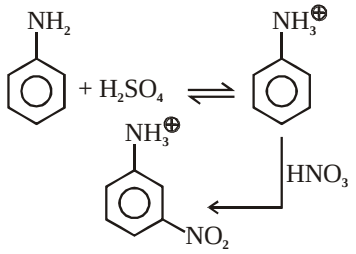
11. Official Ans. by NTA (4)

Sol. 

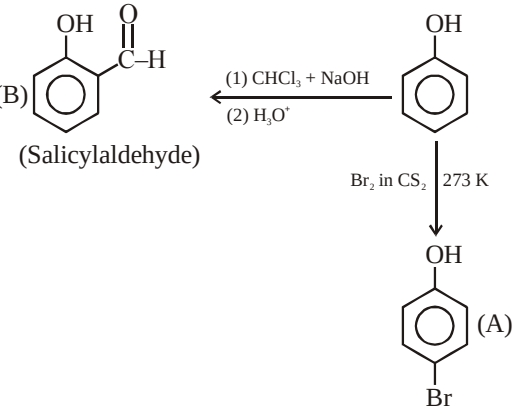
12. Official Ans. by NTA (4)

Sol. 

Due to formation of anilinium ion by acid base reaction m-product is form as considerable amount.



13. Official Ans. by NTA (2)

Sol. (B) 

(Salicylaldehyde)

p–Bromo phenol

14. Official Ans. by NTA (3)

Sol. (a) → (ii) Sand Meyer reaction

(b) → (iv) Gatterman reaction

(c) → (i) Wurtz reaction

(d) → (iii) Fittig reaction

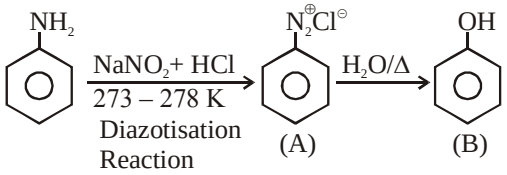
(a) → (ii),

(b) → (iv),

(c) → (i),

(d) → (iii)

15. Official Ans. by NTA (3)

Sol. 

(A) (B)

16. Official Ans. by NTA (2)

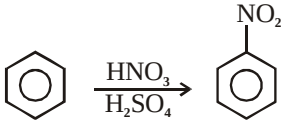
Sol. Positive zero error = 0.2 mm

Main scale reading = 8.5 cm

Vernier scale reading $= 6 \times 0.01 = 0.06$ cm

Final reading = 8.5 + 0.06 – 0.02 = 8.54 cm

17. Official Ans. by NTA (80)

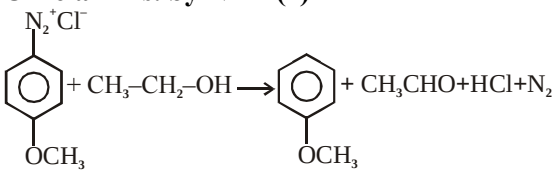
Sol. 

1 mole	1 mole
78gm	123gm
3.9gm	$\frac{123}{78} \times 3.9 = 6.15$gm

But actual amount of nitrobenzene formed is 4.92 gm and hence.

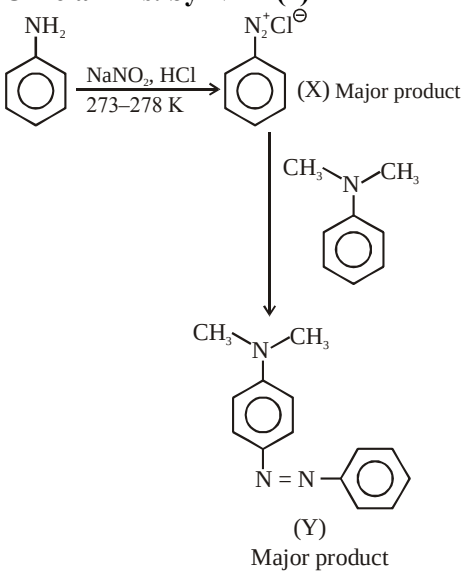
Percentage yield $= \frac{4.92}{6.15} \times 100 = 80\%$

18. Official Ans. by NTA (1)

Sol. 

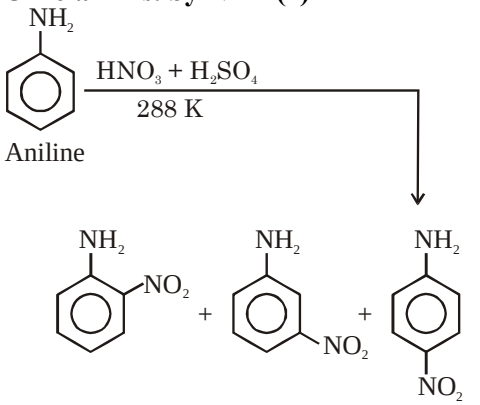
Anisole

19. Official Ans. by NTA (2)

Sol. 

(Y)
Major product

20. Official Ans. by NTA (4)

Sol. 

(A)	(B)	(C)
(2%)	(47%)	(51%)

% yield order ⇒ C > B > A

21. Official Ans. by NTA (78)

Sol. Moles of Benzoic acid $= \frac{6.1}{122}$

= moles of m-bromobenzoic acid

So, weight of m-bromobenzoic acid

$= \frac{6.1}{122} \times 201\text{gm}$

$= 10.05$ gm

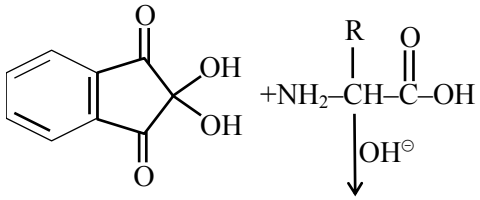
$\%\text{ yield} = \frac{\text{Actual weight}}{\text{Theoretical weight}} \times 100$

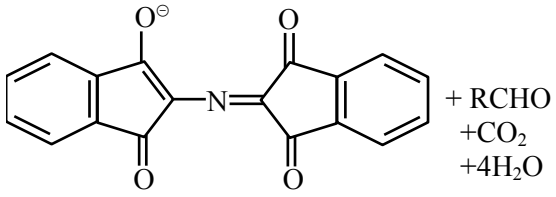
$= \frac{7.8}{10.05} \times 100$

$= 77.61\%$

22. Official Ans. by NTA (4)

Sol.





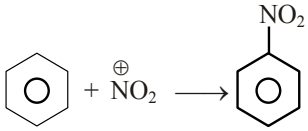
Ninhydrin Test

23. Official Ans. by NTA (4)

Sol. Reagent for nitration of Benzene

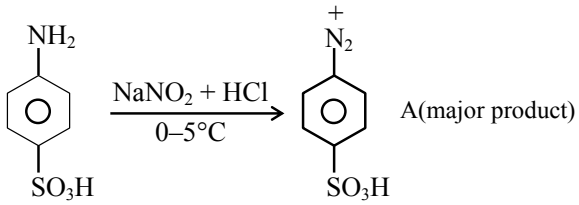
$$\underset{\text{(Acid)}}{H_2SO_4} + \underset{\text{(Base)}}{HNO_3} \rightleftarrows HSO_4^{\ominus} + H_2\overset{\oplus}{N}O_3$$

$$H_2\overset{\oplus}{N}O_3 \rightleftarrows H_2O + \overset{\oplus}{N}O_2$$

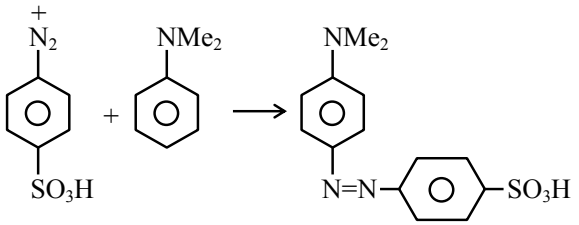


Nitrobenzene

24. Official Ans. by NTA (3)



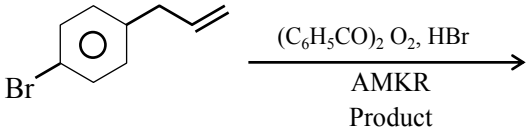
A(major product)

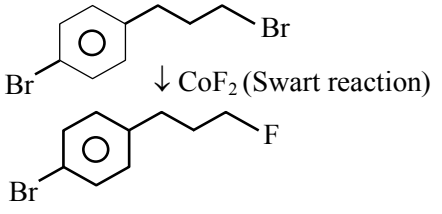


B(major product)

25. Official Ans. by NTA (4)

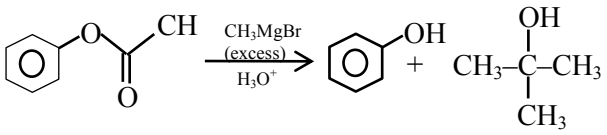
Sol.



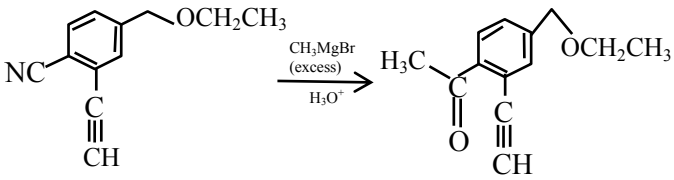


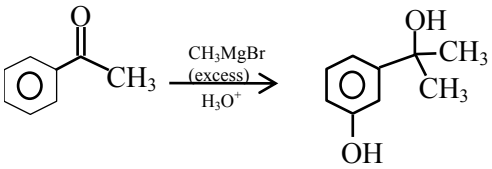
26. Official Ans. by NTA (1)

Sol.

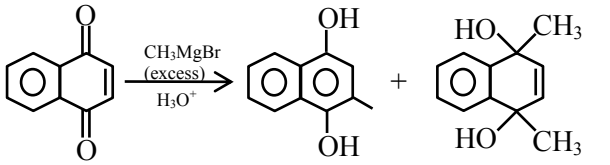


Tertiary alcohol





Phenolic –OH group and tertiary alcohol is present thus two functional groups are present in the product

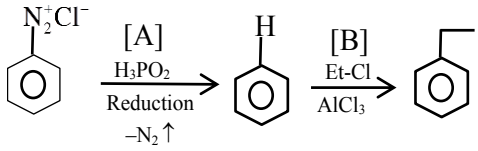


Two 3° alcohol

Since the given question is single correct choice the best appropriate option is (A)

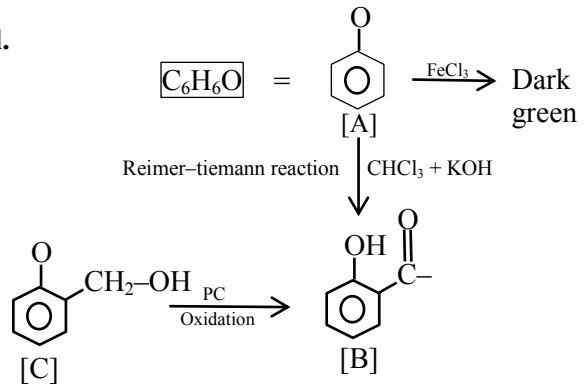
27. Official Ans. by NTA (1)

Sol.



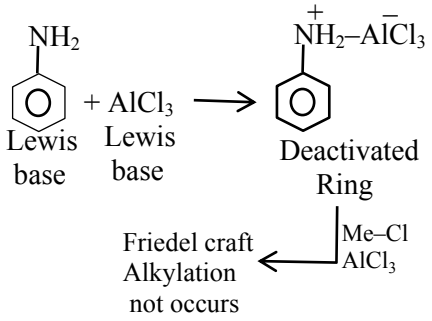
28. Official Ans. by NTA (1)

Sol.



29. Official Ans. by NTA (3)

Sol.



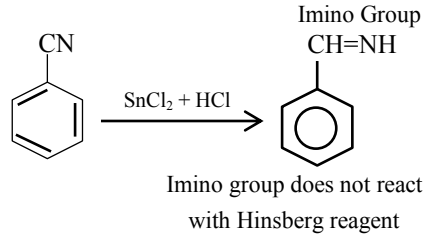
(1) Aniline is lewis base give acid base reaction with $AlCl_3$ and form Anilinium ion

(2) Anilinium ion has strongest deactivated ring so further Friedel craft Alkylation not occurs.

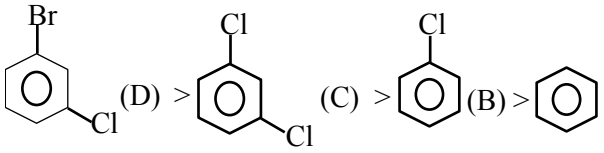
30. Official Ans. by NTA (3)

Sol. Bromine water gives tribromo products, other gives monobromo products in which para is major product.

31.

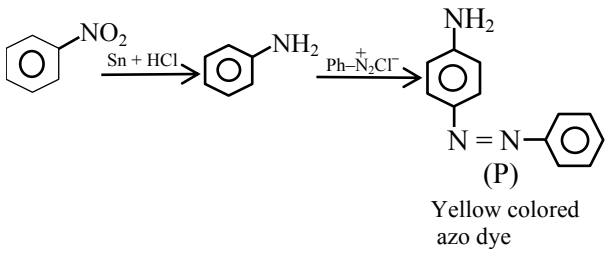


32. The density order



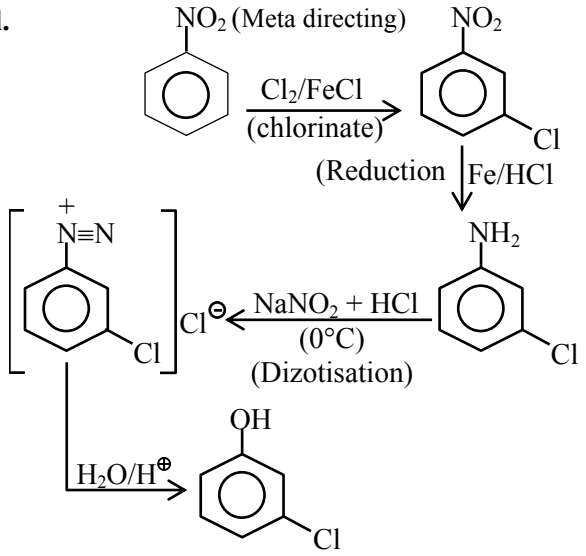
33. Official Ans. by NTA (2)

Sol.



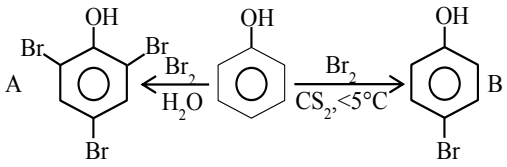
34. Official Ans. by NTA (3)

Sol.



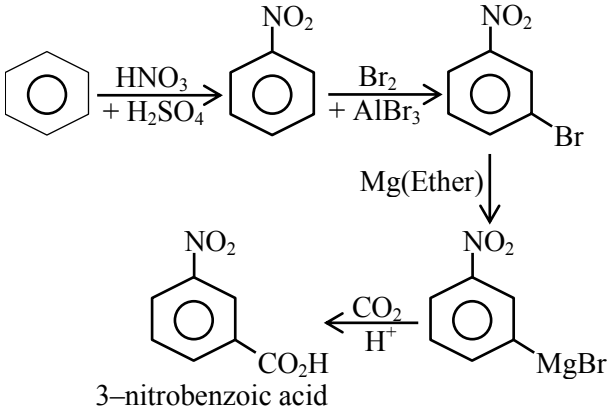
35. Official Ans. by NTA (2)

Sol.



36. Official Ans. by NTA (4)

Sol.

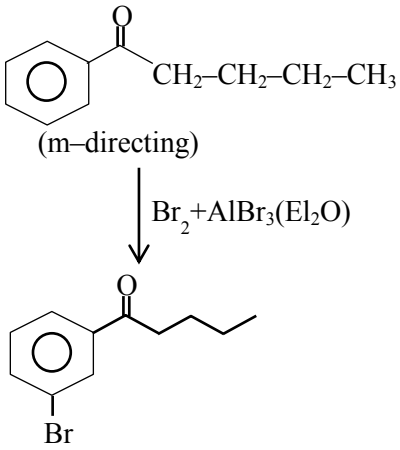


37. Official Ans. by NTA (2)

Sol. Only p-methyl, phenol does not give any colour with phthalic anhydroxide with cons. H_2SO_4.

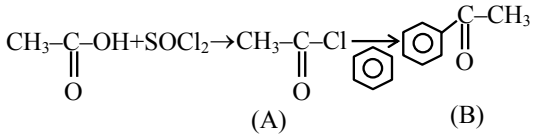
38. Official Ans. by NTA (3)

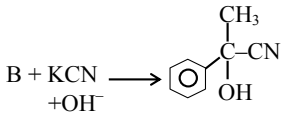
Sol.

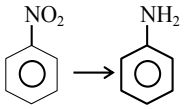


39. Official Ans. by NTA (1)

Sol.





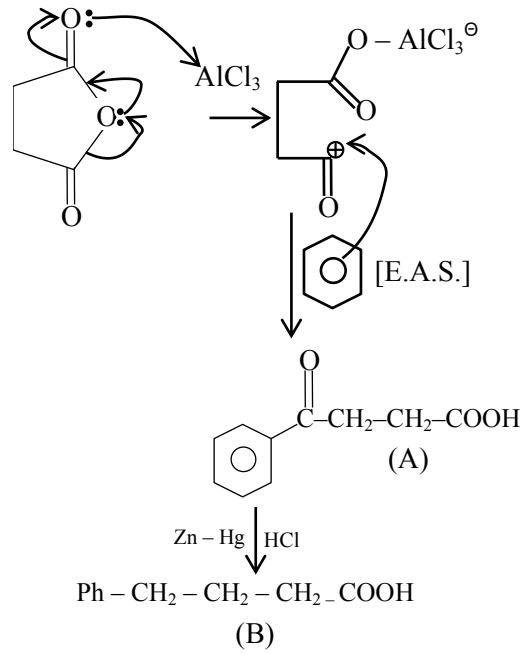
40. 

Reagents used can be

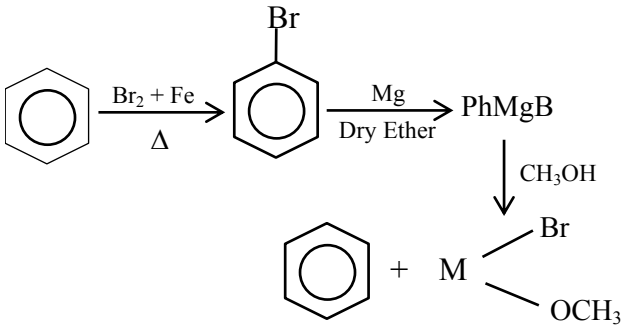
(i) Sn + HCl
(ii) Fe + HCl
(iii) Zn + HCl
(iv) H_2 – Pd
(v) H_2 (Raney Ni)

41. Official Ans. by NTA (1)

Sol.

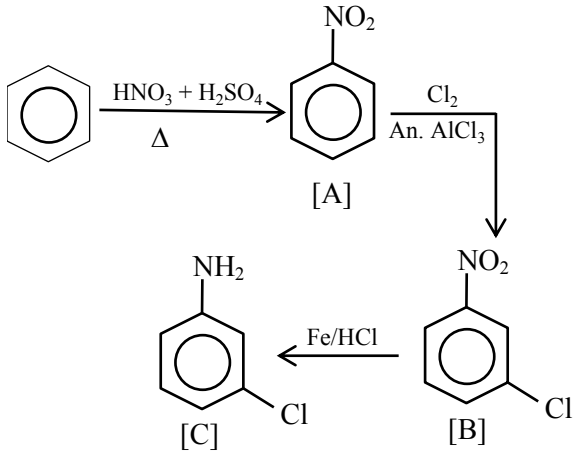


42. Official Ans. by NTA (2)



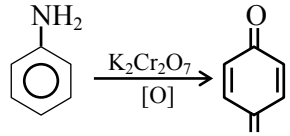
43. Official Ans. by NTA (1)

Sol.



44. Official Ans. by NTA (1)

Sol.



Aniline [A]