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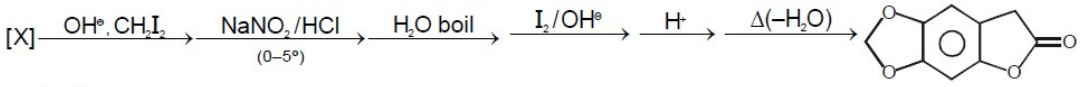
CHEMISTRY

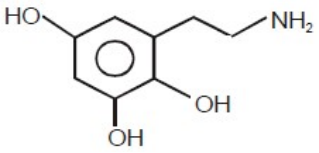
TARGET : JEE Advanced - 2023

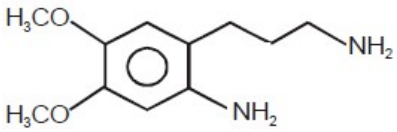
CAPS – 22

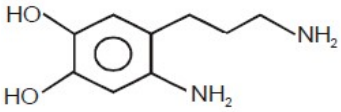
Nitrogen Containing Compounds

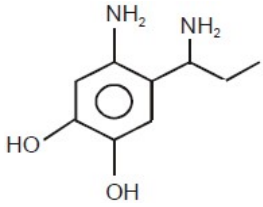
1. The compound 'X' can be



(A) 

(B) 

(C) 

(D) 

2. To get 2, 4, 6- tribromobenzoic acid from aniline the correct sequence of reagents is :

(A) $\xrightarrow[H_2O]{Br_2}\xrightarrow[H_2O]{H_3O^{\oplus}}\xrightarrow[(ii)CuCN]{(i)NaNO_2/HCl,0°C}$ (B) $\xrightarrow[\Delta]{H_3O^{\oplus}/H_2O}\xrightarrow[H_2O]{Br_2}\xrightarrow[(ii)CuCN]{(i)NaNO_2/HCl,0°C}$

(C) $\xrightarrow[(ii)CuCN]{(i)NaNO_2/HCl,0°C}\xrightarrow[\Delta]{H_3O^{\oplus}/H_2O}\xrightarrow[H_2O]{Br_2}$ (D) $\xrightarrow[H_2O]{Br_2}\xrightarrow[(ii)CuCN]{(i)NaNO_2/HCl,0°C}\xrightarrow[\Delta]{H_3O^{\oplus}/H_2O}$

3. Which of the following arylamines will not form a diazonium salt on reaction with sodium nitrite in hydrochloric acid?

(A) m-Ethylaniline (B) p-Aminoacetophenone

(C) 4-Chloro-2-nitroaniline (D) N-Ethyl-2-methylaniline

4. The major products obtained from the following sequence of reactions are:

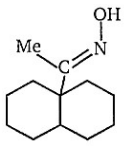
$(CH_3)CHCH_2N(CH_2CH_3)_2 \xrightarrow{CH_3I}\xrightarrow[H_2O]{Ag_2O}\xrightarrow{heat}$ Products

(A) $(CH_3)_2CHCH_2NH_2 + H_2C = CH_2$ (B) $(CH_3)2NCH_2CH_3 + H_2C = C(CH_3)_2$

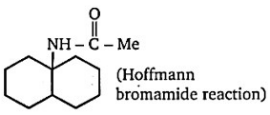
(C) $(CH_3)_2CHCH_2-\underset{\displaystyle CH_3}{\overset{|}{N}}-CH_2CH_3 + H_2C = CH_2$ (D) $(CH_3)_3\overset{+}{N}CH_2CH_3I^- + H_2C = CH_2$

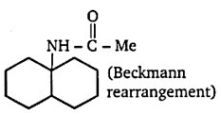
5. Deamination (or) diazotization of n-Bu-NH_2/HCl gives…..isomeric butene.

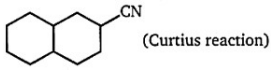
(A) 2 (B) 3 (C) 4 (D) 5

6. 

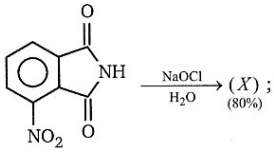
$\xrightarrow{H_2SO_4}$ Product and name of the reaction is:

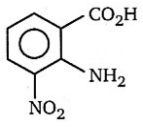
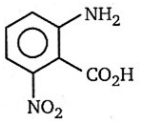
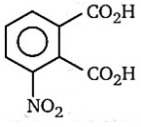
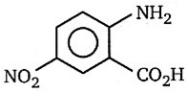
(A) 

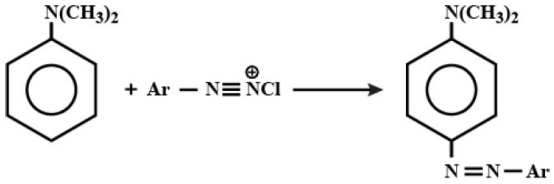
(B) 

(C) 

(D) None of these

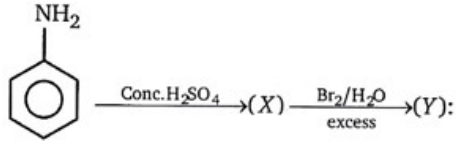
7.  Product X will be:

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

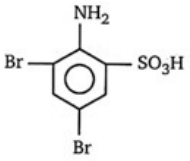
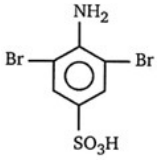
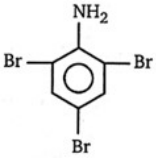
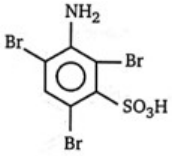
8. 

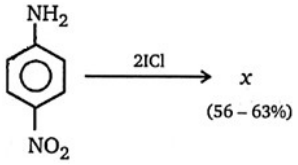
Above (C–N) coupling reaction take place at:

(A) low pH (B) Intermediate pH (C) high pH (D) any pH

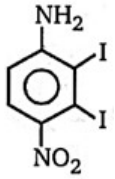
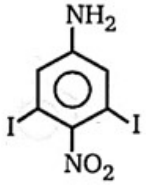
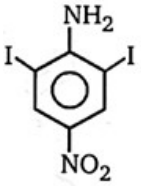
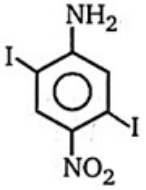
9. 

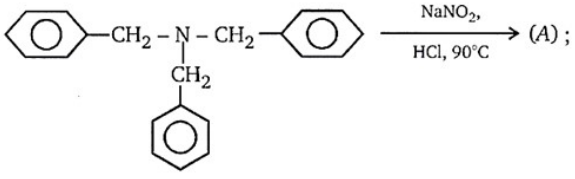
Product (Y) of this reaction is:

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

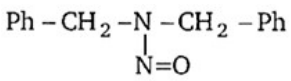
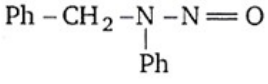
10. 

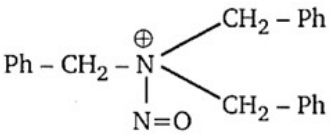
Major product (x) in this reaction is:

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

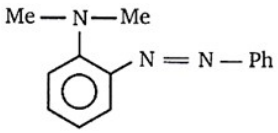
11. 

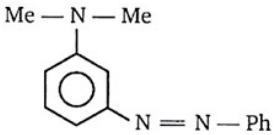
Product (A) is:

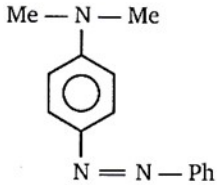
(A)  (B) 

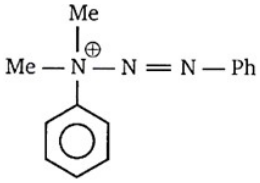
(C)  (D) Ph – N = O

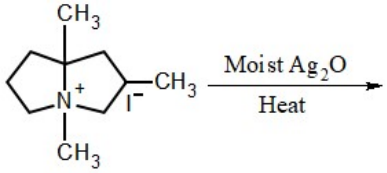
12. $Ph-NH_2 \xrightarrow{CH_3-Cl(2mole)} (A) \xrightarrow{Ph-\overset{\oplus}{N_2}\,\overline{Cl}} \underset{\text{Butter yellow}}{(B)}$ (major) Product of the above reaction is:

(A) 

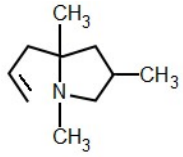
(B) 

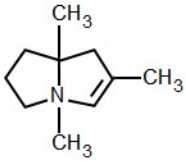
(C) 

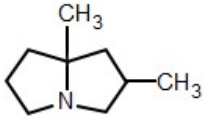
(D) 

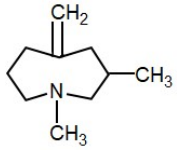
13. 

Product, the main product is :

(A) 

(B) 

(C) 

(D) 

14. During the Hinsbergs Test, which of the following primary amines is most likely to be detected as a secondary amine?

(A) $MeNH_2$

(B) 

(C) 

(D) 

15. Statement-1: $R-CO-NH_2$ and $R-CO-ND_2$ on treating with KOBr produce the same product $R-NH_2$

Statement-2: In both the reactions the intermediate is $R-N=C=O$

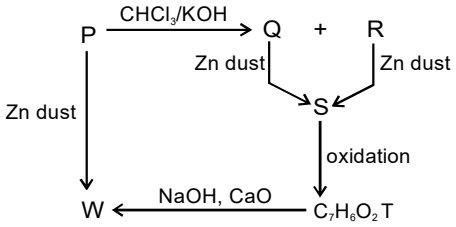
(A) Statement 1 is True, Statement 2 is True; Statement 2 is a correct explanation for Statement 1

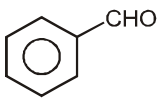
(B) Statement 1 is True, Statement 2 is Tue; Statement 2 is NOT a correct explanation for Statement 1.

(C) Statement – 1 is True, Statement – 2 is False

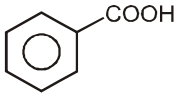
(D) Statement – 1 is False, statement – 2 is True.

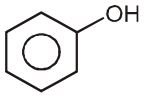
MCQ

16. 

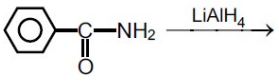
(A) Compound S = 

(B) Compound W = 

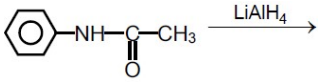
(C) Compound T = 

(D) Compound Q = 

17. Find out the reaction in which obtained product will give positive isocyanide test :

(A) 

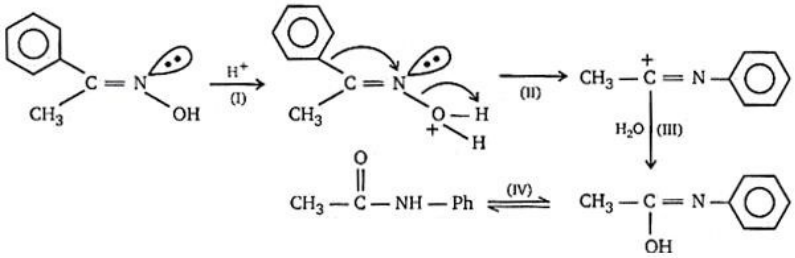
(B) $Ph-C\equiv N \xrightarrow{H_2/Ni}$

(C) 

(D) $Ph-NC \xrightarrow{H_2/Ni}$

Comprehension

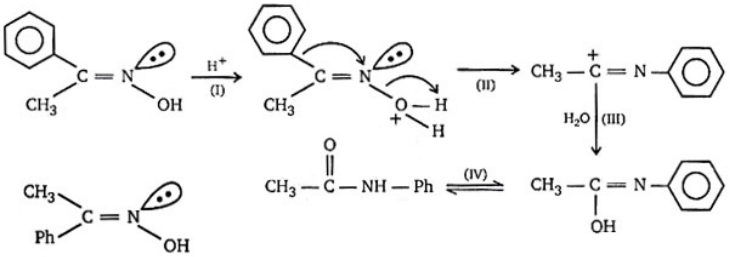
18. Given is mechanism of Beckmann rearrangement.



Rate determining step in Beckmann rearrangement:

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

19. Given is mechanism of Beckmann rearrangement.



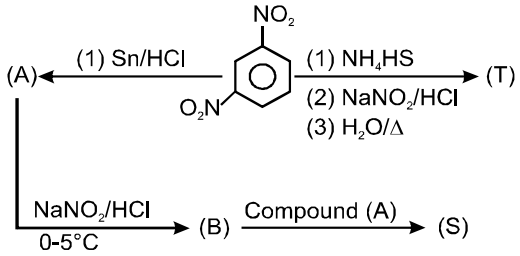
On treatment H2SO4 followed by hydrolysis in acidic medium above compound gives.

(A) $CH_3 - CO_2H$, $Ph - NH_2$ (B) $CH_3 - NH_2$, $Ph - CO_2H$

(C) $Ph - CH_2 - NH_2 + Ph - CO_2H$ (D) $Ph - CO_2H + CH_3 - CO_2H$

Paragraph for Question Nos. 20 to 22

Observe the following reactions and answer the following questions.



20. The Product S can be :

(A) White compound (B) Blue compound

(C) Red Brown compound (D) Colourless liquid

21. For Product (T), The correct statement is :

(A) Turns Red litmus blue (B) Turns $FeCl_3$ (Neutral) into coloured solution

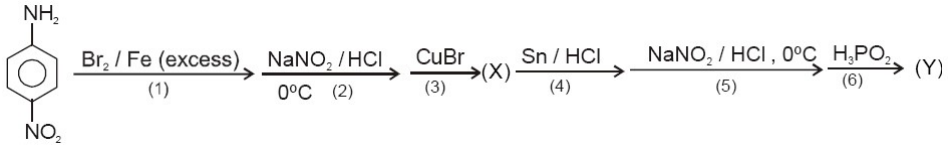
(C) Gives Friedel-Craft-Alkylations reaction (D) Contains two 'N' atoms

22. The product B on heating with H_2O produces :

(A) m-cresol (B) Resorcinol (C) Salicylic acid (D) Salicylaldehyde

Subjective

23. Observe the following synthesis



24. Compound (A) having M.F. C_8H_8O on treatment with $NH_2OH.HCl$ gives (B) and (C). (B) and (C) rearrange to give (D) and (E), respectively on treatment with acid. Compounds (B), (C), (D) and (E) are all isomers of molecular formula C_8H_9NO. When (D) is boiled with alcoholic KOH, an oil (F) C_6H_7N separated out. (F) reacts rapidly with CH_3COCl to give back (D). On the other hand, (E) on boiling with alkali followed by acidification gives a white solid (G), $C_7H_6O_2$. Identify the compounds (A) to (G).

25. Two isomeric compounds (A) and (B) have $C_4H_{11}N$ as molecular formula. Both on separately treating with HNO_2 lose their N_2 producing two isomeric alcohols (C) and (D) respectively of molecular formula $C_4H_{10}O$. (C) reacts with Lucas reagent immediately and units oxidation. (D) does not reacts with Lucas reagent in cold but can be easily oxidized. Complete methylation of either (A) or (B) is made which on decomposition does not produce 1-butene. Identify A to D.

26. Aniline in a set of reaction yield a product D. The structure of products A, B, C, D would be: