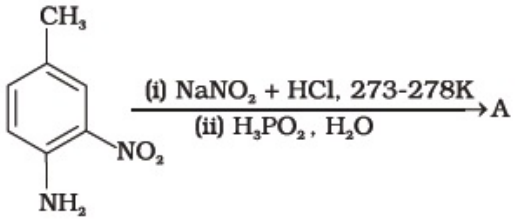
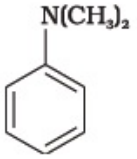
# Organic Compounds Containing Nitrogen

## Short Answer Type Questions

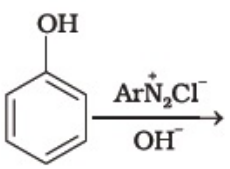
1. What is the role of $HNO_3$ in the nitrating mixture used for nitration of benzene?
2. Why is $NH_2$ group of aniline acetylated before carrying out nitration?
3. What is the product when $C_6H_5CH_2NH_2$ reacts with $HNO_2$?
4. What is the best reagent to convert nitrile to primary amine?
5. Give the structure of 'A' in the following reaction.



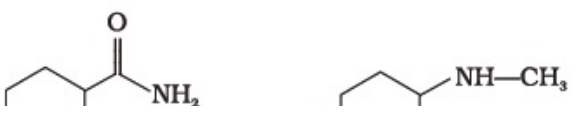

6. What is Hinsberg reagent?
7. Why is benzene diazonium chloride not stored and is used immediately after its preparation?
8. Why does acetylation of $-NH_2$ group of aniline reduce its activating effect?
9. Explain why $MeNH_2$ is stronger base than MeOH?
10. What is the role of pyridine in the acylation reaction of amines?
11. Under what reaction conditions (acidic/basic), the coupling reaction of aryldiazonium chloride with aniline is carried out?
12. Predict the product of reaction of aniline with bromine in non-polar solvent such as $CS_2$.
13. Arrange the following compounds in increasing order of dipole moment.
    $CH_3CH_2CH_2$, $CH_3CH_2NH_2$, $CH_3CH_2OH$
14. What is the structure and IUPAC name of the compound, allyl amine?

Write down the IUPAC name of 

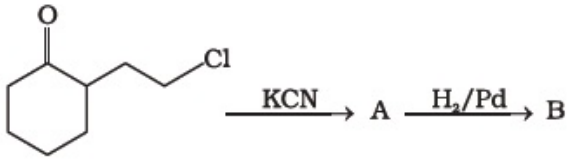

15. A compound Z with molecular formula $C_3H_9N$ reacts with $C_6H_5SO_2Cl$ to give a solid, insoluble in alkali. Identify Z.
16. A primary amine, $RNH_2$ can be reacted with $CH_3-X$ to get secondary amine, $R-NHCH_3$ but the only disadvantage is that 3° amine and quaternary ammonium salts are also obtained as side products. Can you suggest a method where $RNH_2$ forms only 2° amine?
17. Complete the following reaction.



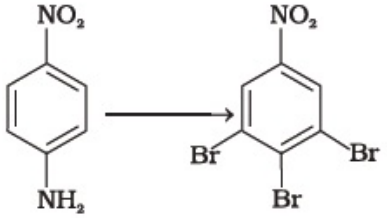

18. Why is aniline soluble in aqueous HCl?
19. Suggest a route by which the following conversion can be accomplished.



20. Identify A and B in the following reaction.

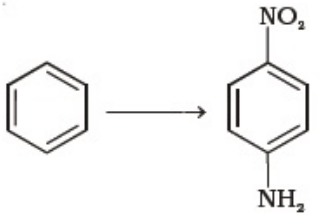



21. How will you carry out the following conversions?
    (i) toluene ⟶ p-toluidine
    (ii) p-toluidine diazonium chloride ⟶ p-toluic acid
22. Write following conversions:
    (i) nitrobenzene ⟶ acetanilide
    (ii) acetanilide ⟶ p-nitroaniline
23. A solution contains 1 g mol. each of p-toluene diazonium chloride and p- nitrophenyl diazonium chloride. To this 1 g mol. of alkaline solution of phenol is added. Predict the major product. Explain your answer.
24. How will you bring out the following conversion?

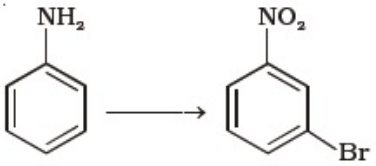



*p*-Nitroaniline 3,4,5-Tribromonitrobenzene

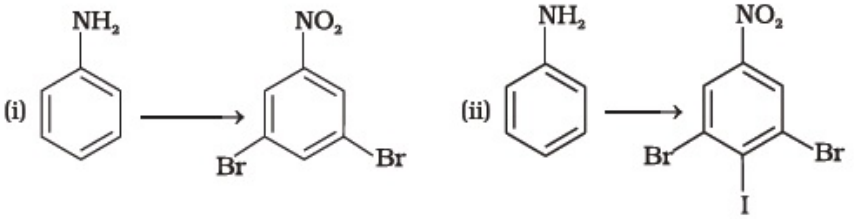
25. How will you carry out the following conversion?




26. How will you carry out the following conversion?




27. How will you carry out the following conversions?



## Long Answer Type Questions

1. A hydrocarbon 'A', ($C_4H_8$) on reaction with HCl gives a compound 'B', ($C_4H_9Cl$), which on reaction with 1 mol of $NH_3$ gives compound 'C', ($C_4H_{11}N$). On reacting with $NaNO_2$ and HCl followed by treatment with water, compound 'C' yields an optically active alcohol, 'D'. Ozonolysis of 'A' gives 2 mols of acetaldehyde. Identify compounds 'A' to 'D'. Explain the reactions involved.
2. A colourless substance 'A' ($C_6H_7N$) is sparingly soluble in water and gives a water soluble compound 'B' on treating with mineral acid. On reacting with $CHCl_3$ and alcoholic potash 'A' produces an obnoxious smell due to the formation of compound 'C'. Reaction of 'A' with benzenesulphonyl chloride gives compound 'D' which is soluble in alkali. With $NaNO_2$ and HCl, 'A' forms compound 'E' which reacts with phenol in alkaline medium to give an orange dye 'F'. Identify compounds 'A' to 'F'.
3. Predict the reagent or the product in the following reaction sequence.