

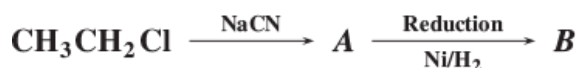
Short Answer Questions-I

Short Answer Questions-I (PYQ)

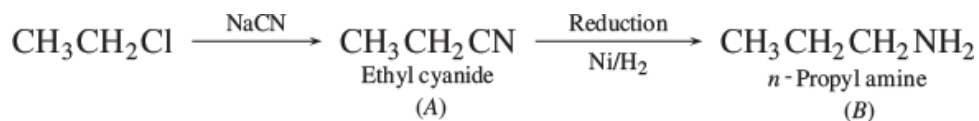
Q.9. Identify *A* and *B* in each of the following processes:

[CBSE (AI) 2010]

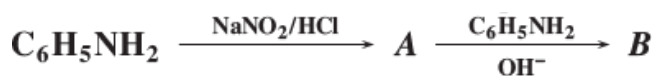
Q.



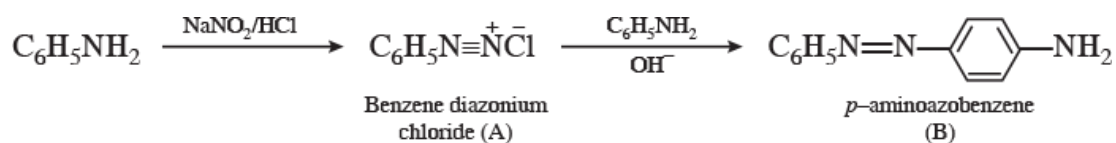
Ans.



Q.



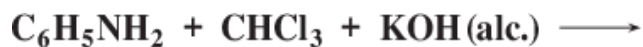
Ans.



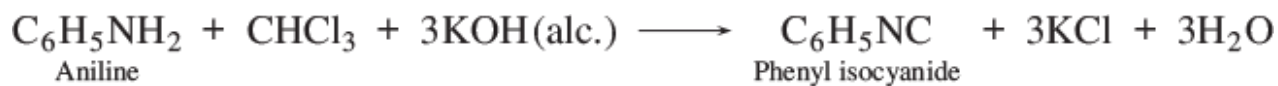
Q.2. Complete the following reaction equations:

[CBSE (F) 2010]

Q.



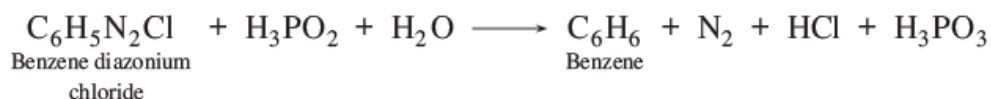
Ans.



Q.



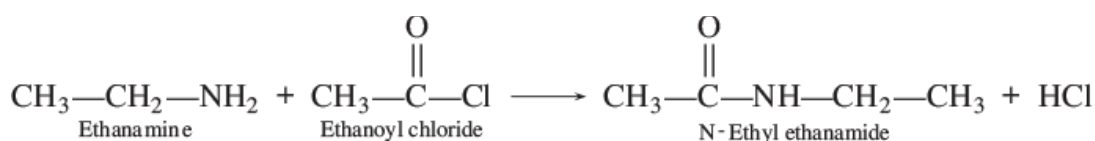
Ans.



Q.3. How are the following conversions carried out?

Q. Ethanamine to N-ethylethanamide

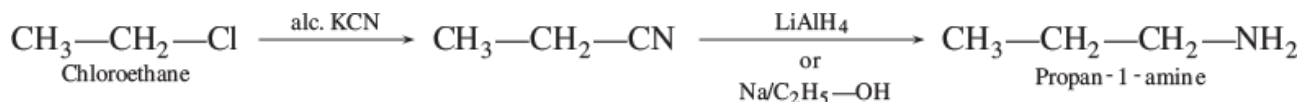
Ans.



Q. Chloroethane to propan-1-amine

[CBSE (F) 2009]

Ans.



Q.4. Explain the following giving a reason in each case:

[CBSE (F) 2010]

Q. Why is an alkylamine more basic than ammonia?

Ans. Alkylamine is more basic than ammonia because in aliphatic amines, the electron releasing alkyl group stabilizes their ammonium cations by dispersing the positive charge and in parent amine makes the nitrogen unshared electrons more available for sharing with a proton.

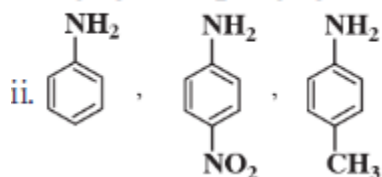
Q. Why do primary amines have higher boiling points than the tertiary amines?

Ans. The boiling points of primary amine are higher than the tertiary amines because strong intermolecular hydrogen bonding takes place between the molecules of primary amine.

Q.5. Arrange the following in increasing order of their basic strength:

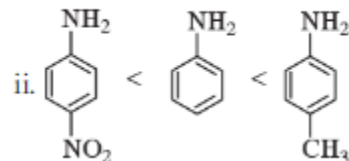
[CBSE Patna 2015]

i. $\text{C}_6\text{H}_5\text{—NH}_2$, $\text{C}_6\text{H}_5\text{—CH}_2\text{—NH}_2$, $\text{C}_6\text{H}_5\text{—NH—CH}_3$



Ans.

i. $\text{C}_6\text{H}_5\text{NH}_2 < \text{C}_6\text{H}_5\text{NHCH}_3 < \text{C}_6\text{H}_5\text{CH}_2\text{NH}_2$



Q.6. Arrange the following:

[CBSE Guwahati 2015]

Q. In increasing order of their basic strength

$\text{C}_6\text{H}_5\text{—NH}_2$, $\text{CH}_3\text{—CH}_2\text{—NH}_2$, $\text{CH}_3\text{—NH—CH}_3$

Ans. $\text{C}_6\text{H}_5\text{NH}_2 < \text{CH}_3\text{—CH}_2\text{—NH}_2 < \text{CH}_3\text{NHCH}_3$

Q. In increasing order of solubility in water

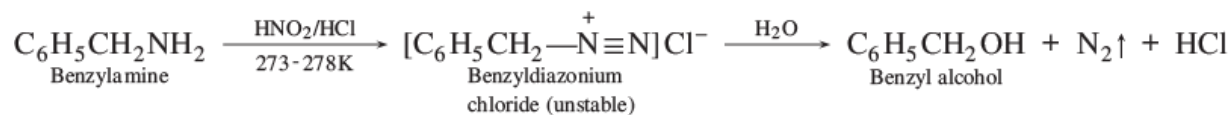
$\text{CH}_3\text{—NH}_2$, $(\text{CH}_3)_3\text{N}$, $\text{CH}_3\text{—NH—CH}_3$

Ans. $(\text{CH}_3)_3\text{N} < (\text{CH}_3)_2\text{NH} < \text{CH}_3\text{NH}_2$

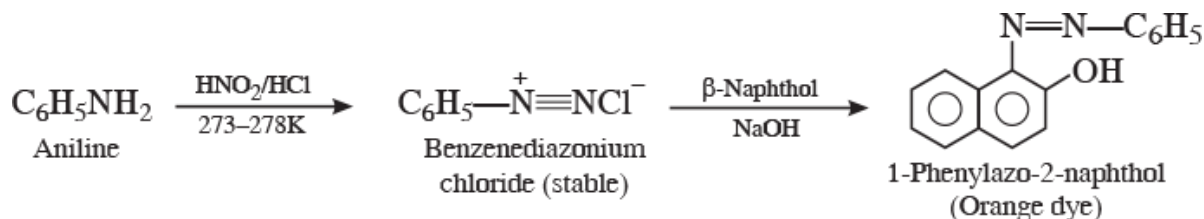
Q.7. Give chemical test to distinguish between $\text{C}_6\text{H}_5\text{CH}_2\text{NH}_2$ and $\text{C}_6\text{H}_5\text{NH}_2$.

[CBSE (AI) 2010]

Ans. $\text{C}_6\text{H}_5\text{CH}_2\text{NH}_2$ reacts with HNO_2 at 273–278 K to give diazonium salt, which being unstable, decomposes with brisk evolution of N_2 gas.



whereas, $\text{C}_6\text{H}_5\text{NH}_2$ reacts with HNO_2 at 273–278 K to form stable benzenediazonium chloride, which upon treatment with an alkaline solution of β -naphthol, gives an orange dye.



Q.8. Arrange the following in the decreasing order of their basic strength:

- $\text{C}_6\text{H}_5\text{NH}_2$, $\text{C}_2\text{H}_5\text{NH}_2$, $(\text{C}_2\text{H}_5)_2\text{NH}$, NH_3
- Ammonia, triethylamine, aniline, ethylamine and diethylamine.

[CBSE (AI) 2009]

Ans.

- The decreasing order of basic strength of the above amines and ammonia follows the following order:
 $(\text{C}_2\text{H}_5)_2\text{NH} > \text{C}_2\text{H}_5\text{NH}_2 > \text{NH}_3 > \text{C}_6\text{H}_5\text{NH}_2$
- Diethylamine > triethylamine > ethylamine > ammonia > aniline.

Q.9. Arrange the following compounds in the order of property indicated for each set :

Q. CH_3NH_2 , $(\text{CH}_3)_3\text{N}$, $(\text{CH}_3)_2\text{NH}$ (increasing order of their basic strength in aqueous solution)

[CBSE Delhi 2013]

Ans. $(\text{CH}_3)_3\text{N} < \text{CH}_3\text{NH}_2 < (\text{CH}_3)_2\text{NH}$

Q. $\text{C}_6\text{H}_5\text{NH}_2$, $\text{C}_6\text{H}_5\text{NHCH}_3$, $\text{C}_6\text{H}_5\text{N}(\text{CH}_3)_2$ (increasing order of basic strength)

[CBSE Delhi 2014]

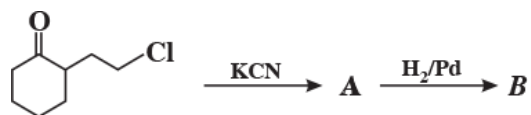
Ans. $\text{C}_6\text{H}_5\text{NH}_2 < \text{C}_6\text{H}_5\text{NHCH}_3 < \text{C}_6\text{H}_5\text{N}(\text{CH}_3)_2$

Short Answer Questions-I (OIQ)

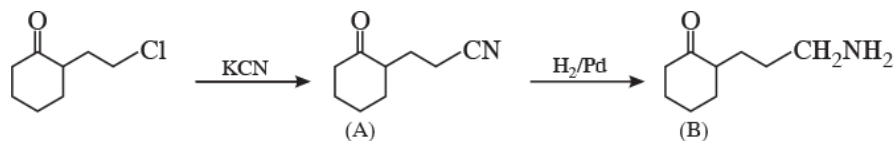
Q.1. Identify A and B in the following reaction.

[NCERT Exemplar]

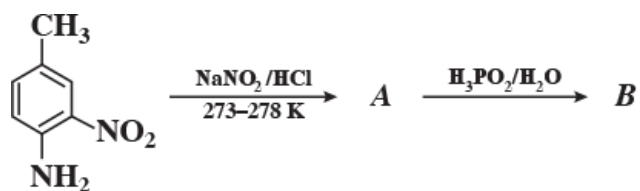
Q.



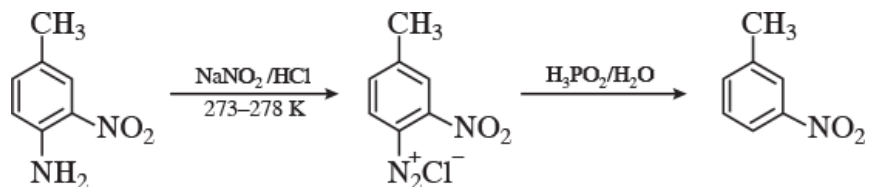
Ans.



Q.



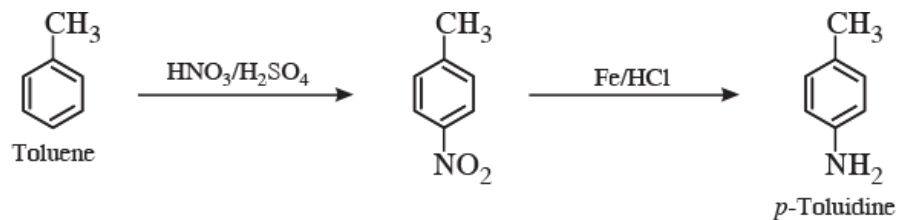
Ans.



Q.2. How will you carry out the following conversions?

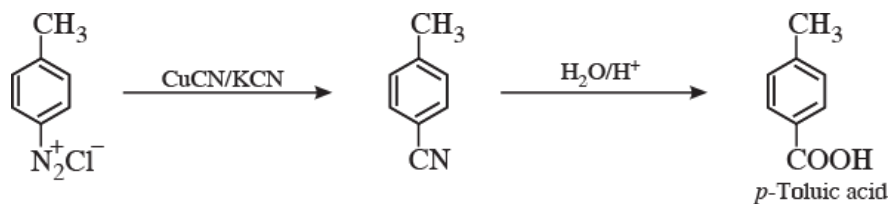
Q. toluene $\rightarrow$ p-toluidine

Ans.



Q. p-toluidine diazonium chloride $\rightarrow$ p-toluic acid

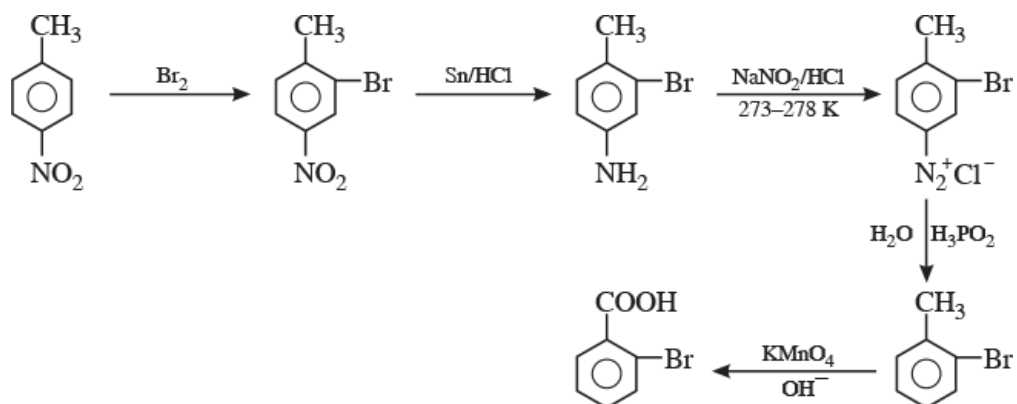
Ans.



Q.3. How will you convert 4-nitrotoluene to 2-bromobenzoic acid?

[HOTS]

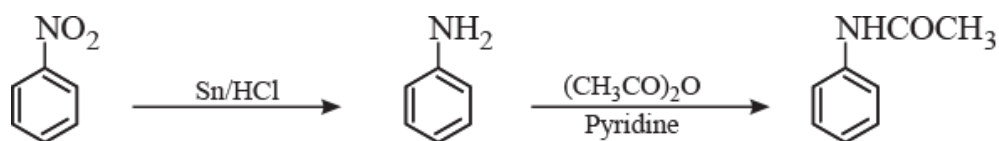
Ans.



Q.4. Write the following conversions:

Q. nitrobenzene $\rightarrow$ acetanilide

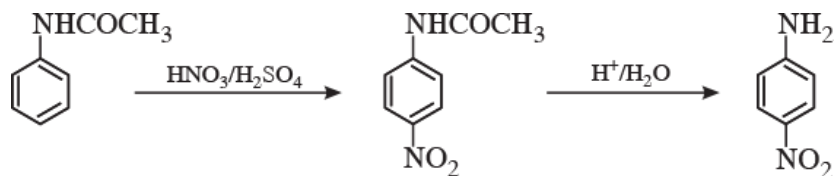
Ans.



Q. acetanilide $\rightarrow$ *p*-nitroaniline

[NCERT Exemplar]

Ans.



Q.5. Account for the following:

Q. Aniline gets coloured on standing in air for a long time.

Ans. Due to electron-donating effect (+R-effect) of —NH_2 group, the electron density on the benzene ring increases. As a result, aniline is easily oxidised on standing in air for a long time to form coloured products.

Q. MeNH_2 is stronger base than MeOH .

[NCERT Exemplar]

Ans. Nitrogen is less electronegative than oxygen therefore lone pair of electrons on nitrogen is readily available for donation. Hence, MeNH_2 is more basic than MeOH .

Q.6. Arrange the following compounds in the order of property indicated for each set :

Q. Methylamine, dimethylamine, aniline, N-methylaniline (increasing order of their acid strength).

Ans. The acid strength increases in the reverse order of their basic strength, *i.e.*,

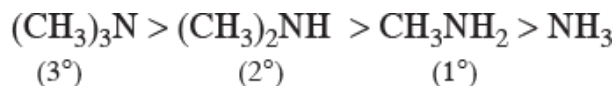
dimethylamine < methylamine < N-methylaniline < aniline.

Q. *p*-toluidine, N, N-dimethyl-*p*-toluidine, *p*-nitroaniline, aniline (increasing basicity)

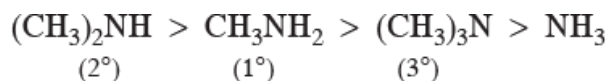
Ans. *p*-nitroaniline < aniline < *p*-toluidine < N, N-dimethyl-*p*-toluidine.

Q.7. Predict, giving reasons, the order of basicity of the following compounds in (i) gaseous phase and (ii) in aqueous solutions $(\text{CH}_3)_3\text{N}$, $(\text{CH}_3)_2\text{NH}$, CH_3NH_2 , NH_3 .

Ans. In gaseous phase, basic character of amines increases with the increase in number of electron releasing groups, due to +I effect, so trend of basic character is



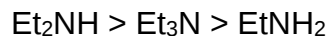
But in aqueous phase, solvation of ammonium cation occurs by water molecules, greater the size of ion, lesser will be the solvation, and lesser will be the stability of ion, so on combining +I effect and solvation effect, in aqueous phase trend changes to



Q.8. Explain the observed K_b order:

Q. $\text{Et}_2\text{NH} > \text{Et}_3\text{N} > \text{EtNH}_2$ in aqueous solution

Ans. Due to combination of +I effect, solvation effect and steric hindrance of ethyl group the basic strength of ethyl substituted amines in aqueous solution is as follows:



As a stronger base has a higher K_b value, therefore, K_b value decreases in the order:

