3. Which one of the following is the strongest base in aqueous solution? (Main - 2007)

a) Trimethylamine

b) Dimethylamine

c) Aniline

d) Methylamine

Solution → b) is the correct answer.

Basicity depends on → (for aliphatic amines).

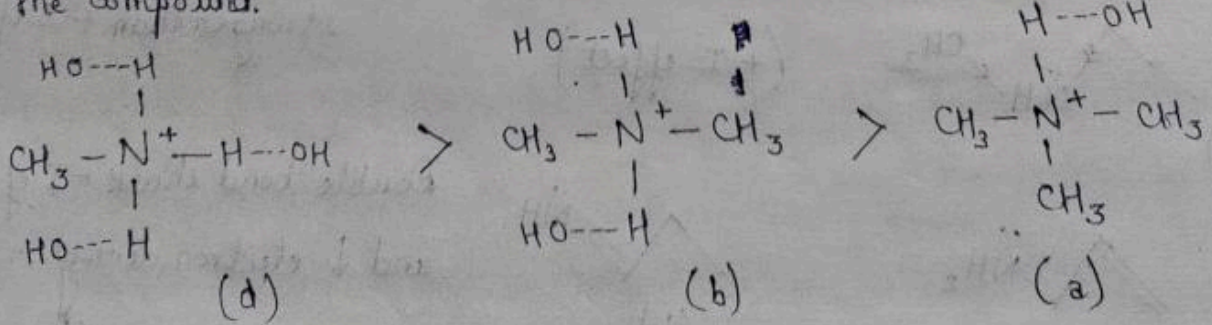
- Inductive effect → CH_3 is an electron donating group. More the no. of CH_3, more electron density on Nitrogen, More basic.

So, 3° > 2° > 1.

- Steric effect → CH_3 is a bulky group. As the no. of CH_3 on nitrogen increases, it becomes more difficult for a proton to attack Less basicity.

So, 1° > 2° > 3°.

- Solvation effect → In aqueous solutions, hydrogen bonding occurs. After attack from proton on nitrogen's lone pair, the cation needs to be stabilized. Greater the stabilization, more basic is the compound.



(d) (b) (a)

So, 1° > 2° > 3°.

Overall, in aqueous solutions, the order of basicity is **2° > 1° > 3°.**

Aniline is the least basic because instead of an electron donating group, it is attached to an electron withdrawing phenyl group which decrease electron density on nitrogen by resonance.