

Preparation of acetanilide (acetylation of aniline)

- It is the acyl derivative of the primary aromatic amine (aniline)
- It is prepared when aniline in its HCl salt form is treated with acetic anhydride and sod. Acetate (anhydrous) ,with stirring ,then upon cooling the product(acetanilide) will solidify as glistening plates.

Why didn't use *acetyl chloride* --- vigorous reaction with production of corrosives HCl gas.

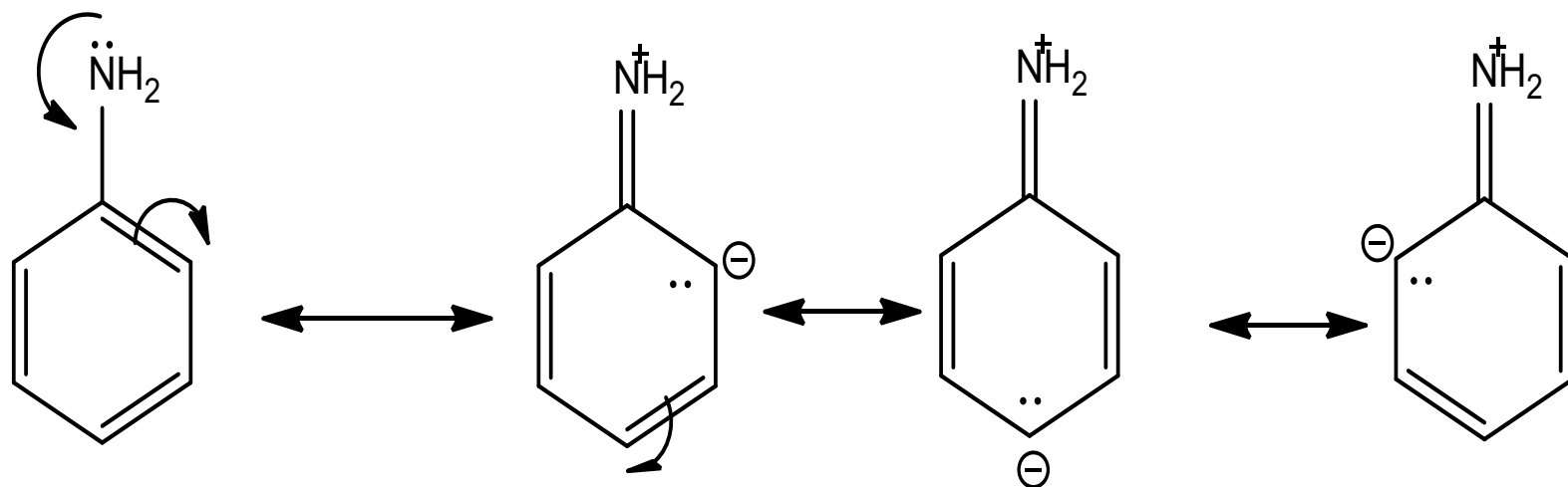
Acetic acid --- slow reaction

Acetic anhydride --- moderate reaction and safe

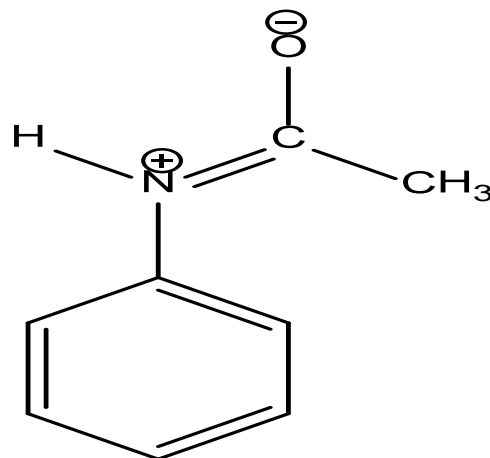
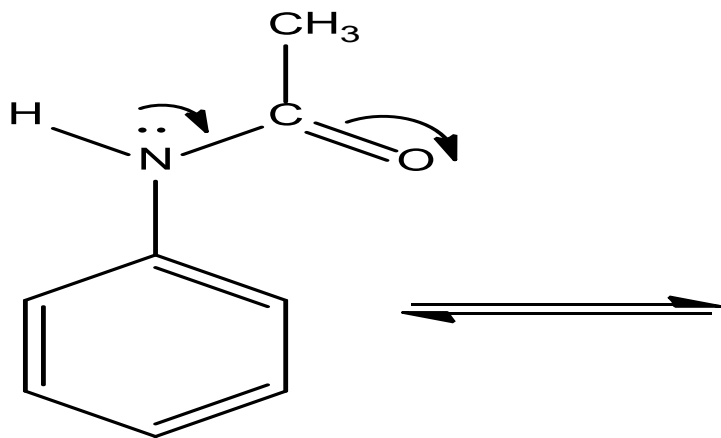
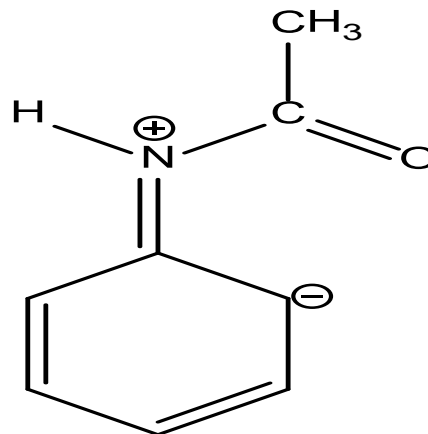
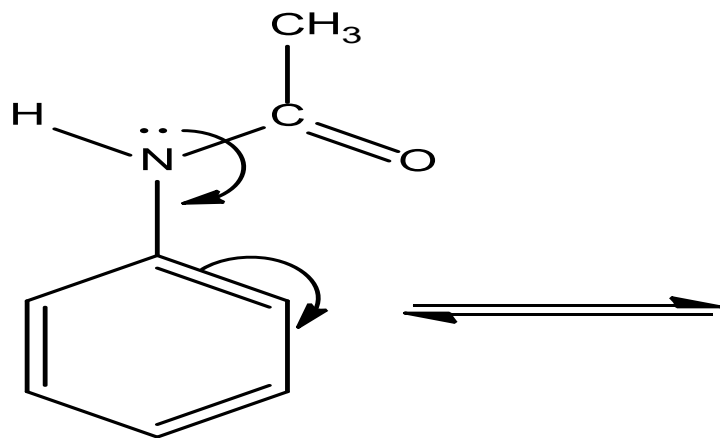
Why we do acetylation before chlorosulfonation?

Aniline can not be mono substituted at para position only because it is very reactive e.g. aniline nitration lead to form tri-nitro aniline;

so we can not get mono substituted sulfonamide ,as in the resonanse of aniline.

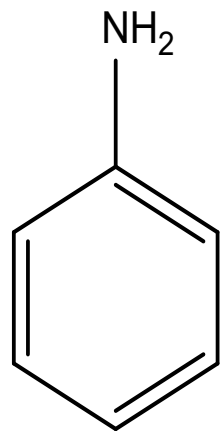


- But if we deactivate the aromatic ring by decrease the electron density on the aromatic ring particularly on the two ortho position and this could be done by acetylation of aniline where acetyl group will exert an inductive effect + steric effect ,then mono substitution
- Then mono substitution at para position will be obtained



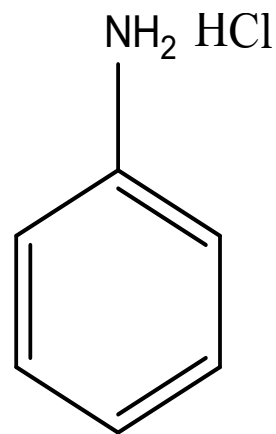
Mechanism of the reaction:

- 1- HCl is added to solubilize aniline at the beginning since aniline is water insoluble
- 2- HCl is used to activate $(\text{Ac})_2\text{O}$ to be attacked by aniline since $\text{aniline} + (\text{Ac})_2\text{O} =$ (no reaction)
- 3- but in this case aniline will form its salt (aniline chloride salt) since its a base , so we have to liberate it without effect the acidity of solution by adding weak acid salt as sodium acetate

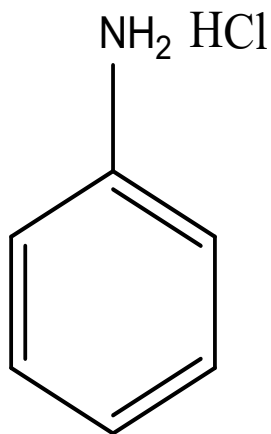


+

HCl

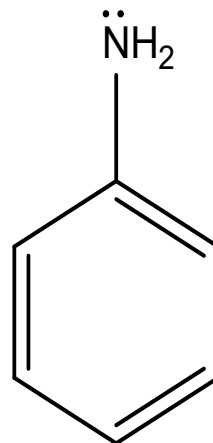


anilinium chloride



+

$\text{CH}_3\text{COO}^- \text{Na}^+$

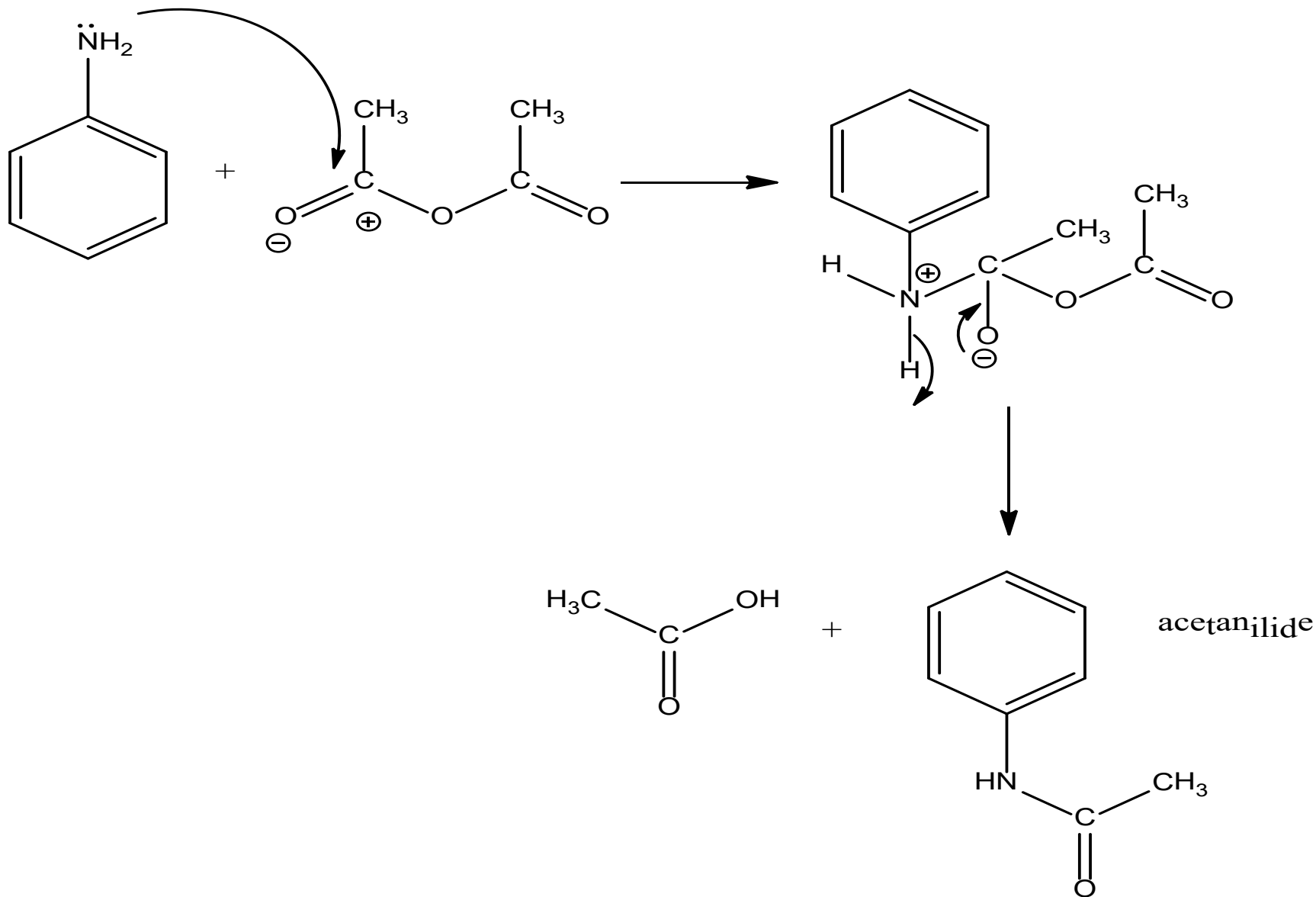


+

NaCl

+

CH_3COOH



Property of acetanilide:

- 1- it crystallize. Colorless ,glisten plates
- 2- sparingly soluble in water, easily in alcohol forming neutral solution.
in dilute acid or alkaline slowly hydrolyze it to aniline + acetic acid or their salts
- 3- melting point = 114
- 4- its aqueous solution give yellowish-white ppt of P-bromoacetanilide on addition of bromine water. This test is given to distinguish between acetanilide and phenacetin
- 5- acetanilide was used as antipyretic then is replaced by safer and more effective compounds
- 6- sp. gr. = 1.074

