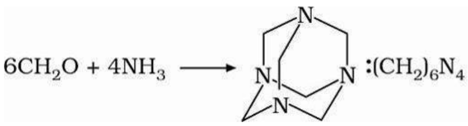
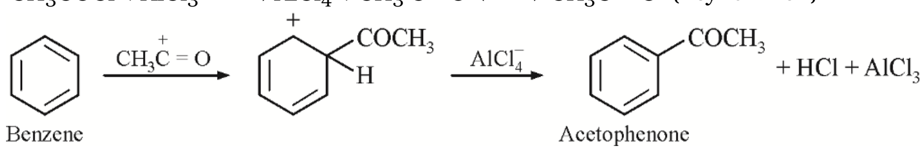
Daily Tutorial Sheet 1	JEE Advanced (Archive)

1. $H-\overset{\overset{\displaystyle O}{\|}}{C}-H + CH_3MgBr \xrightarrow{\text{Ether}} CH_3CH_2OMgBr \xrightarrow[H_2O]{H^+} CH_3CH_2OH$

2.  Hexamethylene

3. $CH_3COCl + AlCl_3 \longrightarrow AlCl_4^- + CH_3\overset{+}{C}=O \longleftrightarrow CH_3C\equiv\overset{+}{O}$ (Acylium ion)



4.(C) All methyl ketones and only acetaldehyde gives a positive iodoform test.

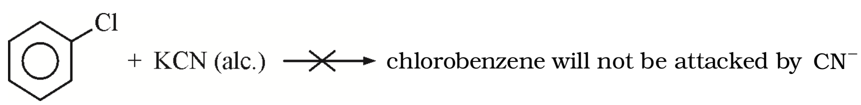
5.(F) It is false statement as in alkaline medium, benzaldehyde undergoes Cannizzaro reaction.

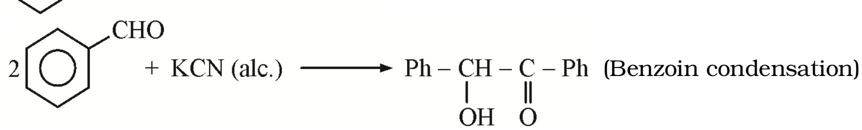
6.(B) Cannizzaro's reaction is given by aldehyde with no alpha hydrogen atom.

7.(C) $RCHO + 2Cu(OH)_2 \longrightarrow RCOOH + \underset{\text{Red ppt.}}{Cu_2O} + 2H_2O$

8.(ABD) $C_2H_5Cl + KCN(\text{alc.}) \longrightarrow C_2H_5CN + KCl$ (S_N2)

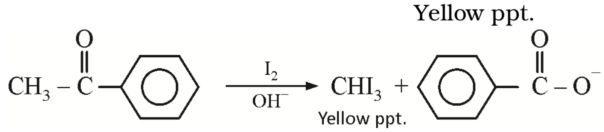
$CH_3-\overset{\overset{\displaystyle O}{\|}}{C}-Cl + KCN(\text{alc.}) \longrightarrow CH_3-\overset{\overset{\displaystyle O}{\|}}{C}-CN + KCl$ (Nu addn-elimination)



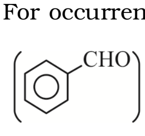


9.(AB) Formation of yellow precipitate with iodine and alkali indicates the formation of iodoform.

$CH_3-\overset{\overset{\displaystyle OH}{|}}{CH}-CH_3 \xrightarrow[NaOH]{I_2} CH_3-\overset{\overset{\displaystyle O}{\|}}{C}-O^{\ominus} + \underset{\text{Yellow ppt.}}{CHI_3}$



Carboxylic acid and its derivatives do not give iodoform test.

10.(AC) For occurrence of base catalysed aldol condensation presence of α-H is essential. In both benzaldehyde  and 2, 2-dimethylpropionaldehyde $\left(H_3C-\overset{\overset{\displaystyle CH_3}{|}}{\underset{\underset{\displaystyle CH_3}{|}}{C}}-CHO\right)$ α-H is not present.

11. $Cl_3C-CHO + NaOH(aq) \longrightarrow CHCl_3 + HCOONa$

12. $CH_3CHO \xrightarrow[K_2Cr_2O_7]{H^+} CH_3COOH \xrightarrow{Ca(OH)_2} (CH_3COO)_2Ca$

$(CH_3COO)_2Ca \xrightarrow{\text{heat}} CH_3-\overset{\overset{\displaystyle O}{\|}}{C}-CH_3 \xrightarrow{H_2NOH} \begin{matrix}H_3C\\H_3C\end{matrix}\!\!>C=N-OH$
acetoxime

13. (i) $C_6H_5-CO-C_2H_5$ (Friedel - Craft acylation)

(ii) Visualise self aldol condensation

$$CH_3-CH_2-\overset{\overset{H}{|}}{C}=O+H\overset{\overset{CH_3}{|}}{C}H-CHO \xrightarrow[\Delta]{NaOH} CH_3CH_2-\overset{\overset{OH}{|}}{C}H-\overset{\overset{CH_3}{|}}{C}H-CHO \xrightarrow{\Delta} CH_3-CH_2-CH=\overset{\overset{CH_3}{|}}{C}-CHO$$

14. $$PhCH_2CHO \xrightarrow[2.\ \Delta]{1.\ OH^-} Ph-CH_2-CH=\underset{\underset{Ph}{|}}{C}-CHO$$

15. Steric crowding at carbonyl carbon and polarity of carbonyl group determine the reactivity towards nucleophilic addition reaction. Greater the steric hindrance, smaller is the reactivity and greater is the polarity, greater is the reactivity.

$$C_2H_5COCH_3 < CH_3COCH_3 < CH_3CHO < HCHO$$

Observe increasing polarity and decreasing steric hindrance from left to right.