

Daily Tutorial Sheet 1

JEE Advanced (Archive)

2.
$$CH_{3}COOC_{2}H_{5} \xrightarrow{C_{2}H_{5}O^{-}} \overline{C}H_{2}COOC_{2}H_{5} \xrightarrow{CH_{3}-C-OC_{2}H_{5}} CH_{3}-C-CH_{2}-COOC_{2}H_{5}$$

$$CH_{3}-C-CH_{2}-COOC_{2}H_{5}$$

$$Claisen condensation$$

$$H_{2}O \downarrow H^{+}$$

$$C_{2}H_{5}OH + CH_{3}-C-CH_{2}COOH$$

3.
$$CH_{3} - C - CH_{3} \xrightarrow{HCN} CH_{3} - C - CN \xrightarrow{H^{+}} CH_{3} - C - COOH \xrightarrow{H^{+}} CH_{3} \xrightarrow{(D)} CH_{3} \xrightarrow{(D)} CH_{3} - CH - CHO \xrightarrow{(D)} CH_{3} \xrightarrow{(D)} CH_{3}$$

- **5.(B)** $CH_3CONH_2 + 4NaOH + Br_2 \longrightarrow CH_3NH_2 + Na_2CO_3 + 2NaBr + 2H_2O$
- **6.(F)** Hydrolysis of ester in alkaline medium is known as saponification and used for preparation of soap.
- 7. H₂O and CO gas

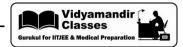
8.
$$CH_3COOH + Cl_2 \xrightarrow{-Red-P} CH_2 - COOH$$

(HVZ reaction)

For this reaction to occur, presence of a α -H is essential requirement. Formic acid does not have any α -H, fails in HVZ reaction.

$$\mathbf{9.} \qquad \qquad \mathrm{CH_{3}CH_{2}CHO} + \mathrm{AgNO_{3}} \xrightarrow{\quad \mathrm{NH_{4}OH} \quad} \mathrm{CH_{3}CH_{2}COOH} \xrightarrow{\quad P_{2}O_{5} \quad} \mathrm{(CH_{3}CH_{2}CO)_{2}O}$$

10.
$$\begin{array}{ccc}
O & O \\
\parallel & \parallel \\
CH_3 - C - OH & < H - C - OH \\
& & + 1 - \text{effect} \\
& & \text{decreases acid-strength}
\end{array}$$



11. X is an ester and both its acid and alcohol fragments have same number of carbons. Hence X is:

$$\begin{array}{c} \operatorname{CH_3CH_2COOCH_2CH_2CH_3} \xrightarrow{\ \ \, H^+ \ \ \, } \operatorname{CH_3CH_2COOH} + \operatorname{CH_3CH_2CH_2OH} \ \ \, ; \quad Z \xrightarrow{\ \ \, [O] \ \ \, } \operatorname{CH_3CH_2COOH} \ \ \, Y \end{array} \xrightarrow{\ \ \, I \ \ \, I \$$

12.
$$(CH_3CO)_2O \xrightarrow{C_2H_5OH} CH_3COOH + CH_3 - C - OC_2H_5$$

- $\label{eq:among_acid} \textbf{Among acid derivatives}, \ the \ reactivity \ towards \ nucleophilic \ acyl \ substitution \ is \ in \ the \ order \ of: \\ Amide < Ester < Anhydride < Acid \ chloride \\ Hydrolysis \ is \ an \ example \ of \ nucleophilic \ acyl \ substitution, \ hence \ the \ reactivity \ towards \ hydrolysis \ is: \\ CH_3CONH_2 < CH_3COOC_2H_5 < (CH_3CO)_2O < CH_3COCl \\ \end{aligned}$
- **14.** $CH_3CONH_2 + Br_2 + 4KOH \longrightarrow CH_3NH_2 + K_2CO_3 + 2KBr + 2H_2O$ Hoffman bromamide reaction
- **15.** Both formic acid and sodium formate exhibit the phenomenon of resonance as:

In formic acid, the extent of delocalization is less compared to sodium formate because of charge separation in the former case. Due to this reason, the bond length between carbon and sp³ oxygen in formic acid is slightly greater than the same between carbon and sp² oxygen. In formate ion, there is no separation of charge and hence same bond length of both carbon oxygen bonds.