Ethyl acetoacetate (Acetoacetic ester) :-

It is the ethyl ester of acetoacetic acid (β-Ketobutyric acid) and hence it's name as ethyl acetoacetate. It is some times referred to as simply acetoacetic ester since it could be regarded as acetyl derivative of acetic ester.

$$CH_3-\overset{O}{\overset{\|}{C}}-CH_2-\overset{O}{\overset{\|}{C}}-OC_2H_5$$

Ethyl acetoacetate

Preparation :- (i) Ethyl acetoacetate is prepared by refluxing ethyl acetate in presence of Sodium ethoxide in ethanol, followed by acidification. The overall reaction which is the self-condensation of two molecules of ethyl acetate

$$\underset{\text{ethyl acetate}}{2\ CH_3-\overset{O}{\overset{\|}{C}}-OC_2H_5} \xrightarrow[\text{(ii) } H^+/H_2O]{\text{(i) } C_2H_5ONa/CH_3OH} \underset{\text{ethyl acetoacetate}}{CH_3-\overset{O}{\overset{\|}{C}}-CH_2-\overset{O}{\overset{\|}{C}}-OC_2H_5} + C_2H_5-OH$$

(ii) **Industrial method :-** Ethyl acetoacetate is prepared industrially by passing Ketene into cold acetone when it

dimerises to form diketen, which on subsequent treatment with ethanol produces ethyl acetoacetate.

$$2\,CH_2=C=O \xrightarrow{\text{cold acetone}} CH_2=C-O-H_2C-C=O \xrightarrow{C_2H_5OH}$$

Keten

diketen

$$\left[CH_2=C-OH \;\; CH_2-COOC_2H_5\right] \xrightarrow{\text{Rearrange}} CH_3-\overset{O}{\overset{\|}{C}}-CH_2-\overset{O}{\overset{\|}{C}}-OC_2H_5$$

intermediate

ethyl acetoacetate