

## What are active Methylene Groups?

### Active Methylene Compounds

The class of compounds which contain a methylene group ( $-\text{CH}_2-$ ) directly bonded to two electron withdrawing groups such as  $-\text{COCH}_3$ ,  $-\text{COOC}_2\text{H}_5$ ,  $-\text{CN}$ , are called **Active Methylene Compounds**. This is so because the  $-\text{CH}_2-$  group in them is acidic and reactive. Ethyl acetoacetate (*Acetoacetic ester*) and Diethyl malonate (*Malonic ester*) belong to this class.

$\text{CH}_3-\text{C}(=\text{O})-\text{CH}_2-\text{C}(=\text{O})-\text{OC}_2\text{H}_5$   
 Ethyl acetoacetate  
 (Acetoacetic ester)

$\text{H}_5\text{C}_2\text{O}-\text{C}(=\text{O})-\text{CH}_2-\text{C}(=\text{O})-\text{OC}_2\text{H}_5$   
 Diethyl malonate  
 (Malonic ester)

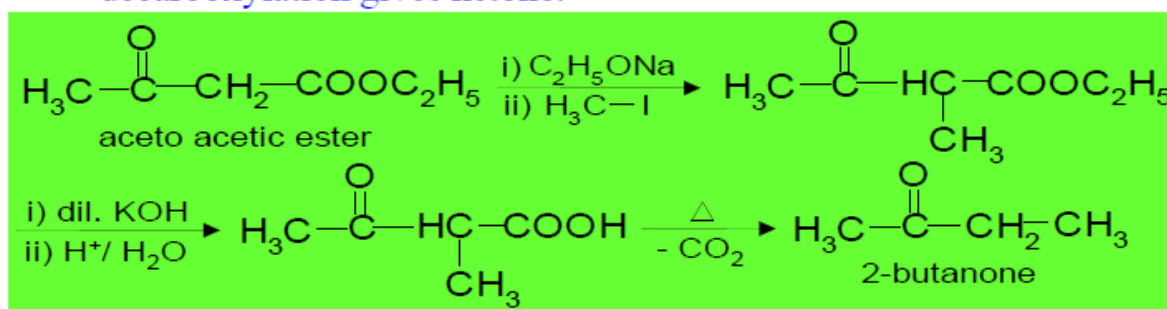
Active Methylene Groups

## How will you obtain from acetoacetic Ester?

- Ketone
- Dicarboxylic Acid
- Di-Ketone
- Mono Carboxylic Acid

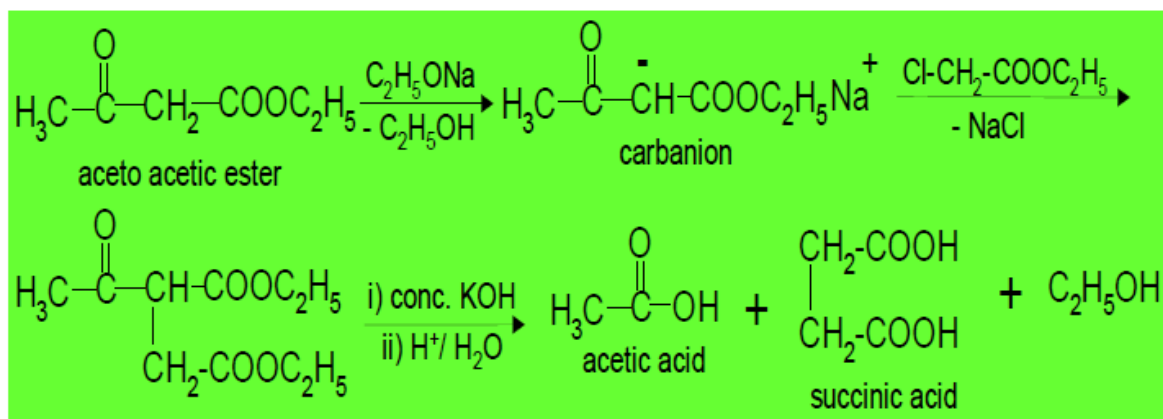
### Ketone:

- AAE on alkylation gives corresponding alkyl aceto acetic acid which on hydrolysis gives corresponding carboxylic acid intermediate. This intermediate carboxylic acid further on decarboxylation gives ketone.



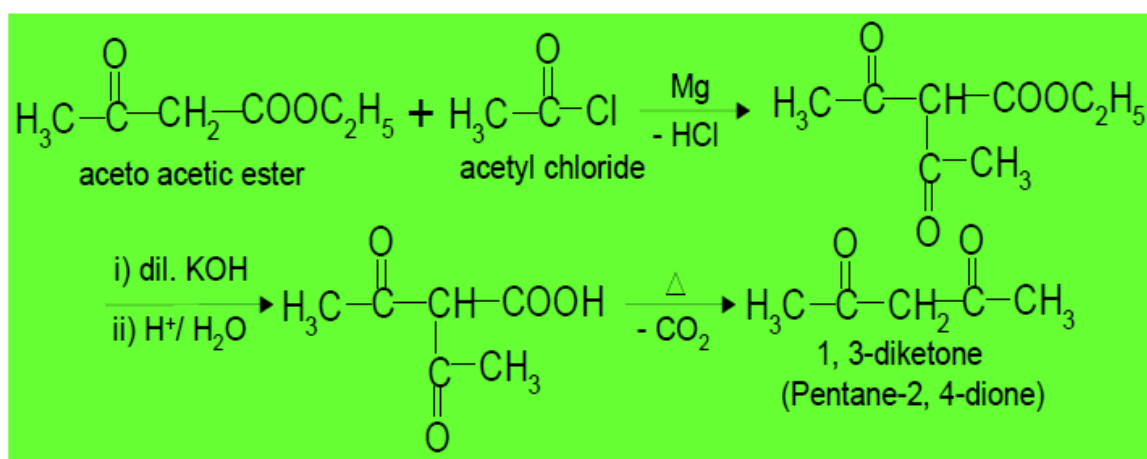
### Dicarboxylic Acid:

- Aceto acetic ester on treatment with sodium ethoxide gives carbanion which on condensation with halo ester followed by hydrolysis gives corresponding dicarboxylic acid.
- Aceto acetic ester on treatment with sodium ethoxide gives carbanion which on condensation with ethyl chloro acetate followed by hydrolysis gives succinic acid.



### Di-Ketone:

- EAA when treated with acetyl chloride in presence of Mg gives ethyl diacetyl acetone intermediate which on further hydrolysis followed by decarboxylation gives 1, 3-diketone.



## Mono Carboxylic Acid:

2. **Synthesis of Mono-carboxylic acid:** - Higher carboxylic acids prepared by alkylating EAA followed by hydrolysis.
- EAA when treated with sodium ethoxide and methyl iodide gives methyl EAA which on further hydrolysis gives **propanoic acid**.

