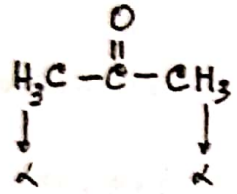
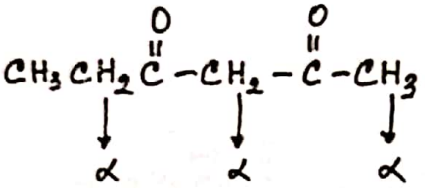
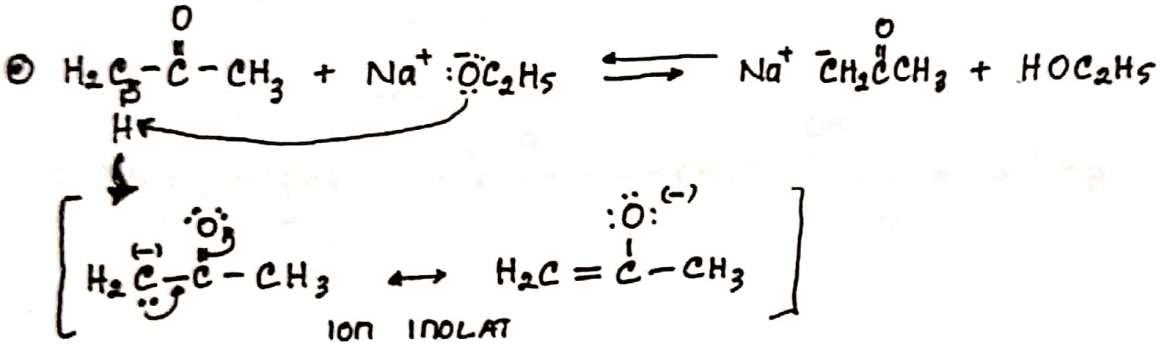
R. KONDENSASI

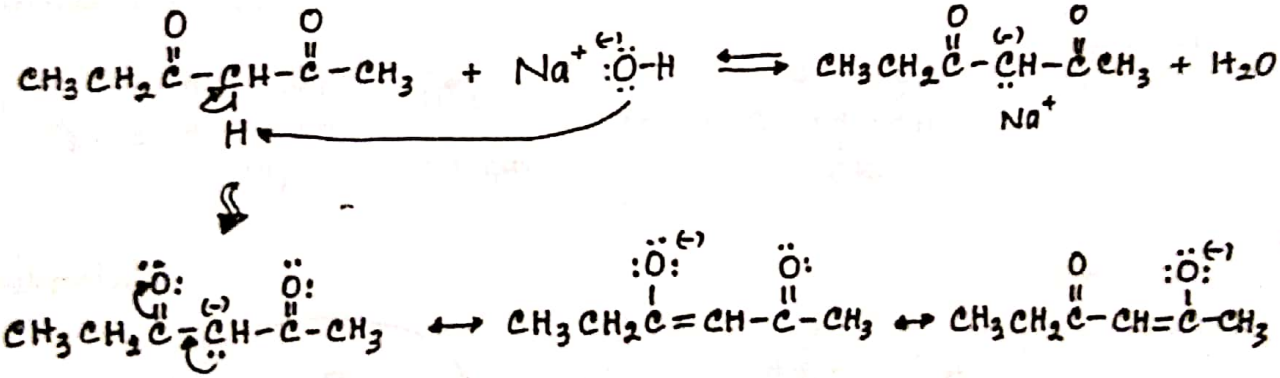
REAKTIVITAS HIDROGEN ALFA (H_α)



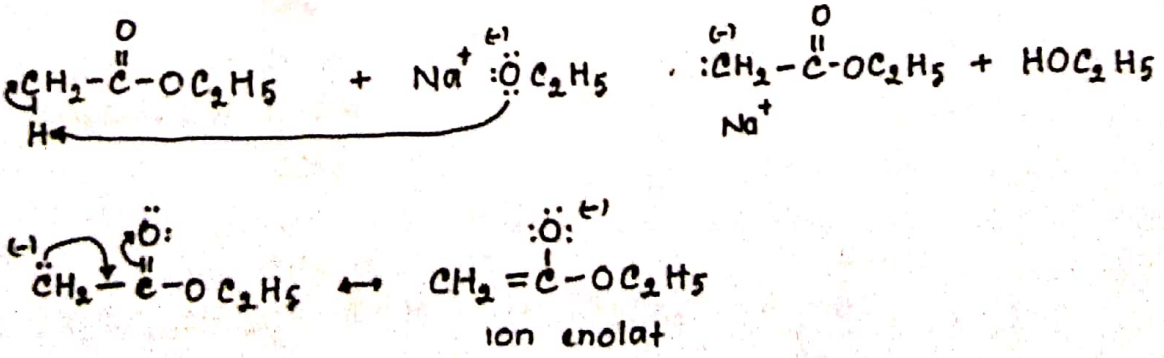


H_α bersifat asam, dapat lepas sebagai H^+, jika direaksikan oleh $Na^+OC_2H_5$, NaH, $NaNH_2$, NaOH (suatu basa)

① 

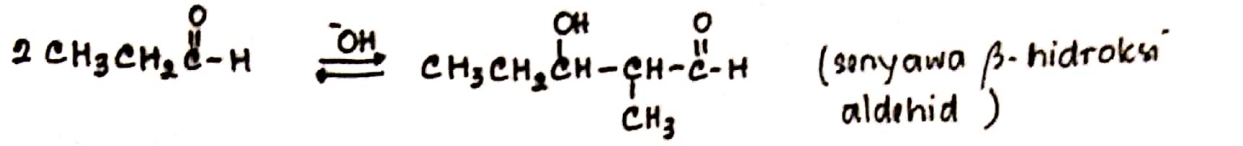
② 

ion enolat

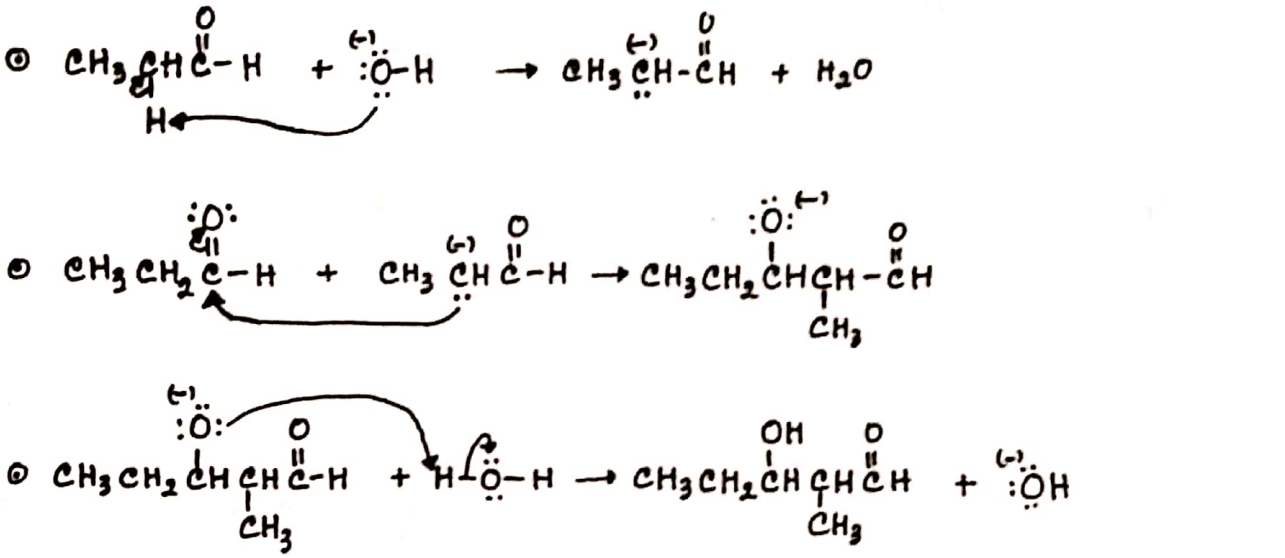
③ 

ion enolat

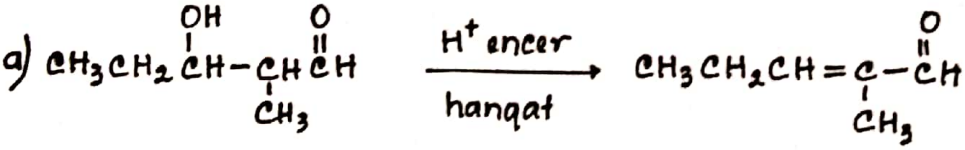
1. KONDENSASI ALDOL (Dimerisasi aldehid yg mempunyai H_α)



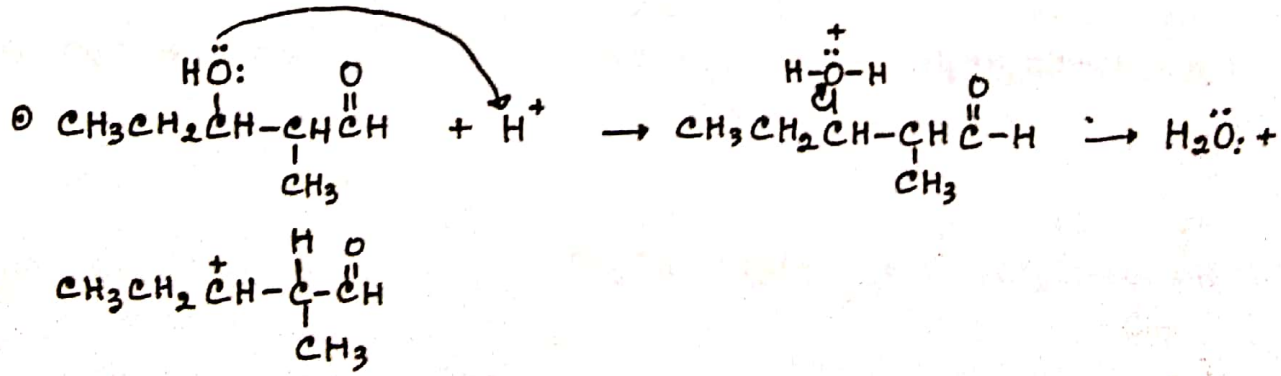
mekanisme :

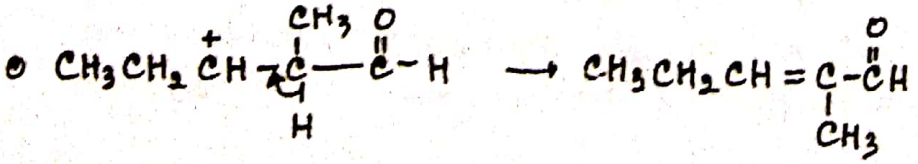


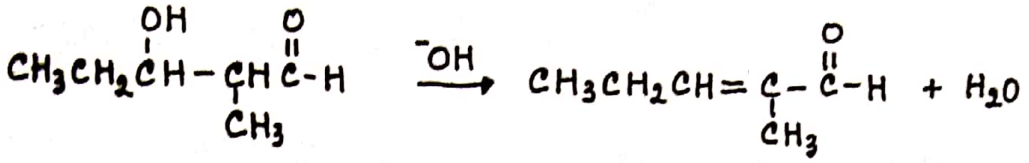
Dehidrasi aldol



Mekanisme :





b) 

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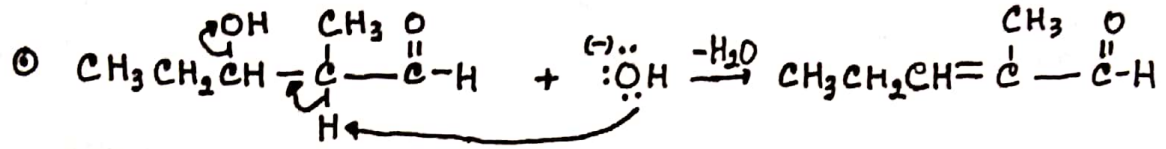
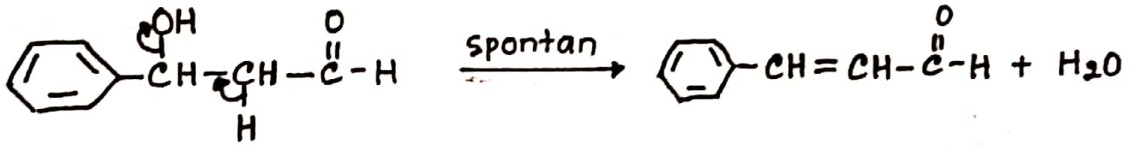
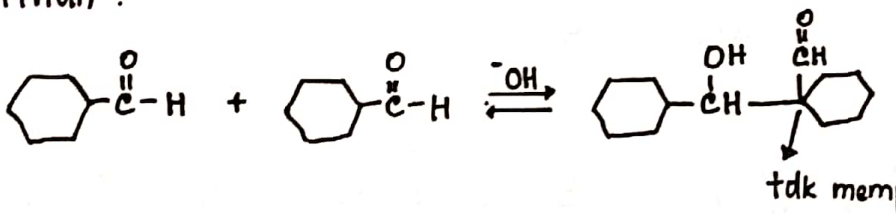


c) 

Latihan :

1) 

tdk mempunyai H_α lagi

2) $CH_3\overset{O}{\overset{\|}{C}}CH_3 + CH_3\overset{O}{\overset{\|}{C}}CH_3 \overset{^-OH}{\rightleftharpoons} CH_3\overset{OH}{\underset{CH_3}{C}}-CH_2\overset{O}{\overset{\|}{C}}CH_3$ (KETOL / β-hidroksi keton)

2%, kesetimbangan lebih berqeser ke kiri. Pembentukan KETOL sukar dilakukan

3) $CH_3\overset{O}{\overset{\|}{C}}-H + CH_3CH_2\overset{O}{\overset{\|}{C}}-H \xrightarrow{^-OH} CH_3\overset{OH}{C}H-\underset{CH_3}{\overset{}{C}}H-\overset{O}{\overset{\|}{C}}H + CH_3CH_2\overset{OH}{C}H-CH_2\overset{O}{\overset{\|}{C}}H +$

$CH_3\overset{OH}{C}H-CH_2\overset{O}{\overset{\|}{C}}H + CH_3CH_2\overset{OH}{C}H-\underset{CH_3}{\overset{}{C}}H\overset{O}{\overset{\|}{C}}H$

Produk dari reaksi kondensasi 2 senyawa aldehid yq berbeda dan ke duanya mempunyai H_α adalah campuran beberapa senyawa aldol. Reaksi ini tdk bermanfaat dlm sintesis di laboratorium

2. KONDENSASI SILANG

Reaksi antara aldehid yg tdk mempunyai H_α dgn senyawa yg mempunyai H_α (aldehid, keton, ester

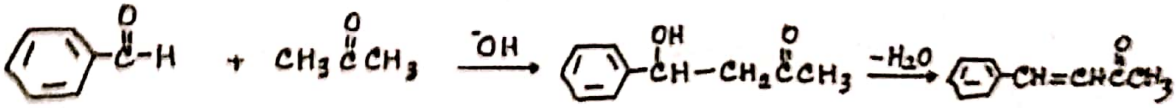
a) $H-\overset{O}{\overset{\|}{C}}-H + CH_3\overset{O}{\overset{\|}{C}}H \xrightarrow{^-OH} H-\overset{OH}{\underset{|}{C}}H-CH_2\overset{O}{\overset{\|}{C}}-H \xrightarrow{-H_2O} H_2C=CH\overset{O}{\overset{\|}{C}}H$

mekanisme :

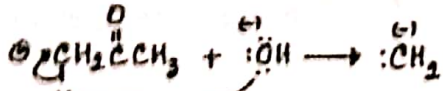
① $\overset{\delta-}{C}H_2\overset{O}{\overset{\|}{C}}H + :\ddot{O}H^{(-)} \longrightarrow {}^{(-)}\ddot{C}H_2\overset{O}{\overset{\|}{C}}H + H_2O$

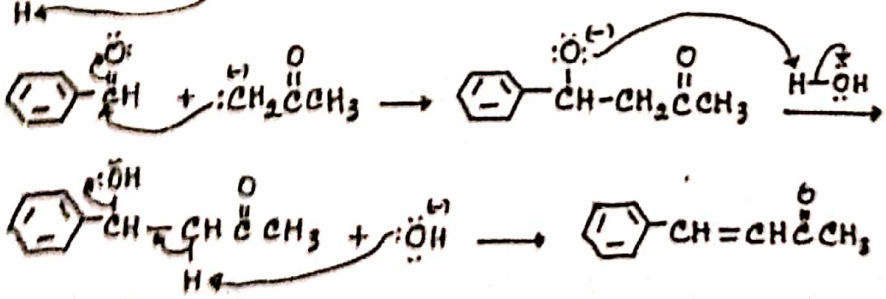
② $H-\overset{:O:}{\overset{\|}{C}}H + :CH_2\overset{O}{\overset{\|}{C}}H \longrightarrow HCH-CH_2\overset{O}{\overset{\|}{C}}H \xrightarrow{H-\ddot{O}H} HCH=CH\overset{O}{\overset{\|}{C}}-H + :\ddot{O}H^{(-)}$

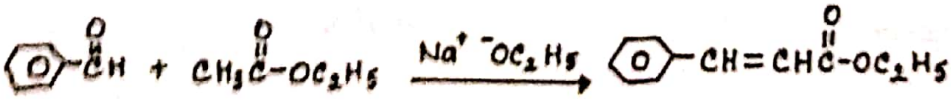
$H_2O + HCH=CH\overset{O}{\overset{\|}{C}}H + OH^{(-)}$

b) 

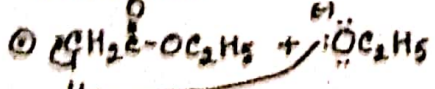
mekanisme :

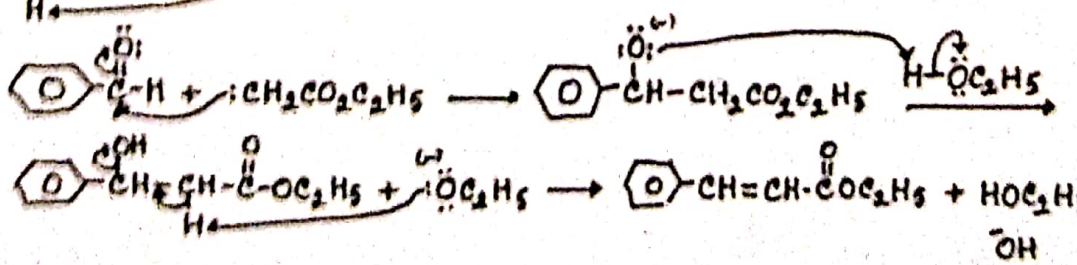
① 

② 

c) 

mekanisme

① 

② 

3. KONDENSASI KNOEVENAGEL

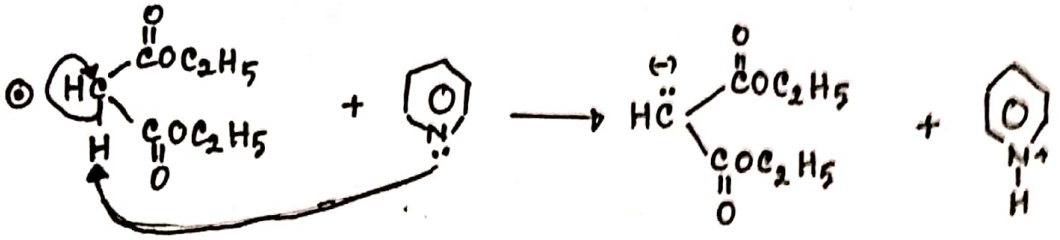
reaksi antara aldehid/keton dgn senyawa yg mempunyai H_α terhadap 2 ggs pengaktif ($>C=O$, $-C\equiv N$)

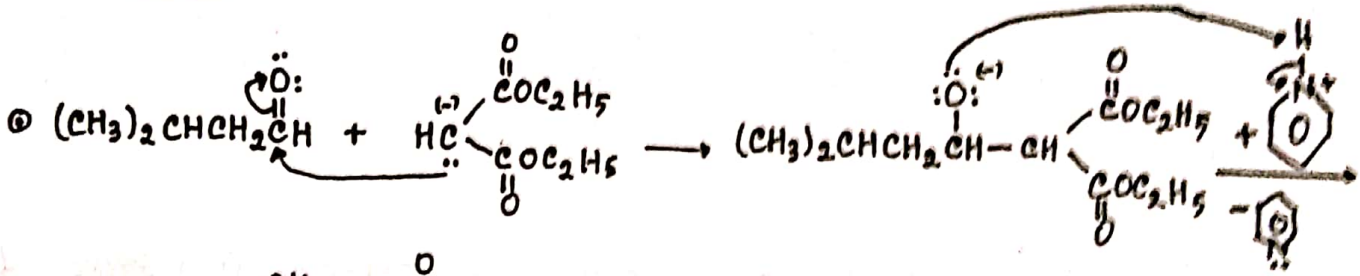
- contoh

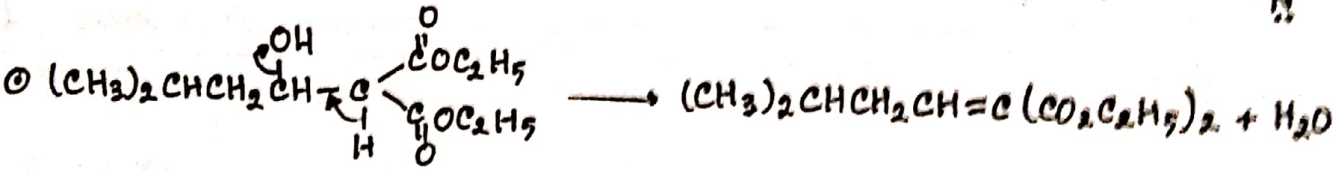
a) $(CH_3)_2CHCH_2\overset{O}{\overset{\|}{C}}H + H_2C(CO_2C_2H_5)_2 \xrightarrow[\text{kalor}]{\text{benzena}} (CH_3)_2CHCH_2CH=C(CO_2C_2H_5)_2 + H_2O$

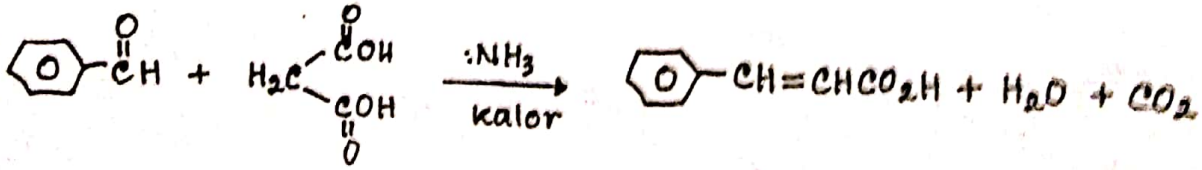
78 %

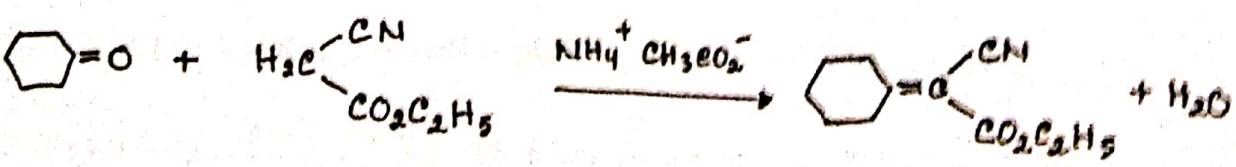
mekanisme :







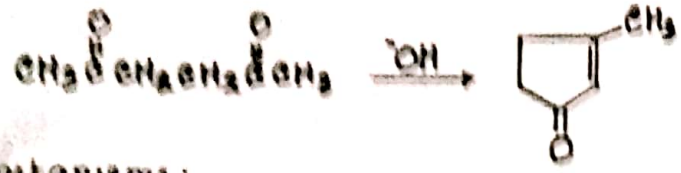
b) 

c) 

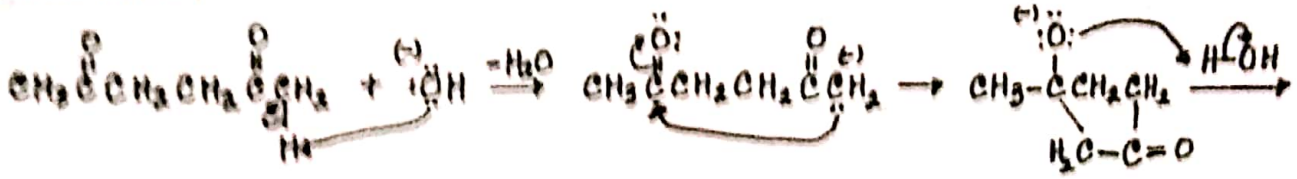
4. SIKLISASI ALDOL

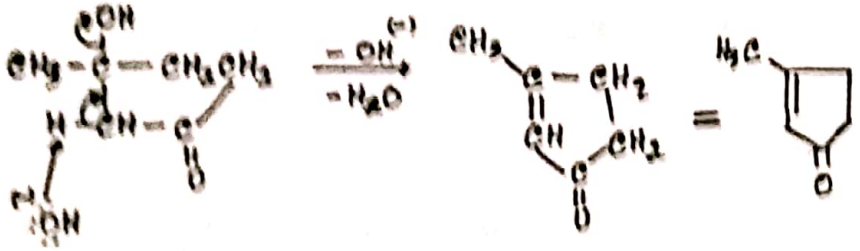
Senyawa yg mempunyai 2 ggs $-\overset{O}{\overset{\|}{C}}-$ dengan katalis basa dapat membentuk cincin beranggota 5 atau 6 dengan mudah

contoh:



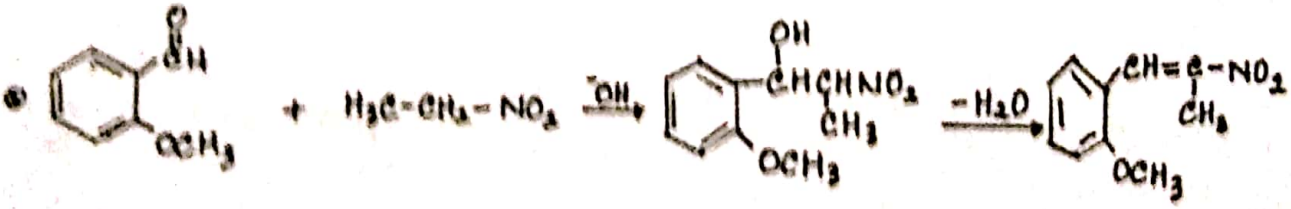
mekanisme:



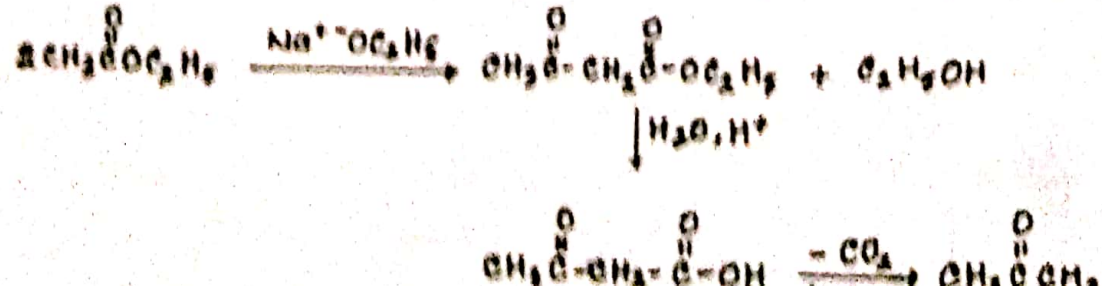


5. KONDENSASI ALDEHID DAN SENYAWA NITRO ALIFATIK

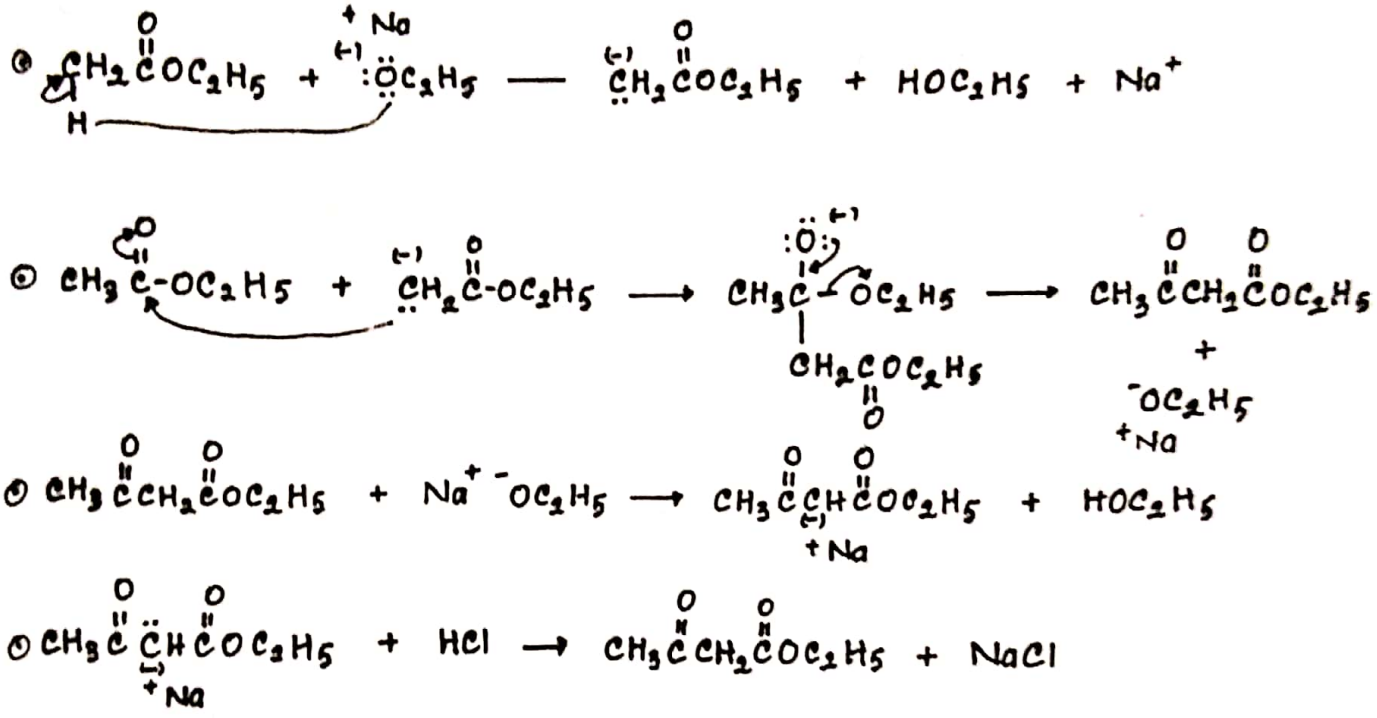
contoh:



6. KONDENSASI ESTER (KONDENSASI CLAISEN) ⇒ ester β keto

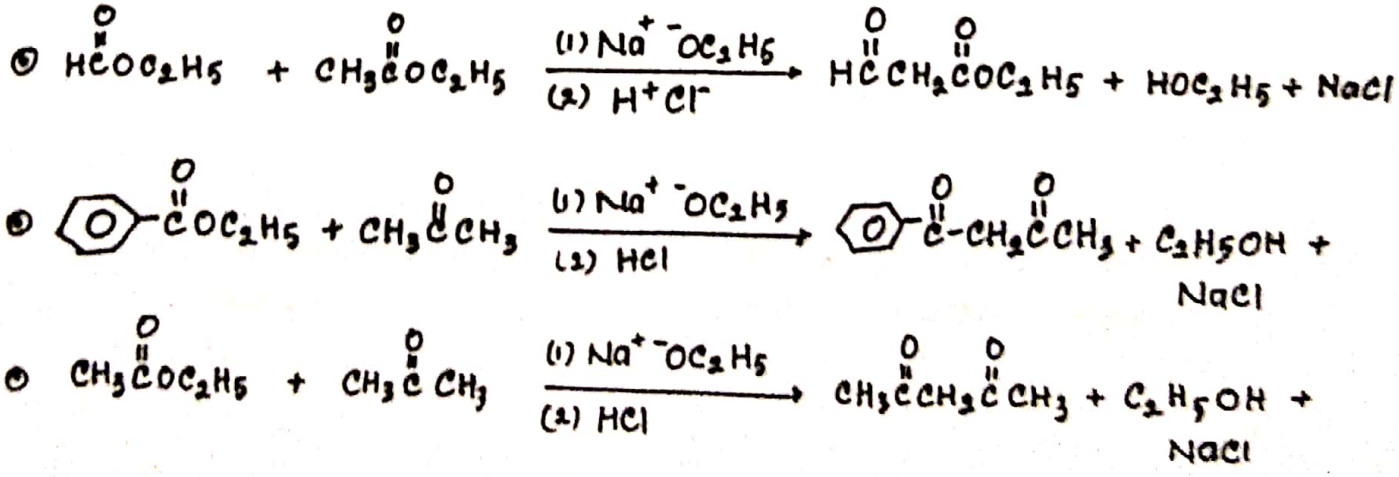


Mekanisme :



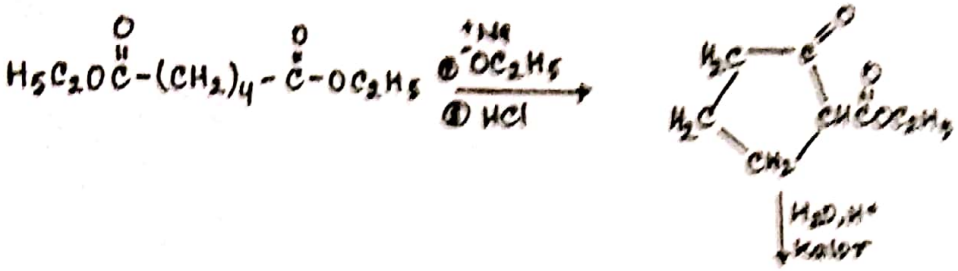
7. KONDENSASI Claisen SILANG

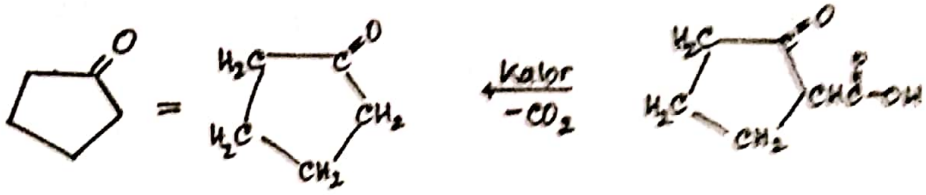
Reaksi antara ester (mengandung H_α atau tidak) dengan senyawa yg mempunyai H_α



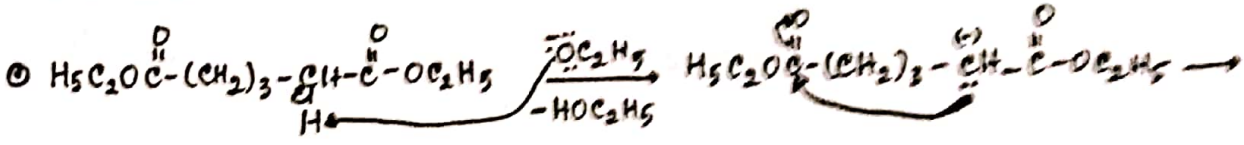
8. KONDENSASI DIECKMANN

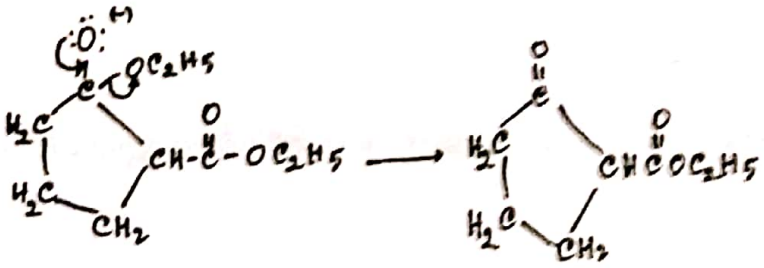
Digunakan untuk membuat keton siklik dari diester





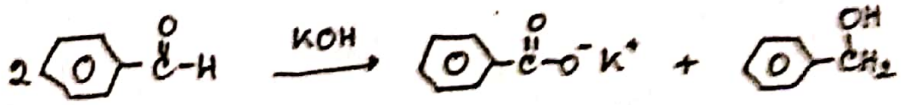
Mekanisme





9. KONDENSASI CANIZARO

2 senyawa aldehid yg tdk mempunyai H_α bergabung, terjadi DISPROPORSIONASI (separoh aldehid teroksidasi & separoh lagi Tereduksi)



Mekanisme: