

BÖLÜM 3

İKİ GRUP PARÇALANMALARI
(TWO GROUP DISCONNECTIONS)

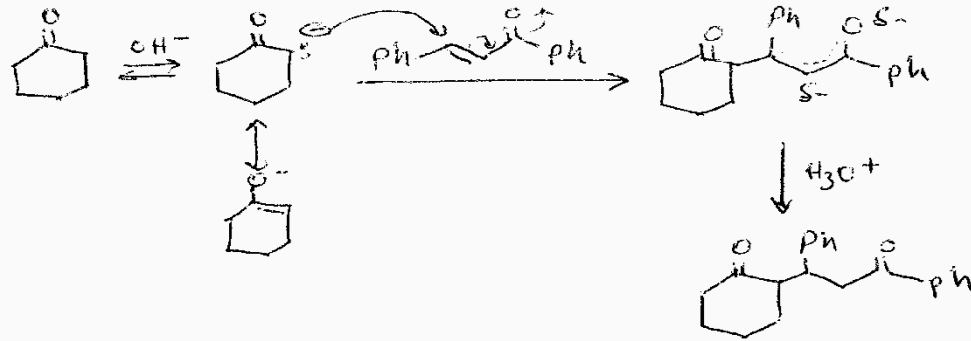


3.2. 1,5-DİKARBONİL BİLEŞİKLERİ

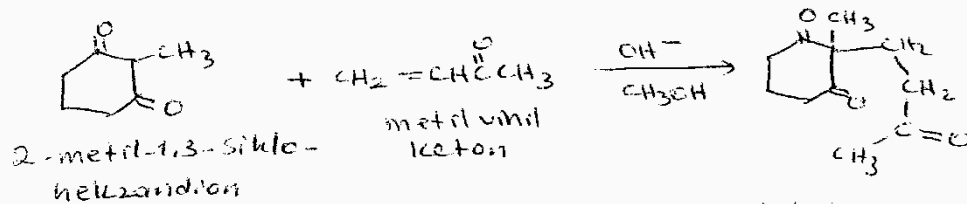
Şimdiye kadar bu bölümde, enolat anyonlarının diğer karbonil bileşikleriyle karbonil grubuna doğrudan etki ederek bağlanmasını inceledik. Bu reaksiyonları biraz daha genişletebiliriz örneğin elektrophil olarak α, β -doymamış karbonil bileşiklerini kullanarak. Bu, "Michael Reaksiyonu" olarak adlandırılır.

Hatırlatma:

Enolat anyonlarının α, β karbonil bileşiklerle konjuge katılmaları "Michael Katılmaları" olarak adlandırılır.

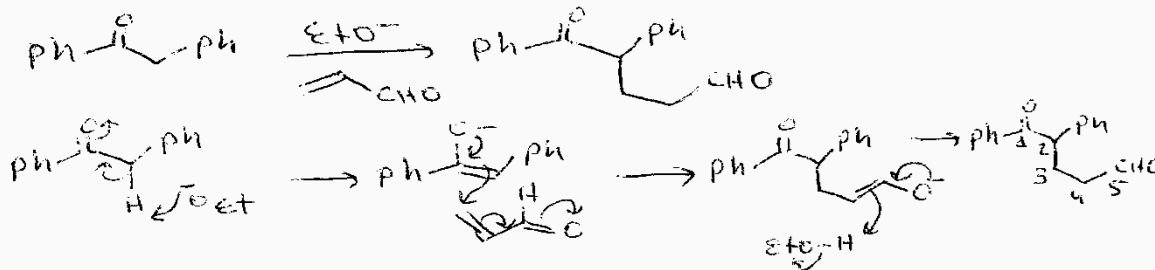
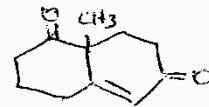


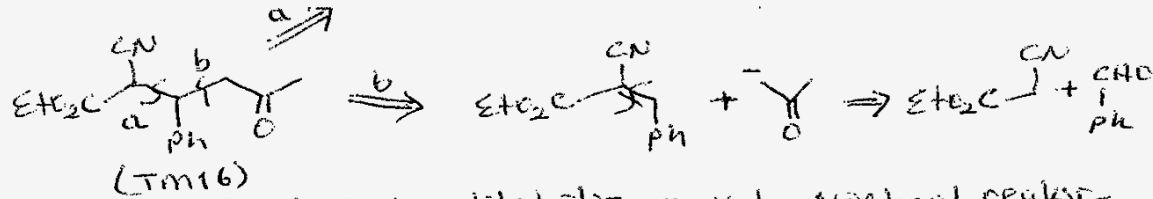
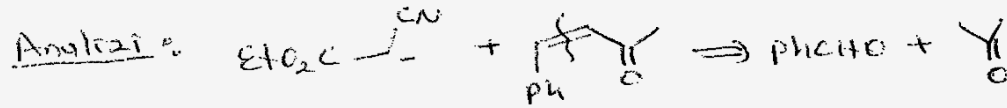
• Robinson halkalaşma reaksiyonu



Bu reaksiyon, konjuge alde katılması (Michael katılması) izleyen basit bir alde kondenzasyona ile halkalaşma reaksiyonudur. (1947 Nobel ödülü, İngiliz kimyacı Sir Robert Robinson)

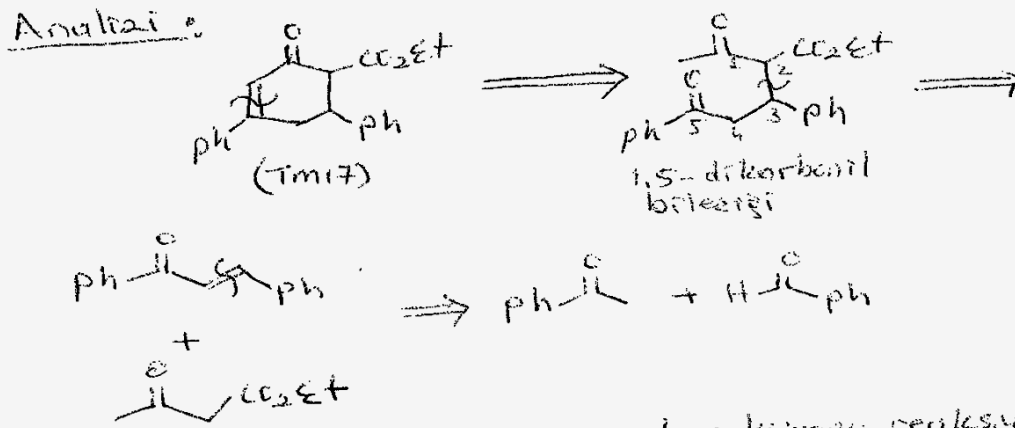
aldol kond. ↓ bir 2





Her iki yol da kabul edilebilir. α yolu Michael reaksiyonuna göre yürür, oluşan anyon daha kararsızdır bundan dolayı α yolu tercih edilendir.

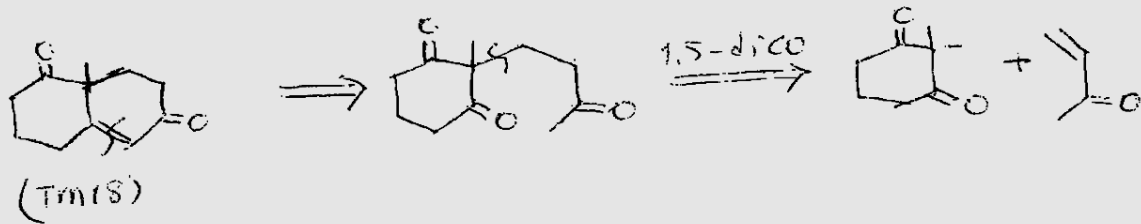
Örnek 3: Michael reaksiyonu sentetik sentezde bir hayli önemli rol oynar. (Tm17) 'yi (α, β doymamış karbonil bileşiği) Michael reaksiyonunu göre analiz ediniz.



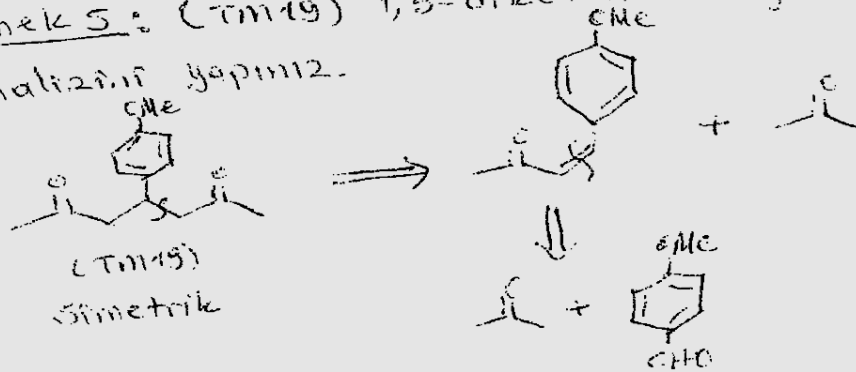
Reaksiyon basamakları, Michael reaksiyonu reaksiyon basamaklarıdır ve halkalaşma Robinson halkalaşmasıdır.



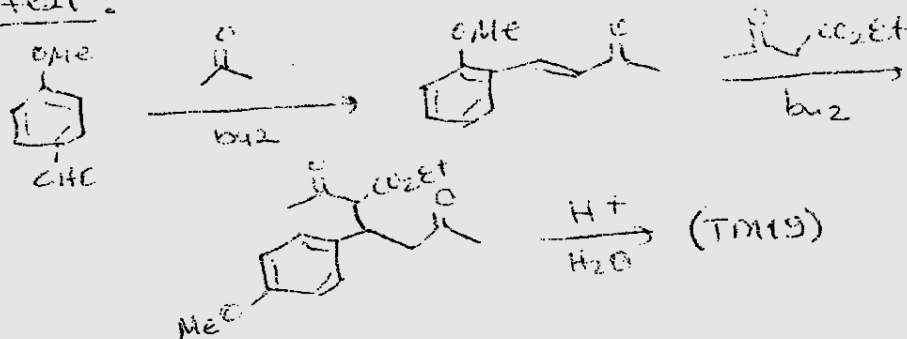
örnek 4: (Tm18) bileşiğini aynı şekilde yapınız



örnek 5: (Tm19) 1,5-diketoni bileşiğinin sentezinin analizini yapınız.

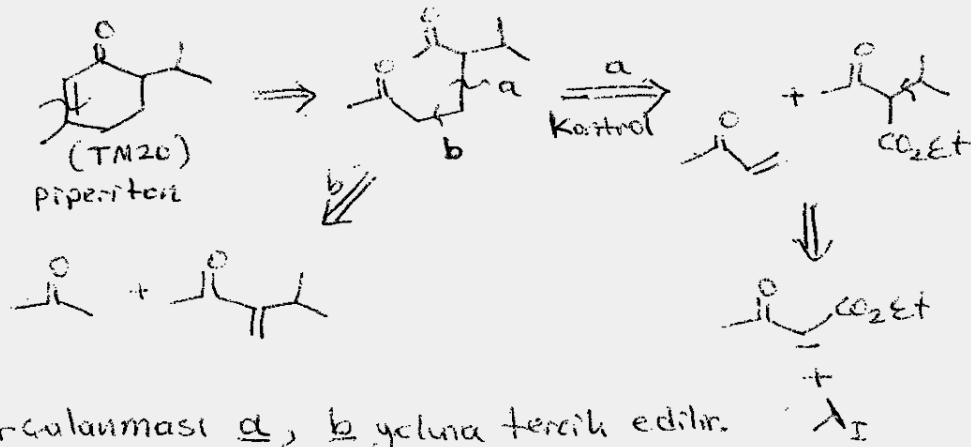


Sentezi:

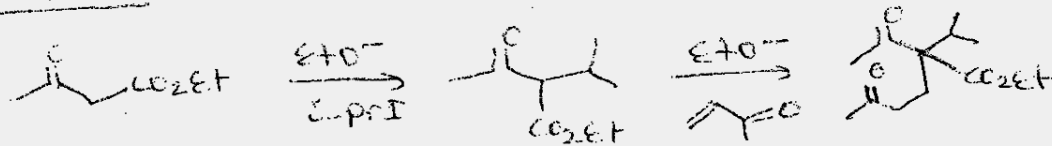


örnek 6 : (TM20) bileşiminin analizi ve sentezini tasarlayınız.

Analizi:

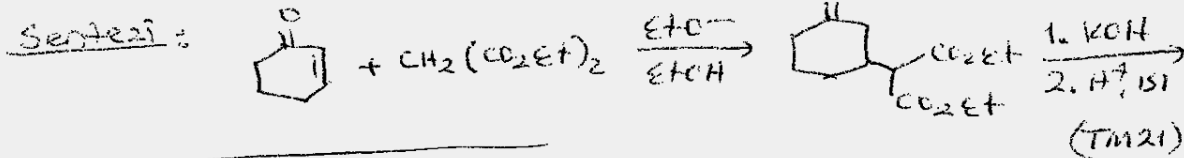
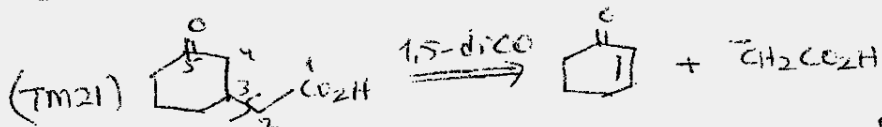


Sentezi:



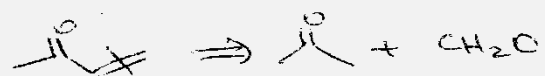
1. baz
 2. Hidroliz ve dekarboksilasyon
- (TM20) Nane kokusu/lezzeti veren bir maddedir

örnek 7 : (TM21)'i elde ediyoruz ?



MANNICH REAKSIYONUNUN KULLANILMASI

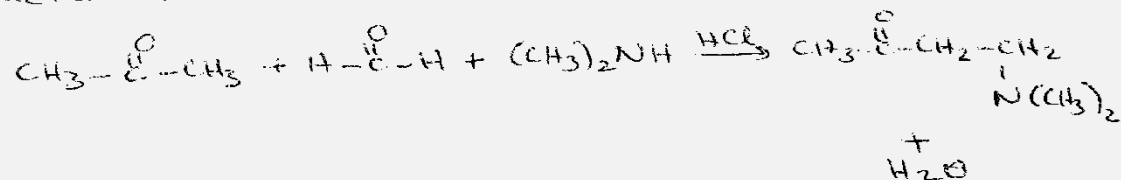
Vinil ketenlerin Michael reaksiyonlarında kullanılması durumunda bilinen parçalanma yöntemi pek kullanılmaz. Çünkü, parçalanma sonucunda oluşan formaldehit çok reaktif olduğu için polimerleşme ve diğer yan reaksiyonlar olur. Bu da, verimi düşürür.



Böyle durumlarda, alkilenmiş Mannich bazları kullanılır. Mannich bazları, Michael reaksiyonlarında kullanılan bazı katalizörler altında bazlanır ve ümitketon reaksiyon karışımına girer.

Hotırlatma : Mannich Reaksiyonu

Enol yapısı oluşturabilen bileşikler formaldehitte birincil ve ikincil aminlerle reaksiyona girerek "Mannich bazları" olarak adlandırılan bileşikleri oluşturur.

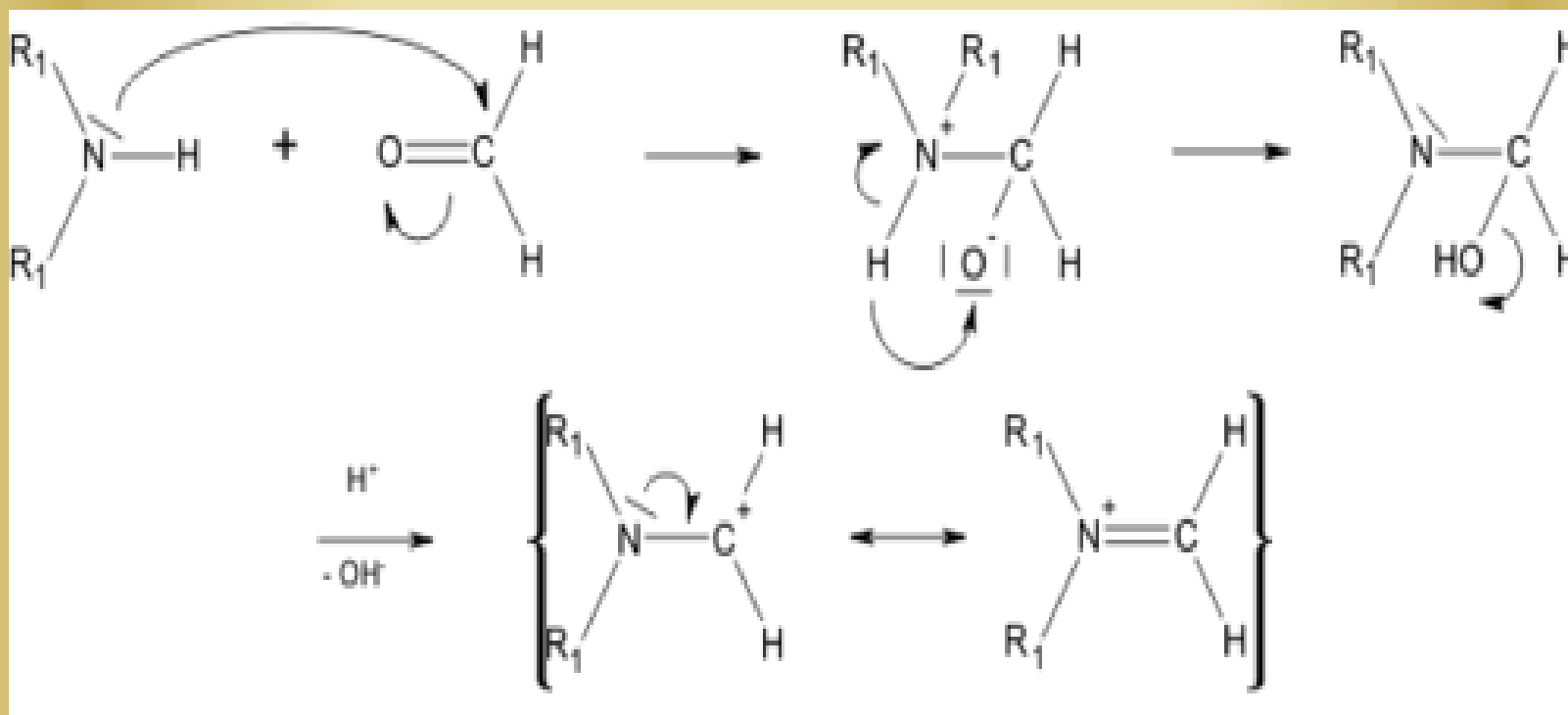


The Mannich reaction is an example of nucleophilic addition of an amine to a carbonyl group followed by elimination of a hydroxyl anion to the Schiff base. The Schiff base is an electrophile which reacts in step two in a second nucleophilic addition with a carbanion generated from a compound containing an acidic proton. The Mannich reaction is also considered a condensation reaction. In the Mannich reaction ammonia or primary or secondary amines are employed for the activation of formaldehyde. Tertiary amines and aryl amines stop at the Schiff base because it lacks a proton to form the intermediate imine. α -CH-acidic compounds (Nucleophiles) are Carbonyl compounds, Nitrile compounds, Acetylene compounds, aliphatic Nitro compounds, α -alkyl-pyridine compounds or Imine compounds. This reaction yields β -amino carbonyl compounds and Mannich base compounds. See for example tropinone. The Mannich reaction requires high reaction temperatures, long reaction times and a protic solvent. Formation of undesired reaction by-product is a common phenomenon.

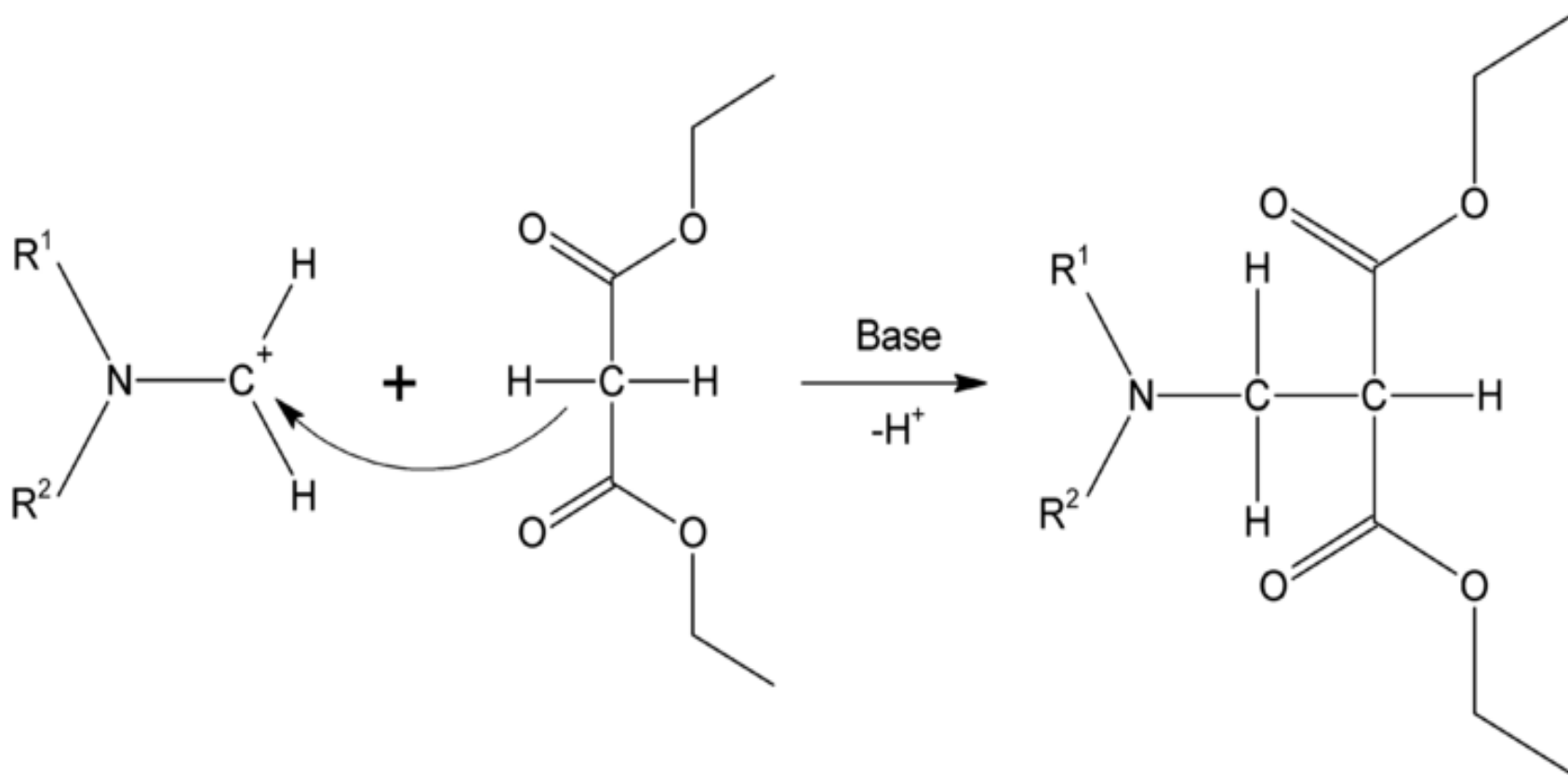
Reaction mechanism

The Mannich Reaction has a two part reaction mechanism

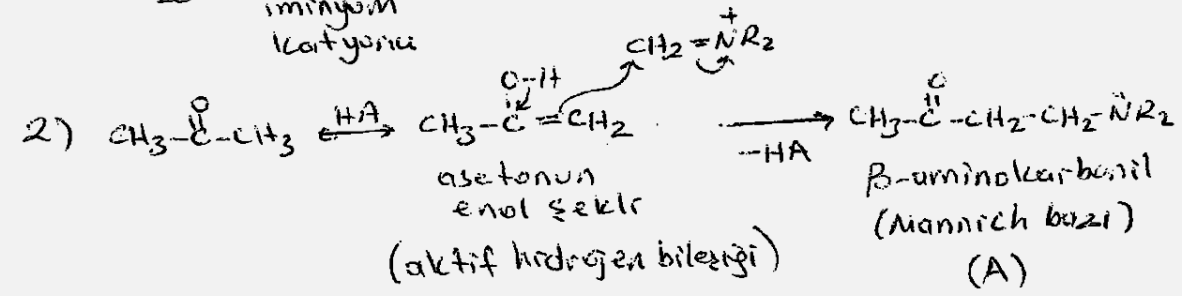
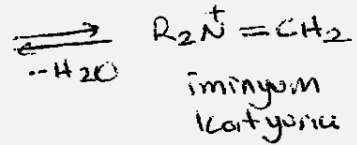
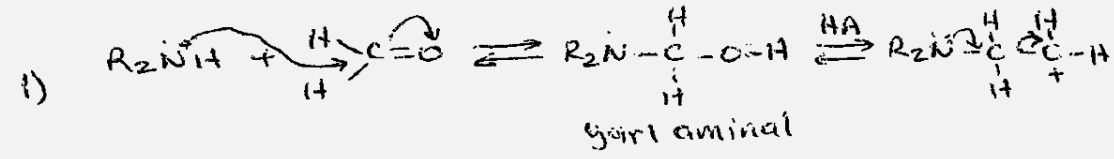
Formation of the Schiff base electrophile in a nucleophilic addition *Scheme 2*
amino alkylation of an acidic hydrogen containing compound *Scheme 3*



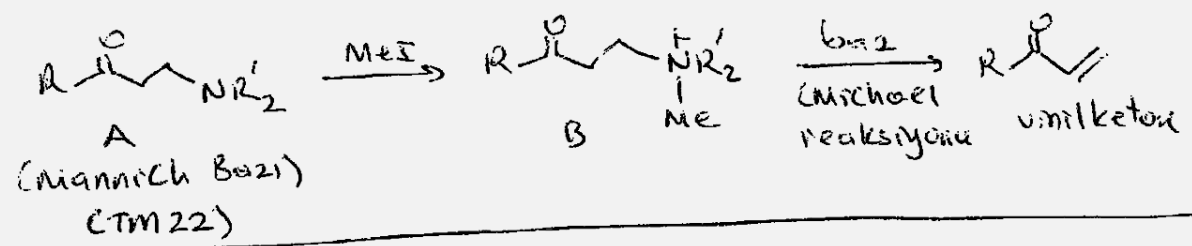
In the second step of the reaction a **carbanion** is generated from a CH acidic compound (in the example below **diethyl malonate**) under the influence of a **base** which then attacks the iminium salt in a second **nucleophilic addition**



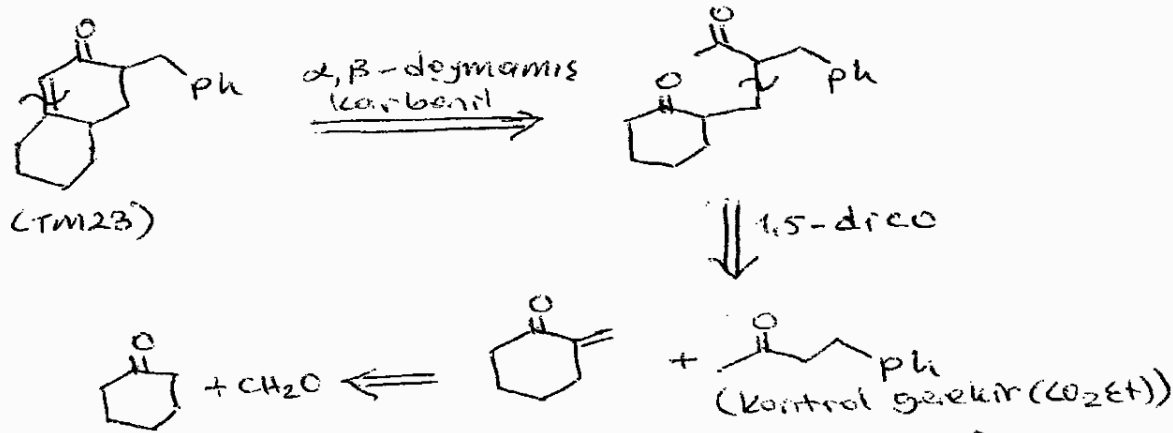
Mannich reaksiyonu mekanizması:



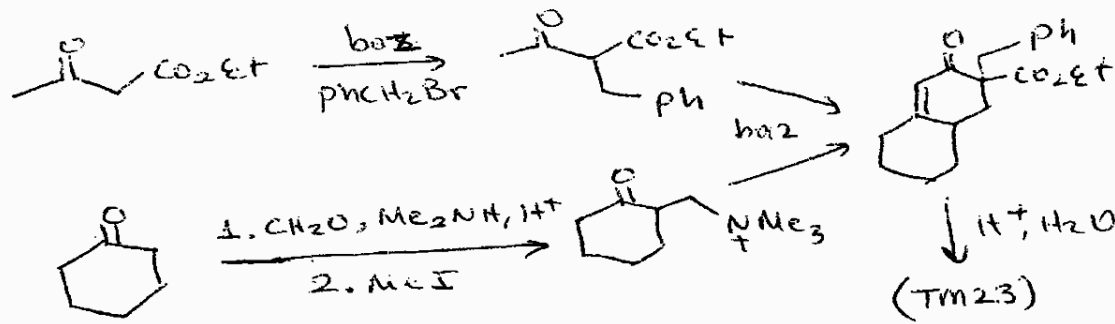
Mannich bazının alkillenmesi ile (B) bileşiğini verir. (B) bileşiğinin bazdaki eliminasyonu sonucunda umilketon elde edilir. Umilketon çok reaktif olduğu için, bu son basamak genellikle Michael reaksiyonun bazik ortamında yapılır, yokse umilketon izole edilemez.



Örnek : (TM23)'ü bu açıklamalara göre yapınız.

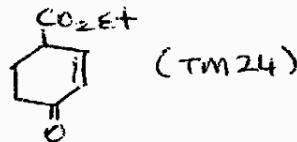


Sentezi : (J. Amer. Chem. Soc., 1954, 76, 4127)

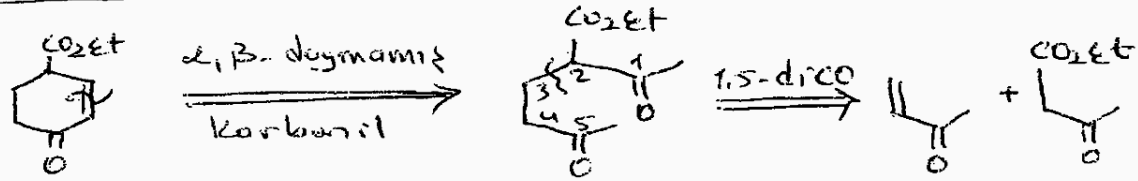


3. PROBLEMLER

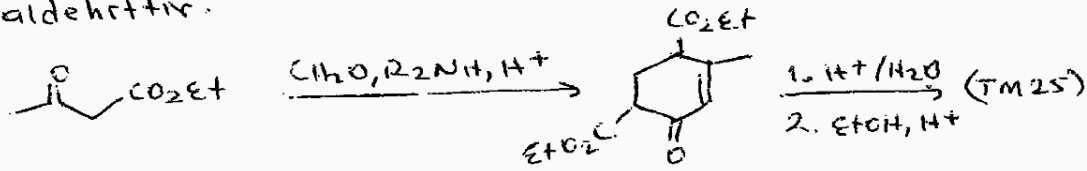
1. Hgmann'ın esteri olarak adlandırılan genellikle sentetik ara ürün olarak kullanılan (TM24) bileşiğin sentezi için öneride bulununuz.



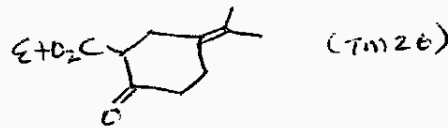
Analizi:



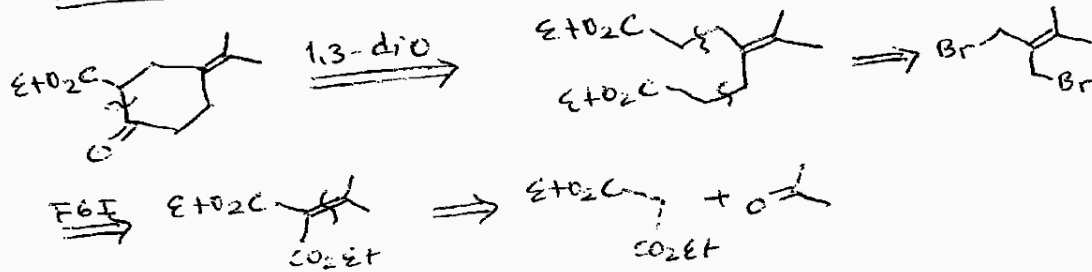
Sentezi: Çıkiş maddeleri iki moleköl asetoasetat ve formaldehittir.



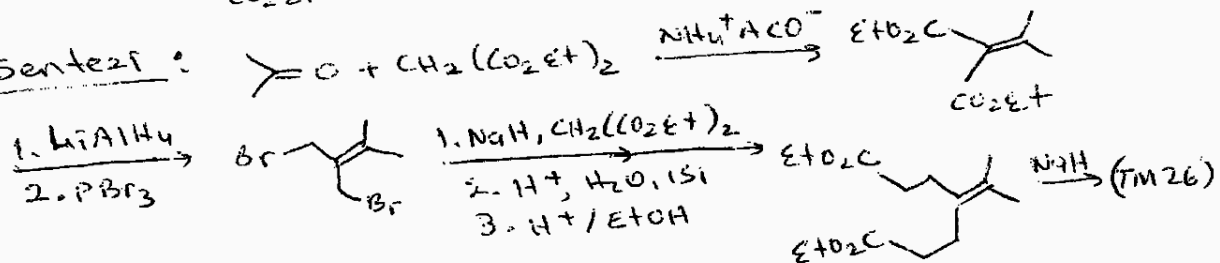
2. (TM26) için bir sentez yöntemi önermiş.



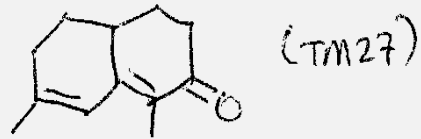
Analizi:



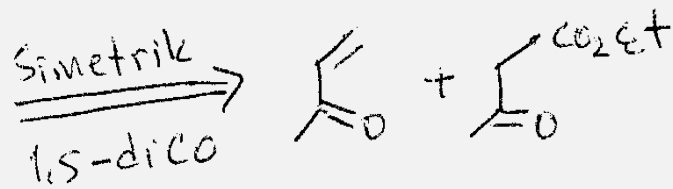
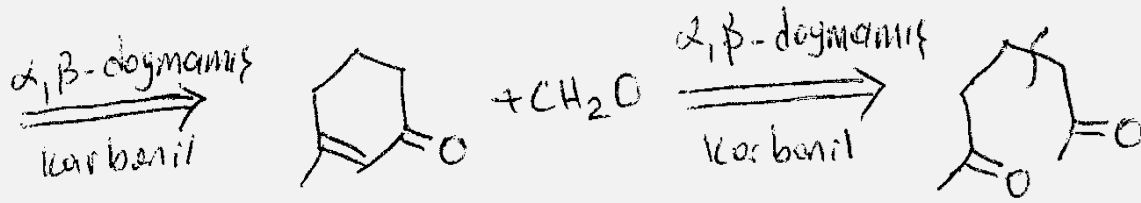
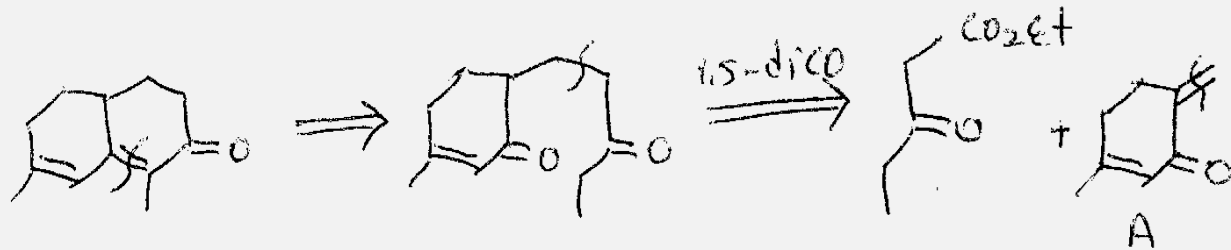
Sentezi:



3. (TM27) için bir analiz yöntemi öneriniz.

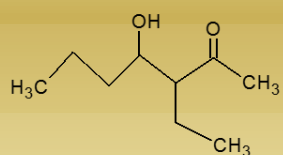


Analiz: öncelikle α, β -doymamış keton parçalanır;

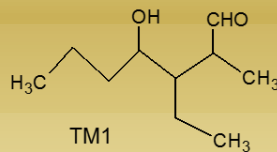


— BÖLÜM SONU —

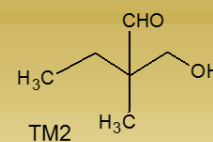
Bölüm 3: Bileşiklerin adlandırılması



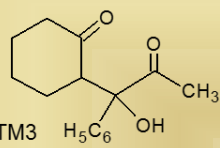
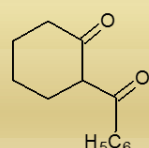
3-ethyl-4-hydroxyheptan-2-one



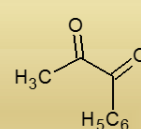
3-ethyl-4-hydroxy-2-methylheptanal



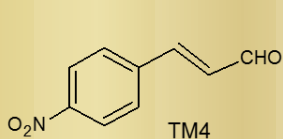
2-(hydroxymethyl)-2-methylbutanal

2-(1-hydroxy-2-oxo-1-phenylpropyl)
cyclohexanone

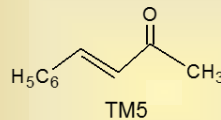
2-benzoylcyclohexanone



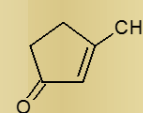
1-phenylpropane-1,2-dione



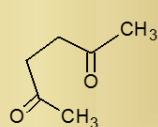
(2E)-3-(4-nitrophenyl)acrylaldehyde



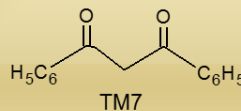
(3E)-4-phenylbut-3-en-2-one



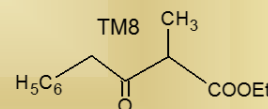
3-methylcyclopent-2-en-1-one



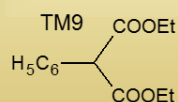
hexane-2,5-dione



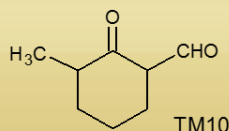
1,4-diphenylbutane-1,4-dione



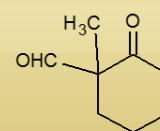
ethyl 2-methyl-3-oxo-4-phenylbutanoate



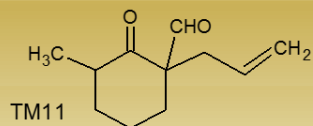
diethyl phenylmalonate



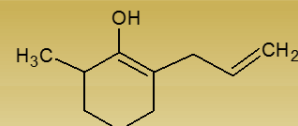
3-methyl-2-oxocyclohexanecarbaldehyde



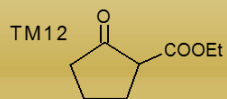
1-methyl-2-oxocyclohexanecarbaldehyde



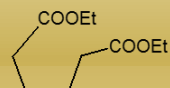
1-allyl-3-methyl-2-oxocyclohexanecarbaldehyde



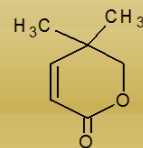
2-allyl-6-methylcyclohex-1-en-1-ol



TM12
ethyl 2-oxocyclopentane
carboxylate

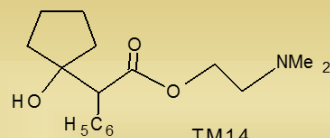


diethyl adipate



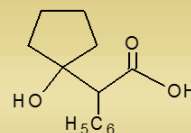
TM13

5,5-dimethyl-5,6-dihydro-2H-pyran-2-one

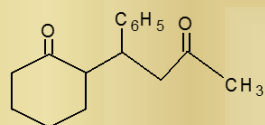


TM14

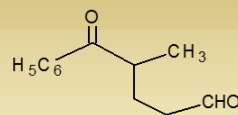
2-(dimethylamino)ethyl (1-hydroxycyclopentyl)
(phenyl)acetate



(1-hydroxycyclopentyl)(phenyl)acetic acid

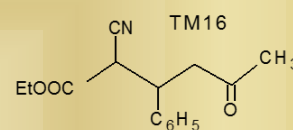


2-(3-oxo-1-phenylbutyl)cyclohexanone



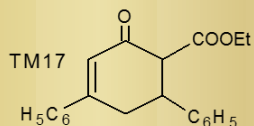
syf. 14

4-methyl-5-oxo-5-phenylpentanal



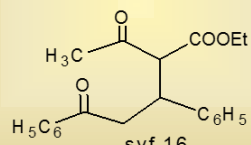
TM16

ethyl 2-cyano-5-oxo-3-phenyl
hexanoate



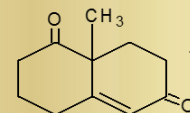
TM17

ethyl 2-oxo-4,6-diphenylcyclohex-3-ene
-1-carboxylate



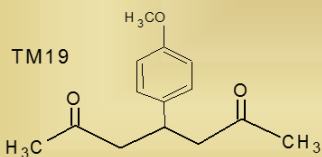
syf. 16

ethyl 2-acetyl-5-oxo-3,5-diphenyl
pentanoate



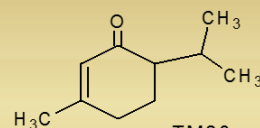
TM18

8a-methyl-3,4,8,8a-tetrahydronaphthalene
-1,6-(2H,7H)-dione



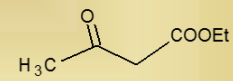
TM19

4-(4-methoxyphenyl)heptane-2,6-dione



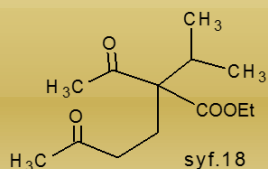
TM20

6-isopropyl-3-methylcyclohex-2-en-1-one



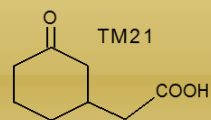
syf. 18

ethyl 3-oxobutanoate



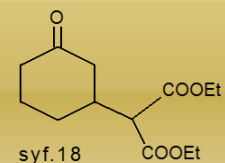
syf. 18

ethyl 2-acetyl-2-isopropyl-5-oxohexanoate



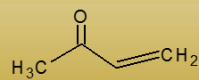
TM21

(3-oxocyclohexyl)acetic acid



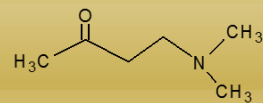
syf. 18

diethyl (3-oxocyclohexyl)malonate

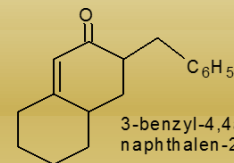


but-3-en-2-one

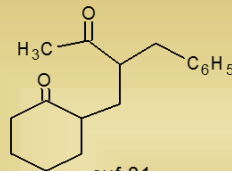
syf.19



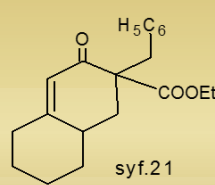
4-(dimethylamino)butan-2-one

3-benzyl-4,4a,5,6,7,8-hexahydro
naphthalen-2(3H)-one

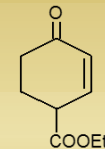
TM23

2-(2-benzyl-3-oxobutyl)
cyclohexanone

syf.21

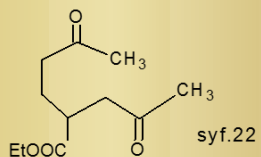
ethyl 2-benzyl-3-oxo-1,2,3,5,6,7,8,8a-
octahydronaphthalen-2-carboxylate

syf.21



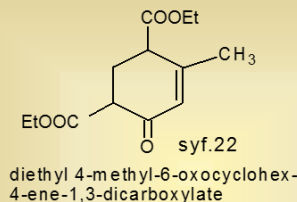
ethyl 4-oxocyclohex-2-ene-1-carboxylate

TM24

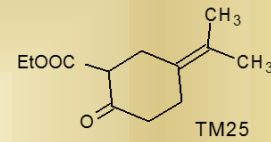


ethyl 5-oxo-2-(2-oxopropyl)hexanoate

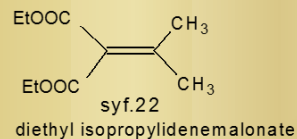
syf.22

diethyl 4-methyl-6-oxocyclohex-
4-ene-1,3-dicarboxylate

syf.22

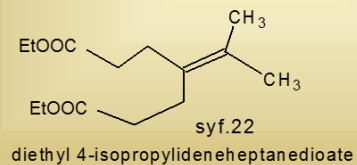
ethyl 5-isopropylidene-2-
oxocyclohexanecarboxylate

TM25



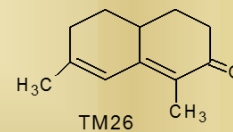
diethyl isopropylidene malonate

syf.22

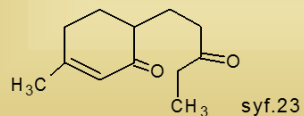


diethyl 4-isopropylideneheptanedioate

syf.22

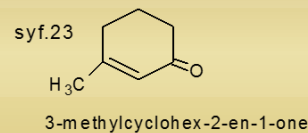
1,7-dimethyl-4,4a,5,6-tetrahydro
naphthalen-2(3H)-one

TM26



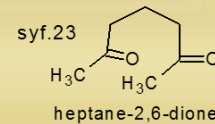
3-methyl-6-(3-oxopentyl)cyclohex-2-en-1-one

syf.23



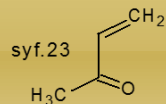
3-methylcyclohex-2-en-1-one

syf.23



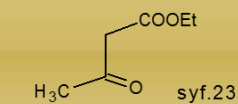
heptane-2,6-dione

syf.23



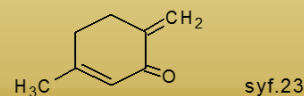
but-3-en-2-one

syf.23



ethyl 3-oxobutanoate

syf.23



3-methyl-6-methylenecyclohex-2-en-1-one

syf.23