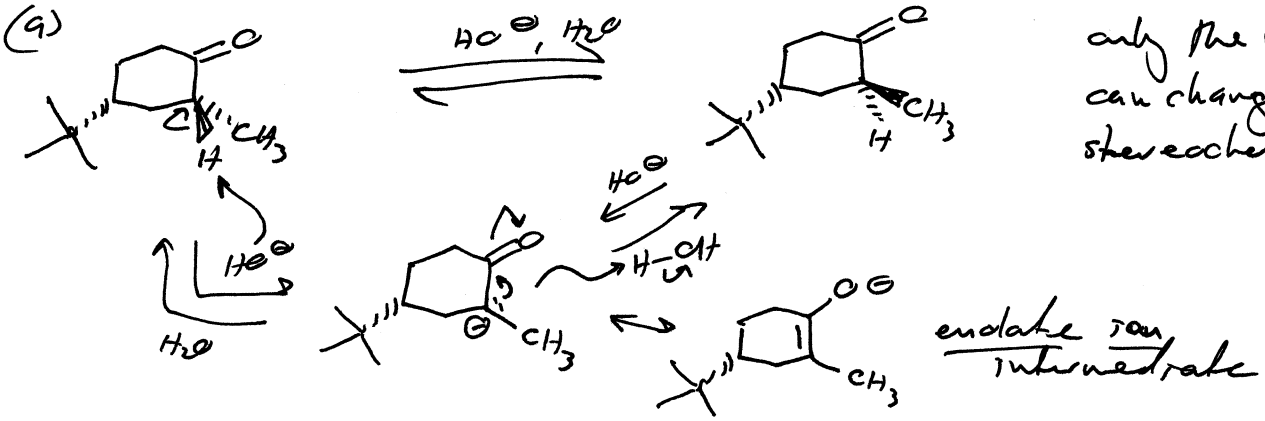
Chem 22 HW set 10 non-graded problems

1. (a) $NC-\ddot{\underset{\ominus}{C}}-CN$?! NO.

(b) NaH is a non-nucleophilic base, so it can be there in excess & not destroy the benzyl chloride. $HO^\ominus$ or $EtO^\ominus$ would destroy the $PhCH_2Cl$ via S_N2 chem.

(c) With 2 diff alkyl groups, we need some control over the sequence — 1 equiv. NaH, R–X, then 1 equiv NaH, R'–X

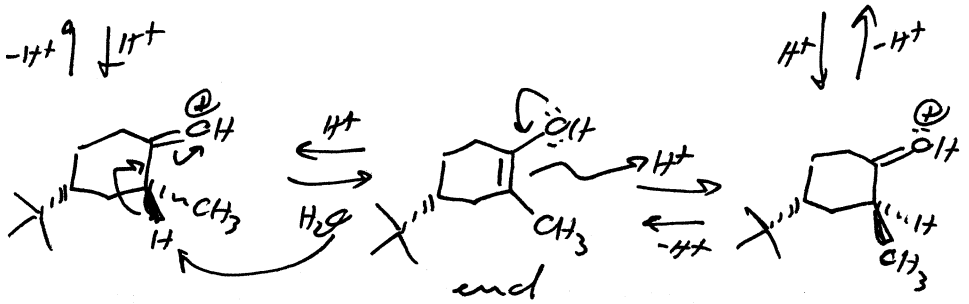
2. (a)



only the α-C can change stereochem!

enolate ion intermediate

(b) acid-cat.



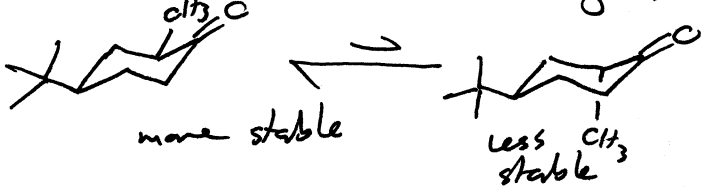
enol intermediate

(c) 3 stereomers

(d) 2R,4R shown above ⇌ 2S,4R

optical activity would change from that of pure R,R to something between that of R,R & that of S,R – it would not go to zero as it does in racemization

(e) Think chairs!

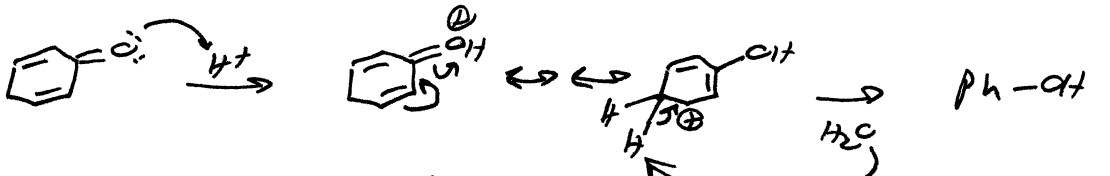


more stable

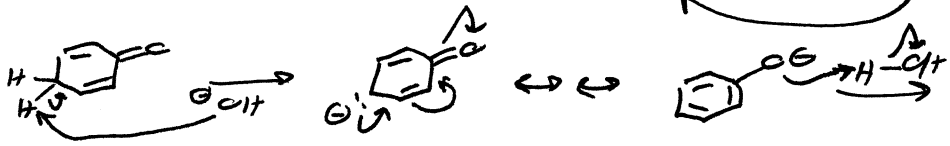
less stable

(note: that's not a ring-flip)

3. (a)

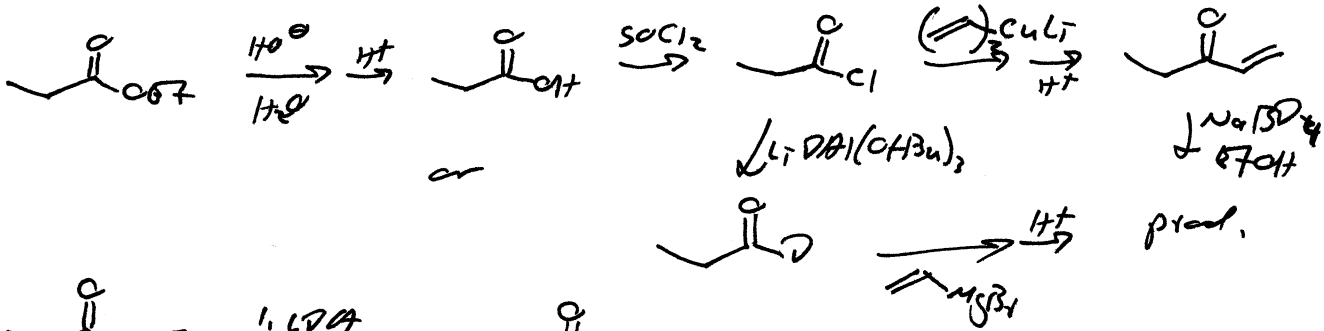


(b)

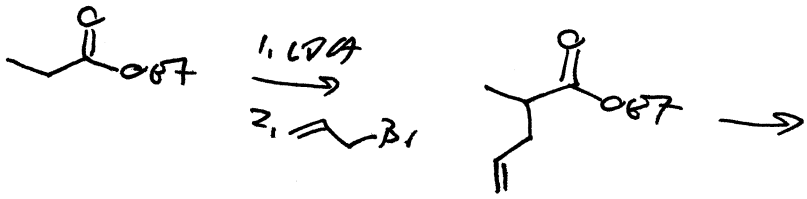


(c) the enol is aromatic – that's worth about 20 kcal/mol of stabilization.

4. (a)



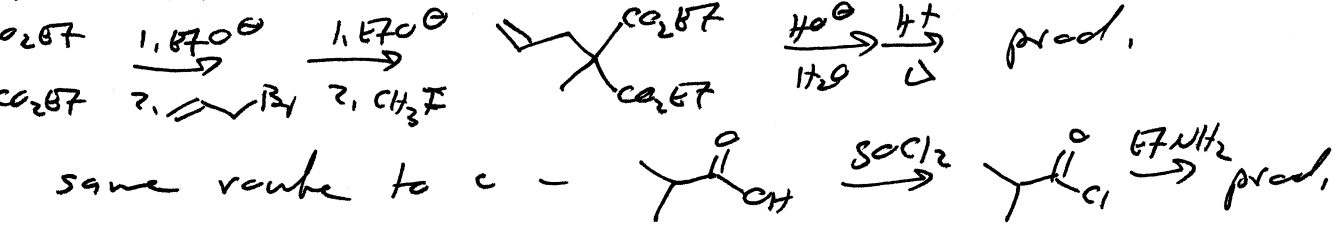
(b)



(c) as above –
alkylate the ester, then convert to amide

why not make  first, then alkylate?

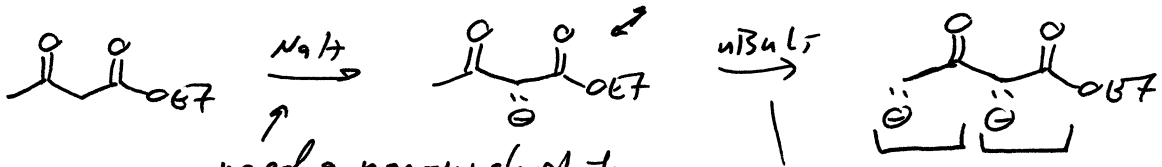
(d) Yes - b + c –



same route to c –

(e) acetoacetic ester synth –
write it out! – add the benzyl group, hydrolyze & decarboxylate as usual, then reduce

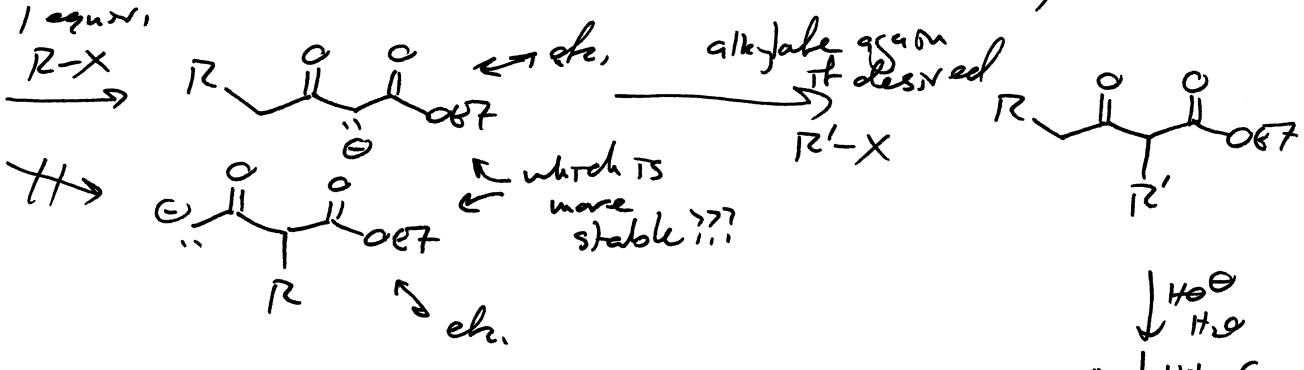
malonic ester synth –
write it out! – add the allyl group, hydrolyze, yes, hydrolyze, even though the product is an ethyl ester! why ???, decarbox, then reesterify.

5. 

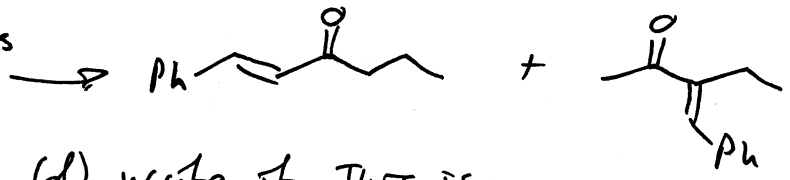
need a non-nucleophilic base here — what might nBuLi do to this keto-ester besides deprotonate?

now we need the extra-strong base & there's less danger of nucleophilic attack on a C=O

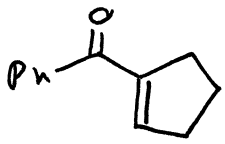
each ⊖ is now delocalized by one C=O



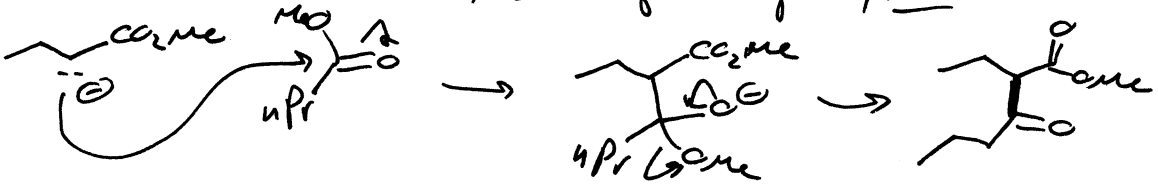
6. (a)

(b) Z enolate forms 

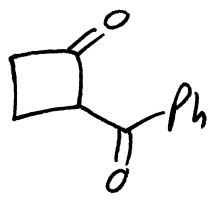
likely mixtures of stereoisomers, controlled by thermodynamics

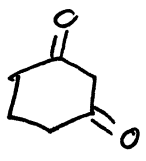
(c) 

(d) write it. This is important. Don't forget that the elim is not E2 — it's 2 steps — deprot., then –⊖OH

7. (a) 

gets fully deprotonated, then reprot.

(b) 

(c) 

(d) write it!