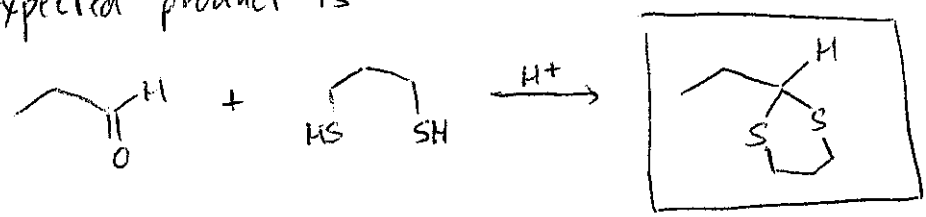
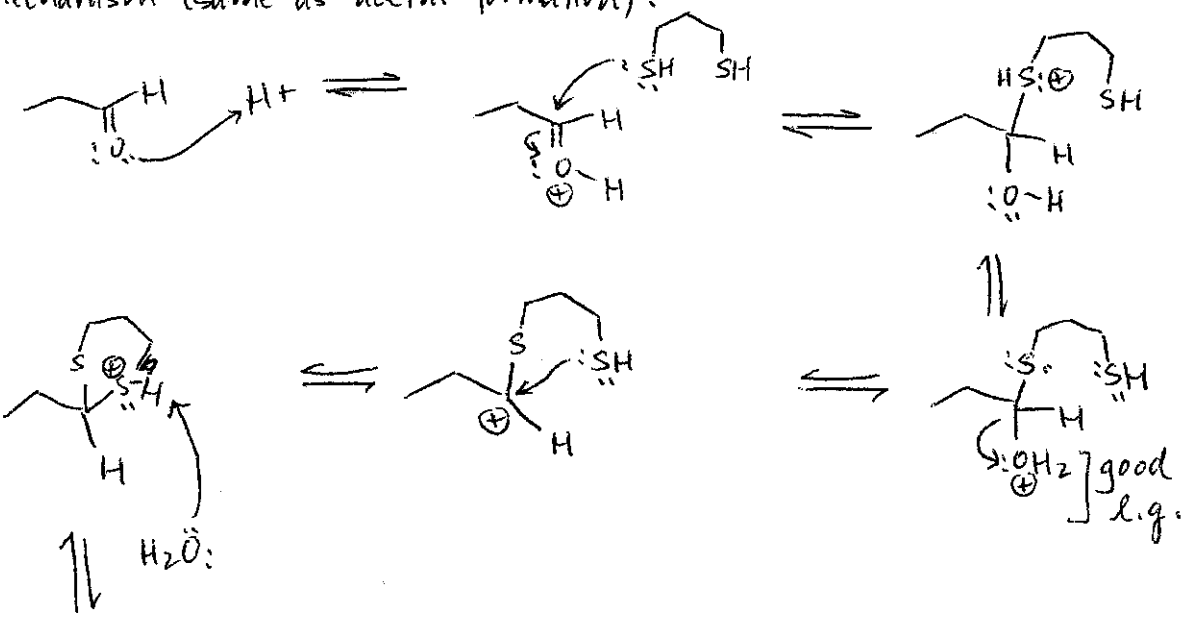
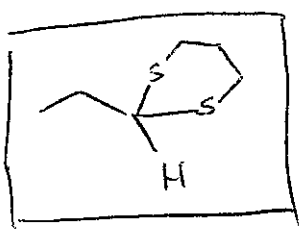
3. This reaction is completely analogous to addition of a diol, except that we have sulfur instead of oxygen. (Recall that S is directly under O in the periodic table, so same # of valence electrons and similar chemical reactivity!)

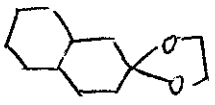
The expected product is:



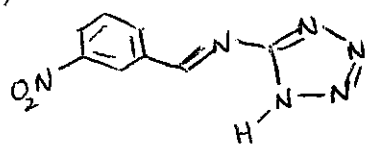
Mechanism (same as acetal formation):



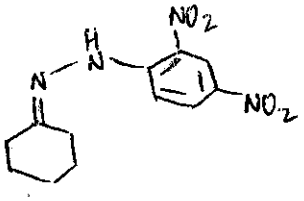


4. (a) 

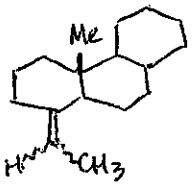
acetal formation

(b) 

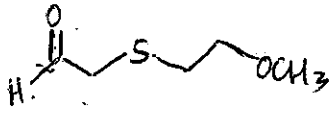
imine formation

(c) 

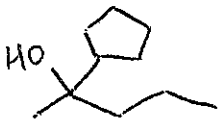
imine formation

(d) 

Wittig rxn

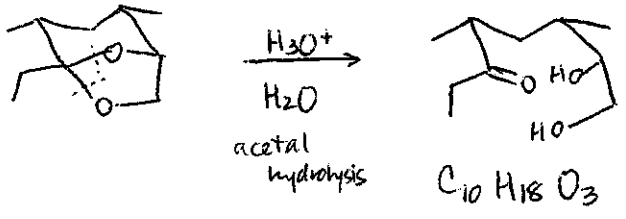
(e) 

acetal hydrolysis

(f) 

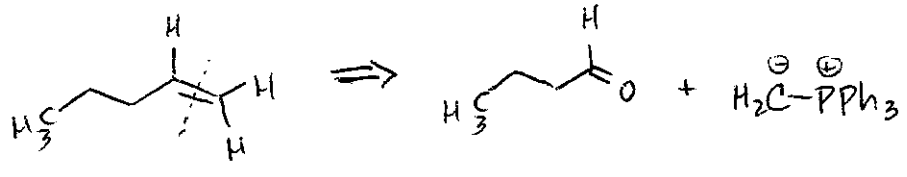
Grignard rxn

5. Need to recognize that multistriatin (**2**) is an acetal:



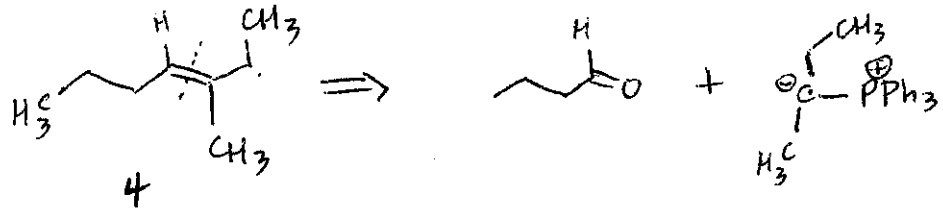
IR peak @ 1715 cm^{-1} is C=O

6. Using Wittig chemistry:



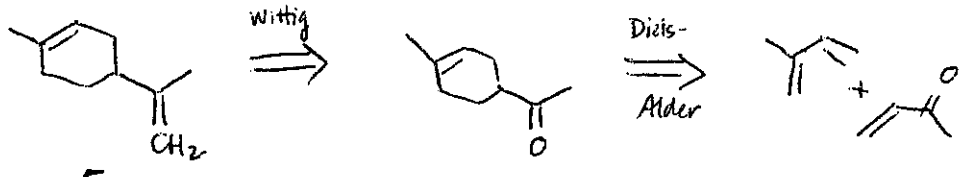
3

#6 (con't)



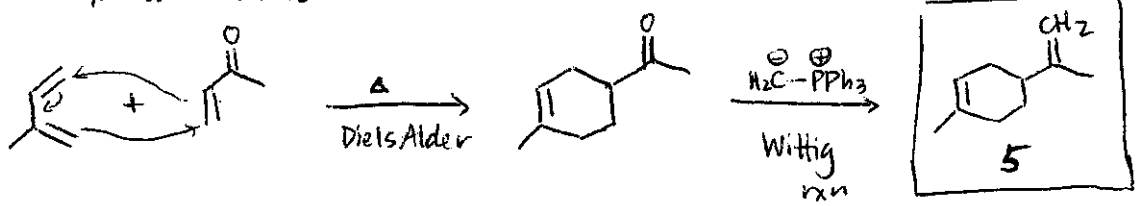
4

7. Synthesis of limonene (5):



5

So, in forward direction:



5