

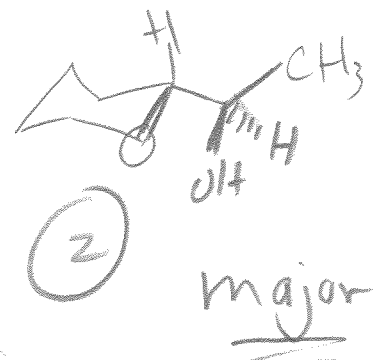
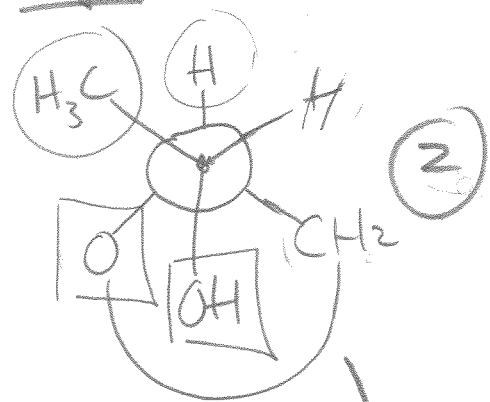
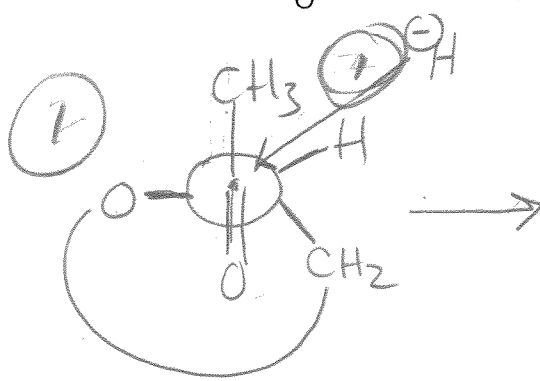
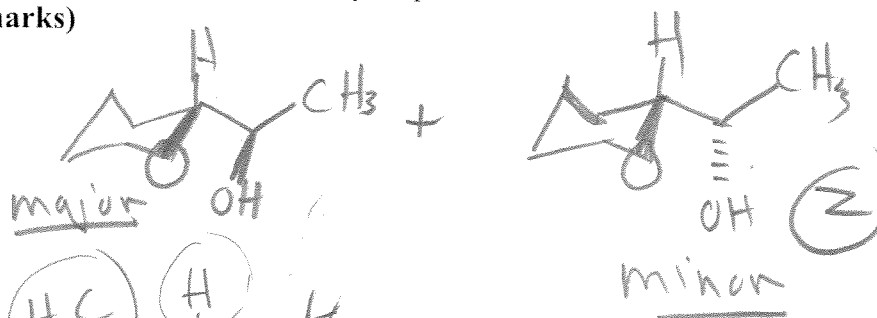
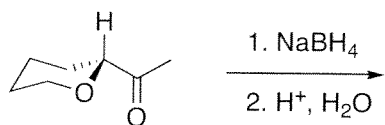
Answer Key

Name:
Student #:

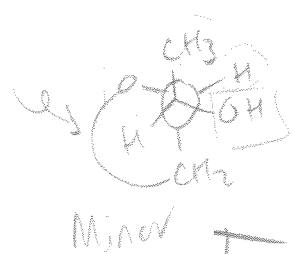
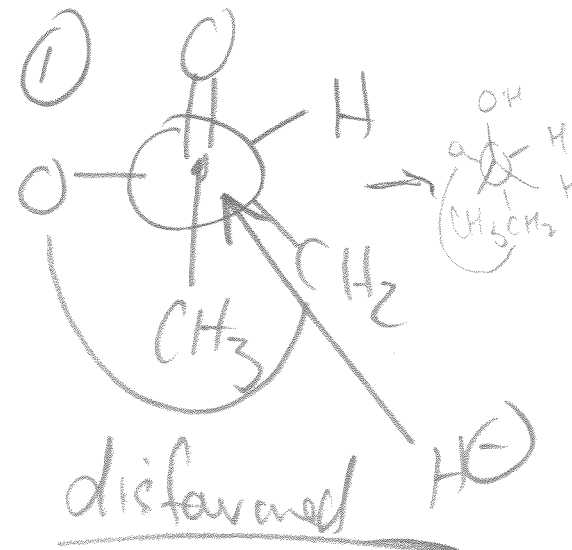
CHM 3120
Intermediate Organic Chemistry (Fall 2012)
EXAM #1 Version A

Instructions: Please answer all questions in the space provided. If you require additional space you may use the back pages. The last page of the exam has been intentionally left blank. Model kits are permitted. There are **6 questions**, (7 pages) and **50 marks** in total.

1. Consider the following reaction. Provide the structure of **all** the products that can be formed in this reaction. Clearly indicate which one(s) will be the **major** and **minor** products. Using an appropriate model, clearly justify why the major product is formed. Provide the name of this model. Finally, explain how the minor product is formed. (10 marks)



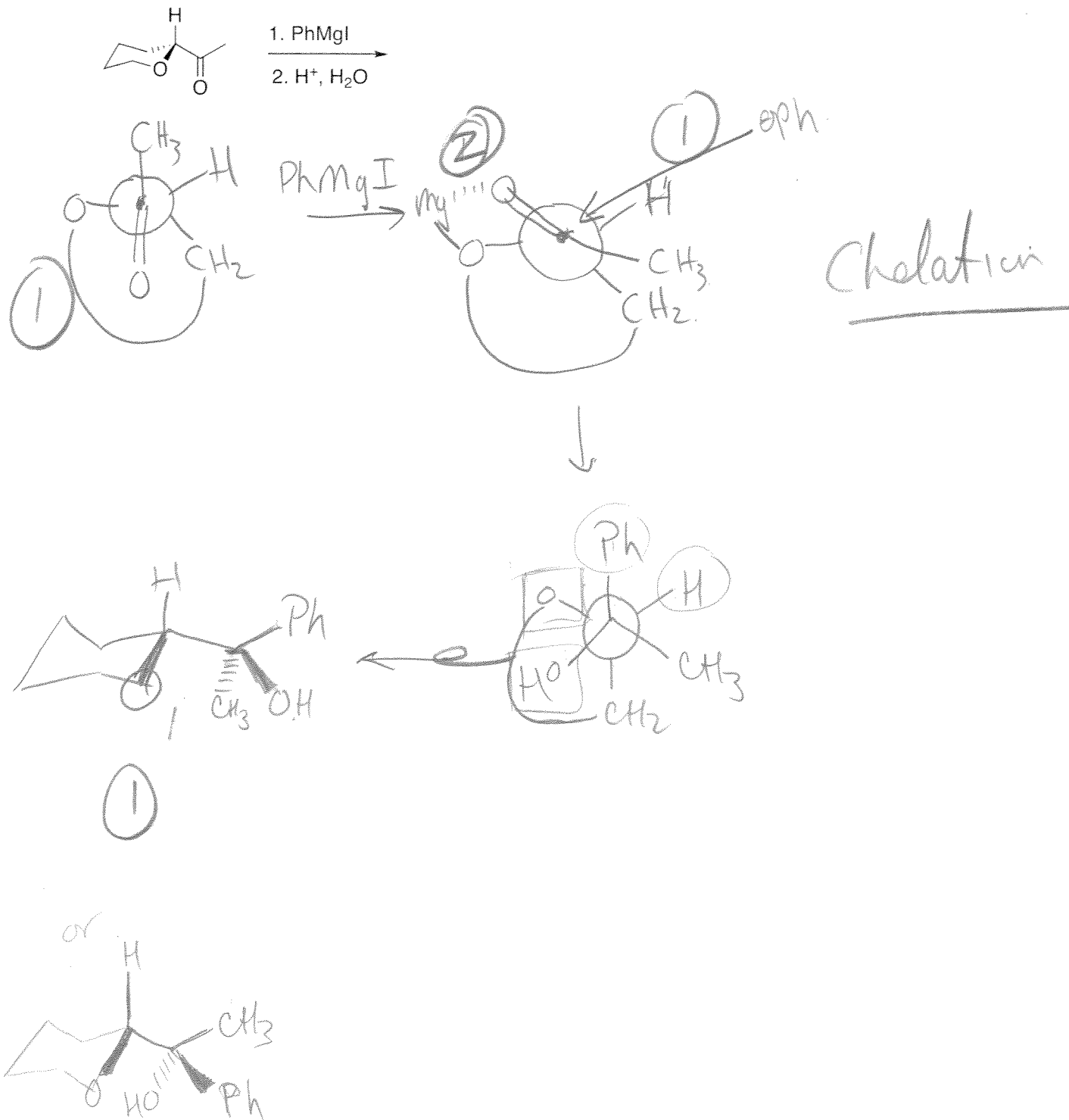
minor ≠ *



Felkin-Anh (1)

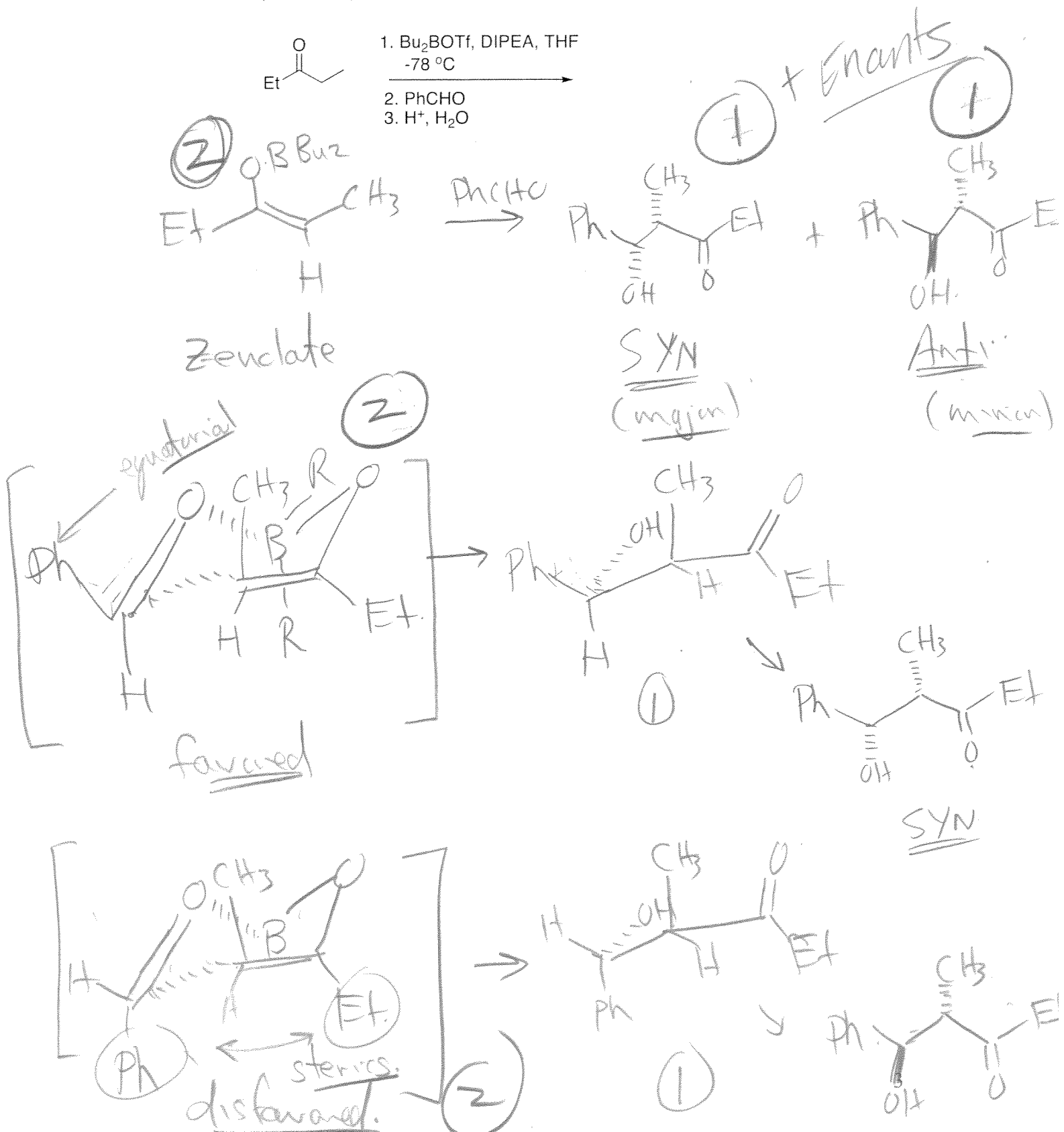
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2. Consider the following reaction. Provide the structure of the **major** product that is obtained in this reaction. Using an appropriate model, clearly justify why this product is formed. (5 marks)



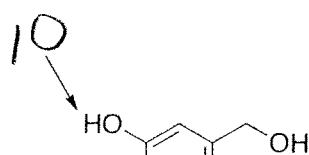
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3. Consider the following reaction. What is the structure of the enolate that is preferentially formed? What are the structures of major and minor products formed when this enolate reacts with PhCHO? Using the appropriate transition state explain which product is preferred. NOTE: DIPEA = diisopropylethyl amine (10 marks)

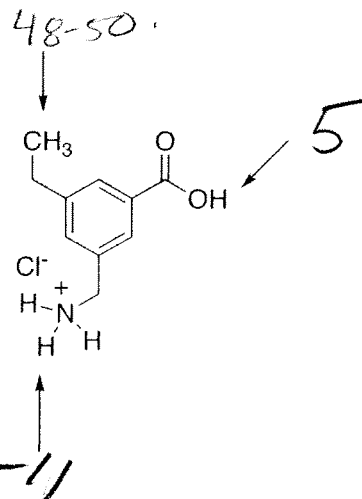
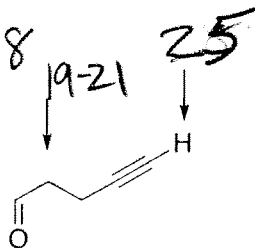
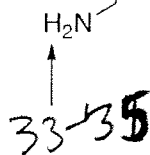


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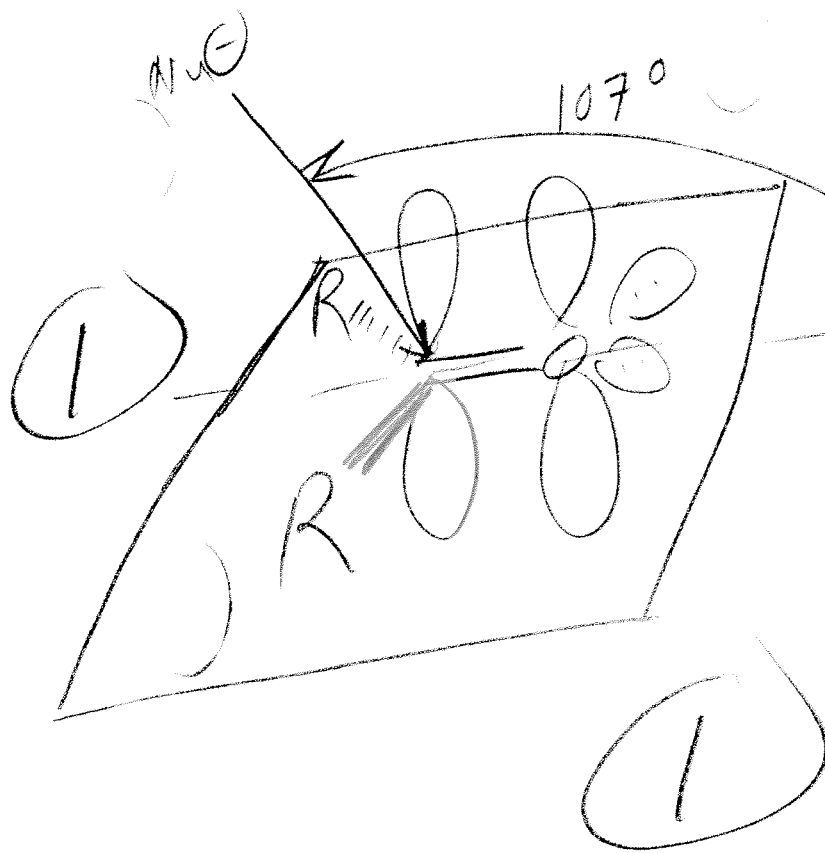
4. a) Provide a pKa value for the indicated proton(s) in the following molecules. (8 marks)



1 pt each



b) Using a general example explain what is the "Burgi-Dunitz Angle". Why does it arise and why is it significant? (2 marks)

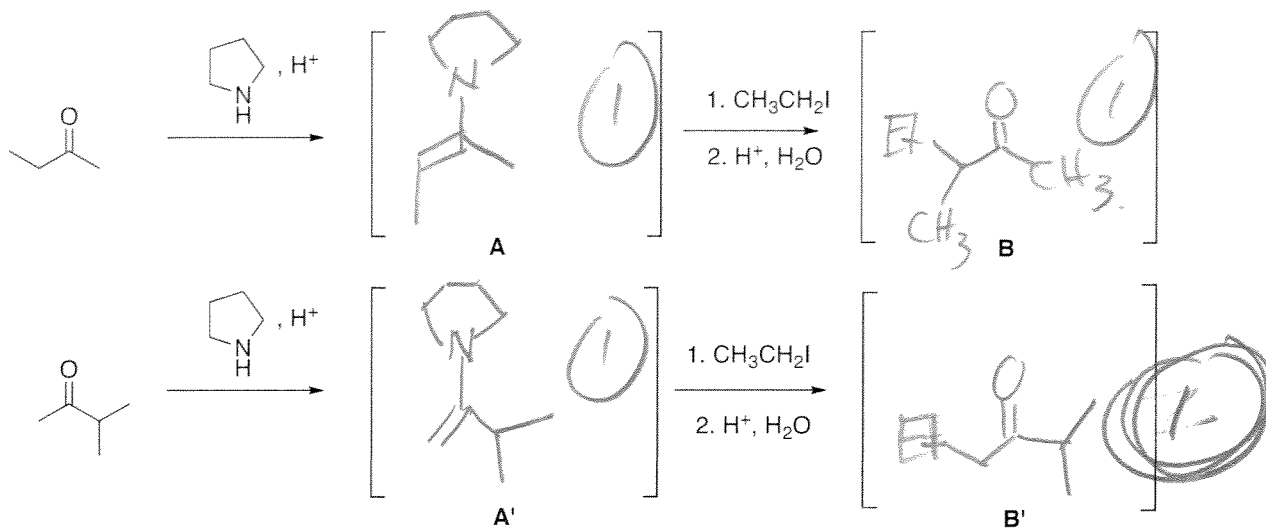


1. Repulsion of
-ve charge on Nu
Nucleophile with
lone pairs of oxygen
+ HOMO of carbonyl.

2. Trajectory of Nuc "pushed"
closer to chiral centre.

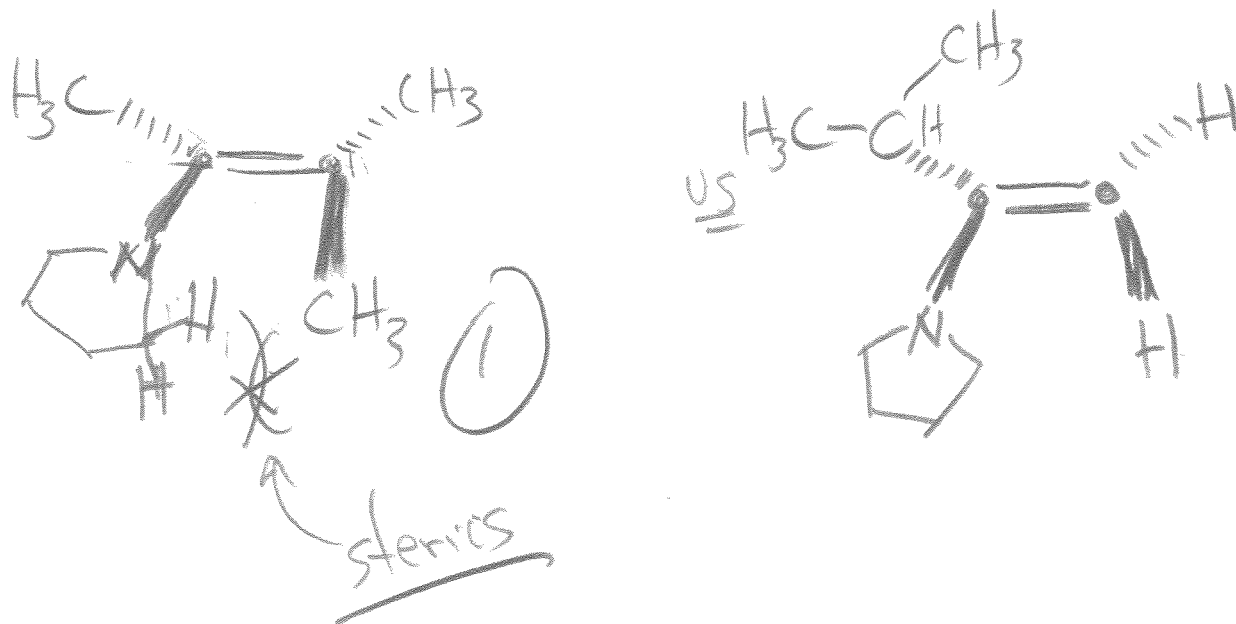
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5. Consider the following reactions. What are the structures of A, A' and B, B'?



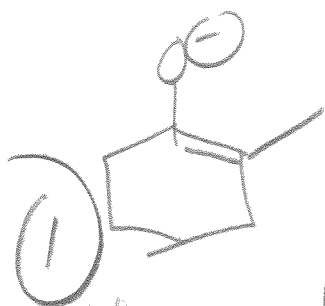
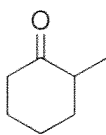
Explain using an appropriate illustration why A is formed in the first reaction but A' is formed in the second reaction? (5 marks)

- because of steric interactions with more substituted enamine are too great



Name:
Student #:

6. Consider the following unsymmetrical ketone. Draw the structures of the thermodynamic and kinetic enolates that are derived from this ketone. What are the reaction conditions and factors that ensure the selective formation of each? (10 marks)



Thermodynamic Enolate

Reversible
Conditions

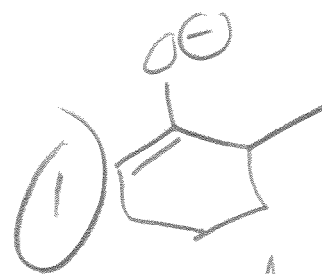
①

Favored by:

- ① Protic solvent
- ② Weak base (pKa of conjugate acid close to that of α -H's)
- ③ Excess of Ketone
- ④ \uparrow ed Rxn temp.

③

- order of addition



Kinetic Enolate

Irreversible
Conditions

①

Favored by:

- ① Hindered Base (LDA etc)
- ② Strong Base (pKa of conjugate acid \approx 30-35)
- ③ Excess of Base
- ④ Aprotic Solvent

③

⑤ Low Temp