CHEMISTRY 12A FALL 2018

EXAM 2

OCTOBER 18, 2018

NAME- WRITE BIG ______________________________________

STUDENT ID: ___________________

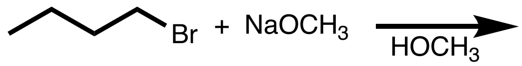
SECTION AND/OR GSI IF YOU ARE IN THE LABORATORY COURSE: _________________________

- **You will have 75 minutes in which to work.**
- **BE NEAT! Non-legible structure drawings will not be graded.**
- **Only answers in the answer boxes will be graded – you can write in other places, but we only grade the answers in the boxes.**
- **All pages of the exam must be turned in.**
- **No calculators**
- **No stencils**
- **Molecular models may be used**

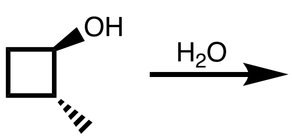
Problem	Points (Maximum)
1	20
2	20
3	12
4	16
5	22
6	22
7	8
Total	*120*

1. (20 points) For each reaction draw the major organic products, **including all stereoisomers**. Write NR if you think there will be no reaction.

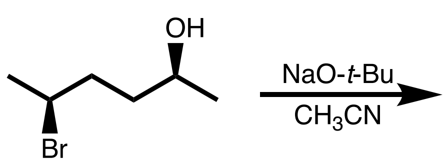
a.



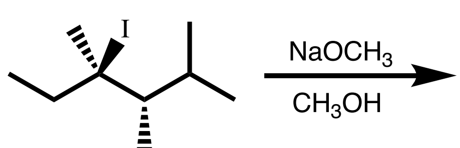
b.



c.

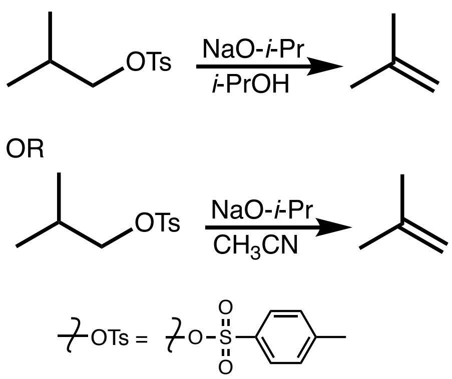


d.



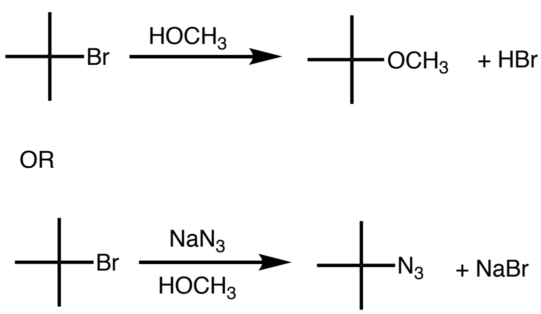
2. (20 points) **Circle** the reaction in the following pairs of reactions that you would expect to go faster. It is possible that both reactions have the same rate. It is possible that one of the reactions shown in each pair does not occur at a measurable rate. You may disregard any other products besides the ones pictured that may form under the reaction conditions. Give explanations in the boxes provided.

a.



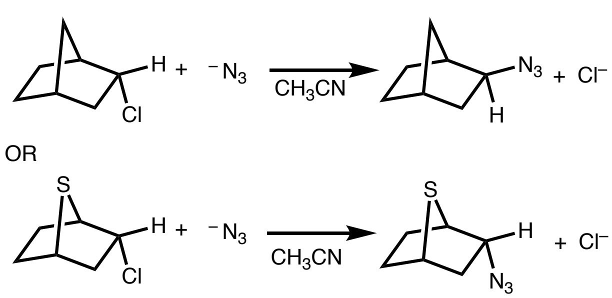
Type of Reaction: ______
Explanation for your choice of faster reaction:

b.



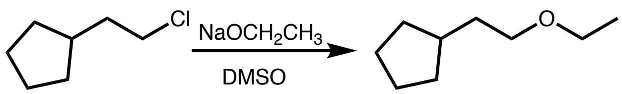
Type of Reaction: ______
Explanation for your choice of faster reaction:

c.

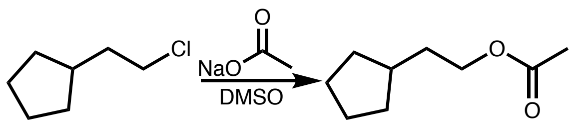


Type of Reaction: ______
Explanation for your choice of faster reaction:

d.



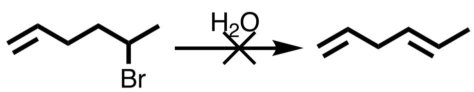
OR



Type of Reaction: ______
Explanation for your choice of faster reaction:

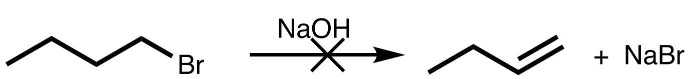
3. (12 points) The following reactions would not occur as written. i. What product or products would actually be made? ii. Why was the desired product not formed? iii. How could you change either the substrate **OR** reaction conditions to give the desired product?

a.



What product is actually made? (Draw structure or NR for no reaction)	Why was desired product not formed? (Explain in 1 sentence and include **drawings** of any relevant structures)	How could substrate **or** reaction be changed to give desired product? Draw your revised reaction.

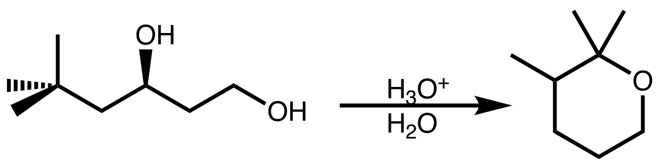
b.



What product is actually made? (Draw structure or NR for no reaction)	Why was desired product not formed? (Explain in 1 sentence and include **drawings** of any relevant structures)	How could substrate **or** reaction be changed to give desired product? Draw your revised reaction.

4. (16 points) Draw the mechanism of the following reaction using arrows to indicate the flow of electrons.

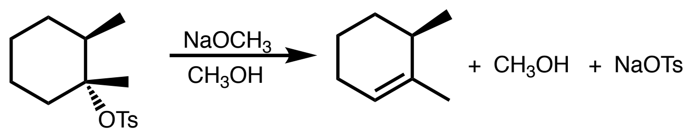
a.



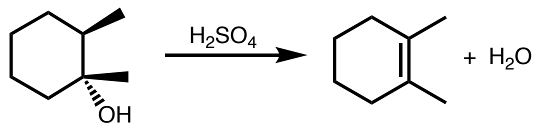
b. Draw all the stereoisomers of the products that would be formed in the reaction in part a.

5. (22 points) Consider the two reactions shown below.

Reaction A



Reaction B



a. Draw the mechanism of Reaction A using arrows to show the flow of electrons.

b. Draw the mechanism of reaction B using arrows to show the flow of electrons.

c. Why do the reactions produce different products?

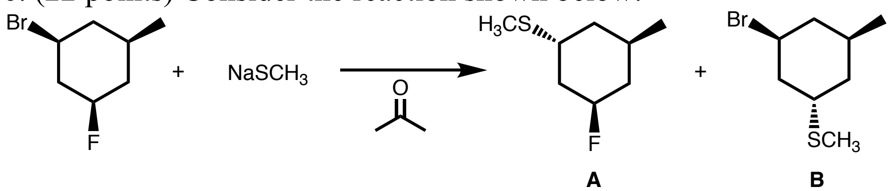
i. Explain why Reaction A produces the product shown. Include a sketch and a discussion of the orbitals involved in the step that forms the alkene.

Sketch and label orbitals:

ii. Explain why Reaction B produces the product shown. Include a sketch and a discussion of the orbitals involved in the step that forms the alkene.

Sketch and label orbitals:

6. (22 points) Consider the reaction shown below:



a. Draw the mechanism for the formation of each product.

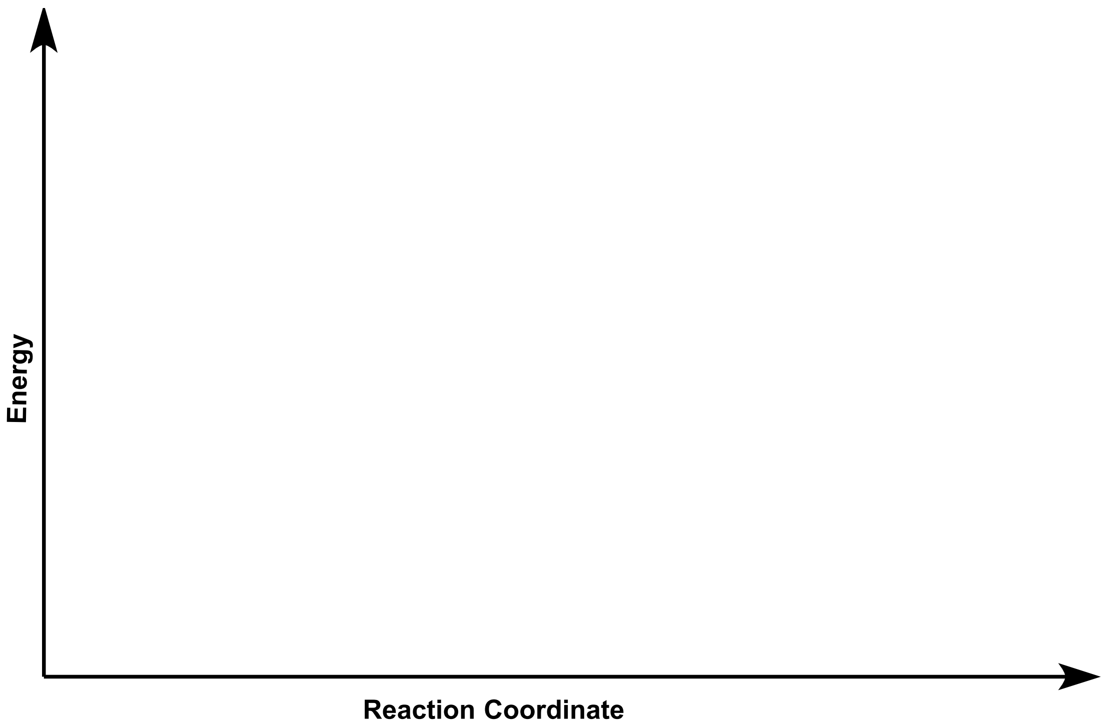
b. Which is the major product of this reaction? Explain your answer briefly. In your answer, identify the type of reaction this is.

c. Draw the transition state for the formation of each product. Are the stabilities of the transition states different for the two reactions?

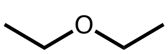
Sketch of TS to form Product A:	Sketch of TS to form Product B:

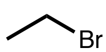
Are the stabilities of the two TS's different? Explain your answer.

d. Draw a reaction coordinate energy diagram showing formation of both products. Draw structures of the starting materials and products on your diagram. Label the $\Delta G^{\ddagger}$, and $\Delta G°$, and the transition state for the formation of each product.



7. (8 points) Synthesize the ether shown below using ethyl bromide as the only source of carbon in the product. This will require several steps.



using


as the only source of carbon in the product