

Please print:

Last name: _____

First name: _____

Chem 2062 Exam 1, Individual Portion

Spring 2006

Andy Aspaas, Instructor

Monday, February 6, 2006

Instructions:

You have 55 minutes to complete this portion of the exam.

3 questions are included in this portion of the exam, worth a total of 80 points.

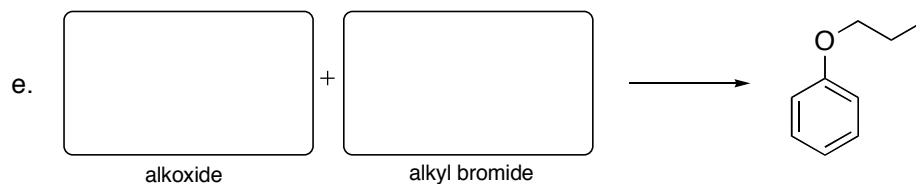
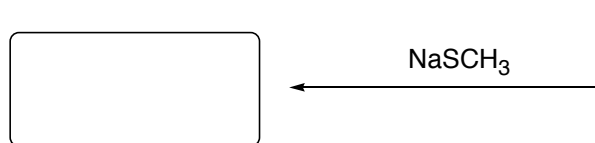
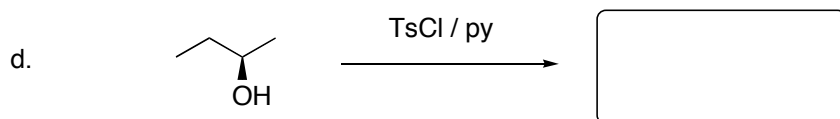
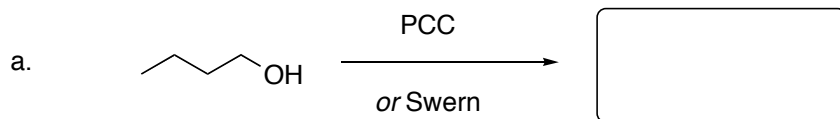
The 4th question (worth 20 points) will be worked on in groups tomorrow. It will involve the stereochemistry and regiochemistry of the Diels-Alder reaction, so prepare appropriately.

No model kits or calculators may be used.

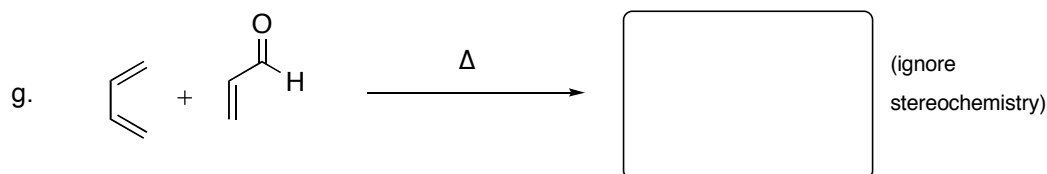
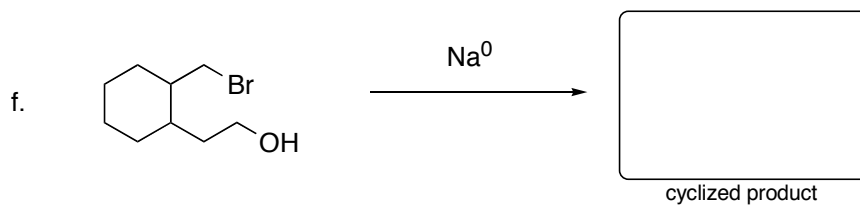
I, _____ have read and understand the directions given above, and pledge that I will follow all regulations with regard to Academic Dishonesty as outlined by this college when taking this exam.

Signature _____ Date and Time _____

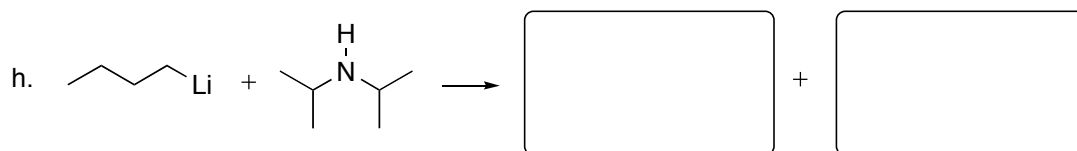
1. (40 pts) Complete the following reactions by drawing the missing organic reactants or products. Show relevant stereochemistry where appropriate.



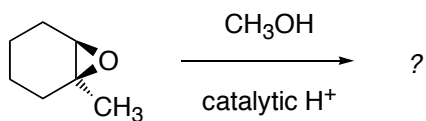
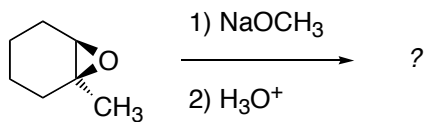
What is the name of the above reaction? _____



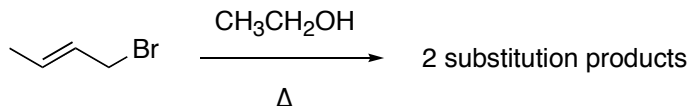
What is the name of the above reaction? _____



2. (20 pts) In both of the reactions below, the epoxide will be opened and a methoxy ($-\text{OCH}_3$) group will be incorporated into the molecule, but the regiochemistry (position of attack) and/or stereochemistry will be different. Draw the mechanisms for the two reactions, and draw the products with correct stereochemistry.



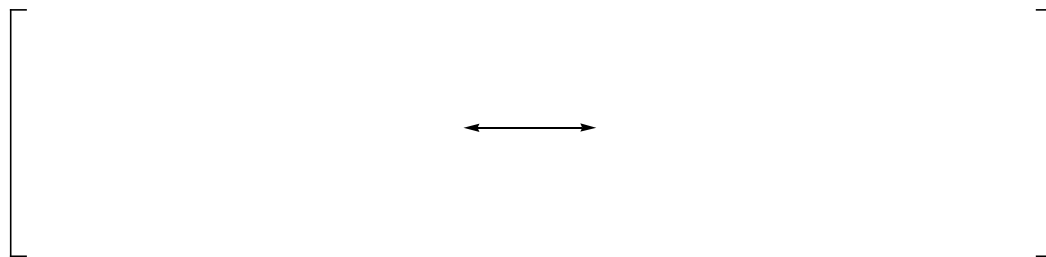
3. (20 pts) When 2-bromo-2-butene is reacted with boiling ethanol, two substitution products are formed.



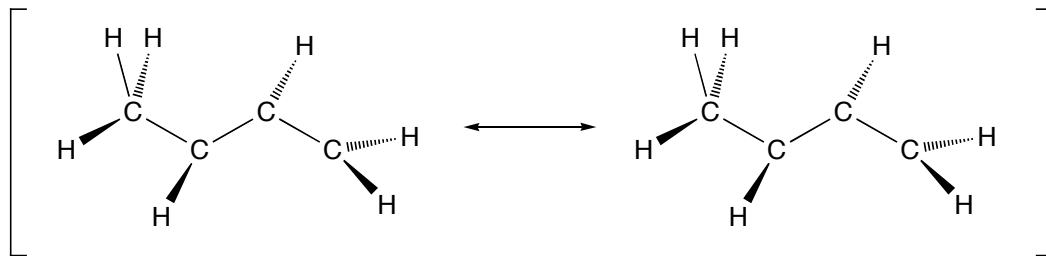
This reaction goes by way of a resonance-stabilized reactive intermediate.

Is that intermediate an anion, cation, or radical? _____

Draw simple line drawings of the two resonance structures of the intermediate.



On the templates below, add p orbitals, π bonding, and charges to make 3D representations of your two resonance structures above.



This problem is continued on the next page...

Draw all of the molecular orbitals for this intermediate. Indicate the electron occupancy of each orbital using a box with arrows like this: $\boxed{\uparrow\downarrow}$

Energy 

In your diagram above, draw a box around the orbital that best demonstrates the reactivity of your resonance structures on the previous page.

Finally, draw the two substitution products of this reaction.

