



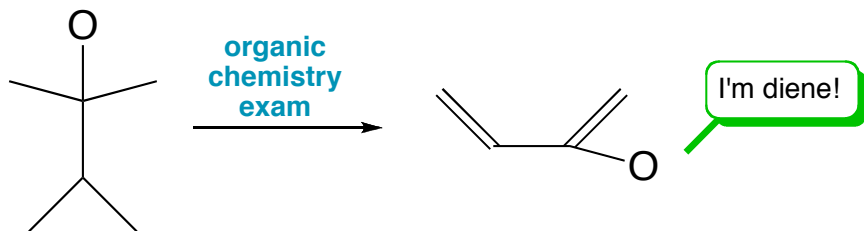
Chem 341 • Organic Chemistry I

Midterm Exam 2 • October 19, 2007

KEY

What happens to an organic chemistry student during an exam . . .

Organic Student



Please read through each question carefully and answer in the spaces provided.

A good strategy is to go through the test and answer all the questions you can do easily. Then go back and tackle the more difficult problems.

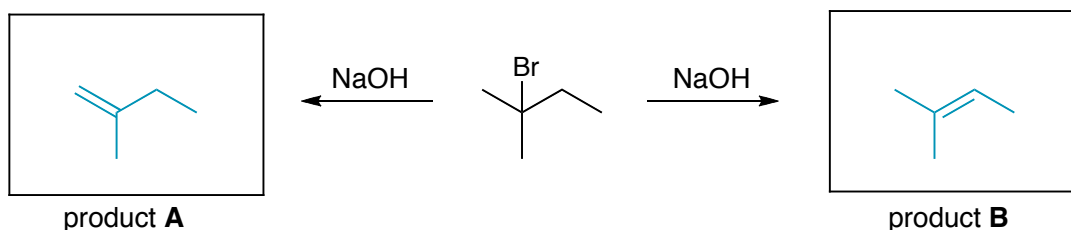
Please make sure your structures are drawn clearly and indicate any necessary stereochemistry with bold or dashed bonds.

Finally, think about what you know. Common sense and reason can often help you out.

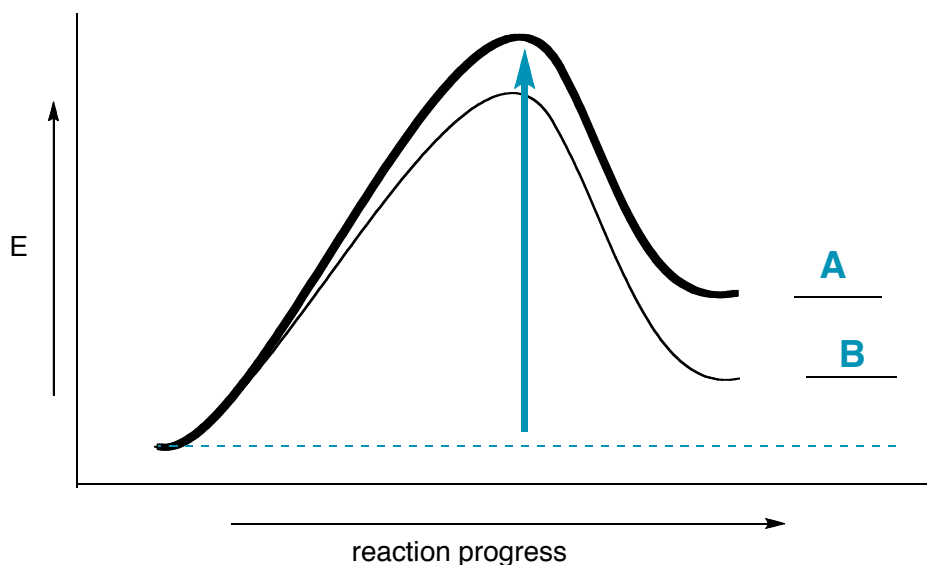
You may use the back of the pages for scratch paper.

Problem 1	18 pts	_____	Problem 6	30 pts	_____
Problem 2	10 pts	_____	Problem 7	6 pts	_____
Problem 3	8 pts	_____	Bonus	5 pts	_____
Problem 4	18 pts	_____			
Problem 5	10 pts	_____	TOTAL	100 pts	_____

1. The bromo compound shown below can undergo an elimination reaction with base to form an alkene. There are two possible products. Draw the structure of these products in the box. Note, it doesn't matter which product you put in box **A** or box **B**, but it should match what you answer for the rest of the problem below. (6 pts)



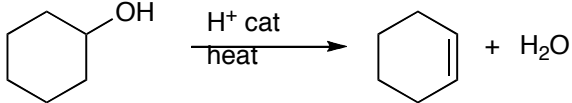
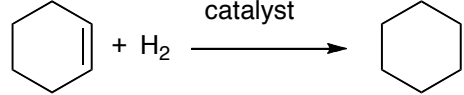
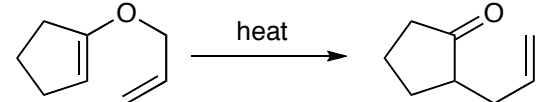
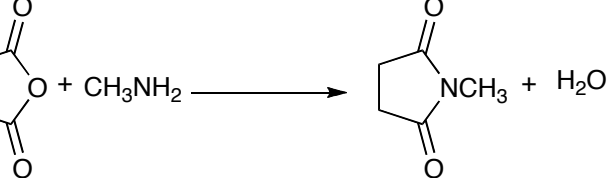
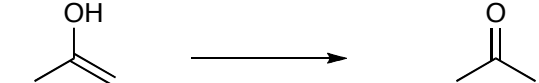
The following reaction energy diagram describes the reaction above and the two possible pathways that it can undergo. Please label *on the diagram* with an **A** and **B** the products that match your answers from above. Also, please indicate *with an arrow* the activation energy for the slowest reaction. (6 pts).



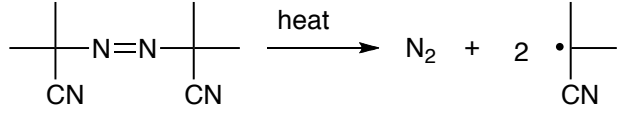
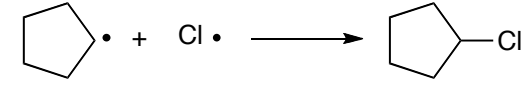
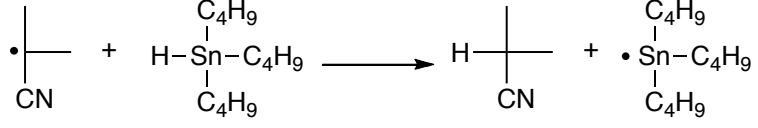
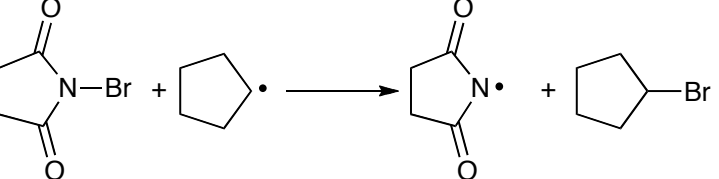
Please answer the following questions about the reaction and the reaction energy diagram above. (6 pts)

- a) Is the ΔG° for the reaction positive or negative? POSITIVE
- b) Is the most stable product the fastest to form? YES
- c) Is this a one step or two step reaction? ONE STEP

2. For each reaction listed below, identify what overall class of reaction has taken place. (10 pts)

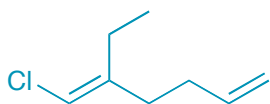
		addition	elimination	substitution	rearrangement
a)		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b)		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c)		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d)		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
e)		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

3. Identify each of the following free radical processes as either an initiation, propagation, or termination event. (8 pts)

		initiation	propagation	termination
a)		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b)		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c)		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
d)		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

4. Draw the correct structure for the following compounds. (18 pts)

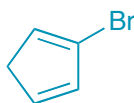
a) *E*-1-chloro-2-ethyl-1,5-hexadiene



d) *cis*-hepta-2-en-4-yne



b) 2-bromo-1,3-cyclopentadiene



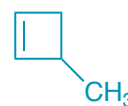
e) 1,5-cyclooctadiene



c) 1,2-pentadiene



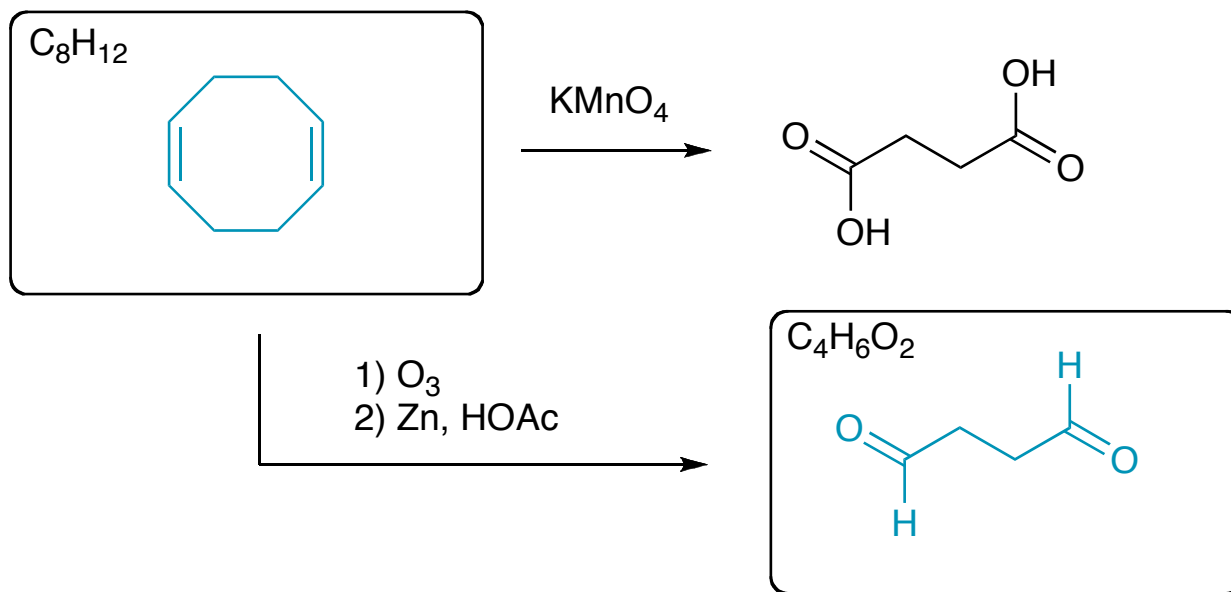
f) 3-methylcyclobutene



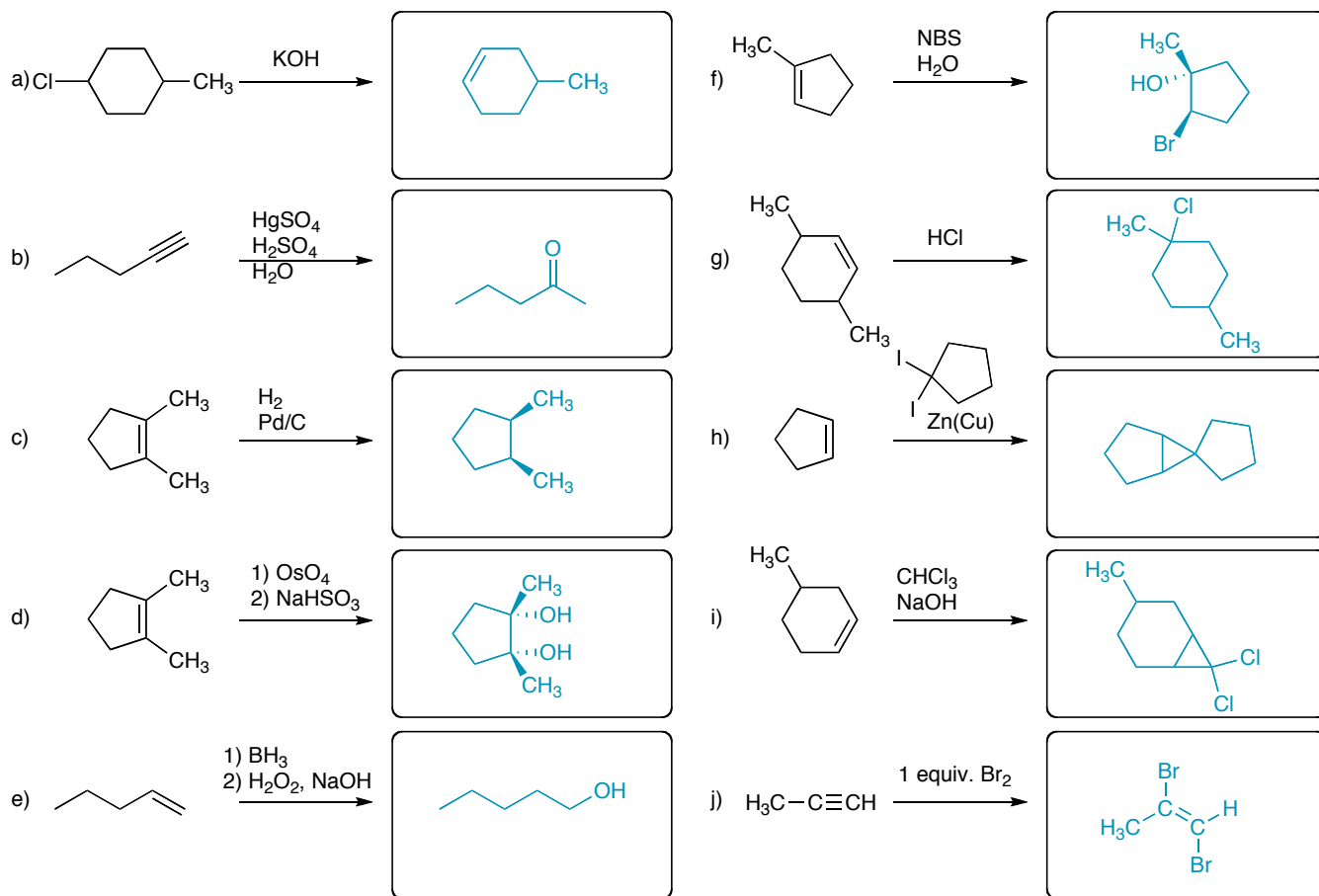
5. An unknown molecule with the formula C_8H_{12} was treated with potassium permanganate resulting in the formation of a single 4-carbon diacid product. Reaction with ozone, followed by Zn/HOAc also resulted in the formation of a single 4-carbon compound. (10 pts)

How many degrees of unsaturation does the starting material possess? 3

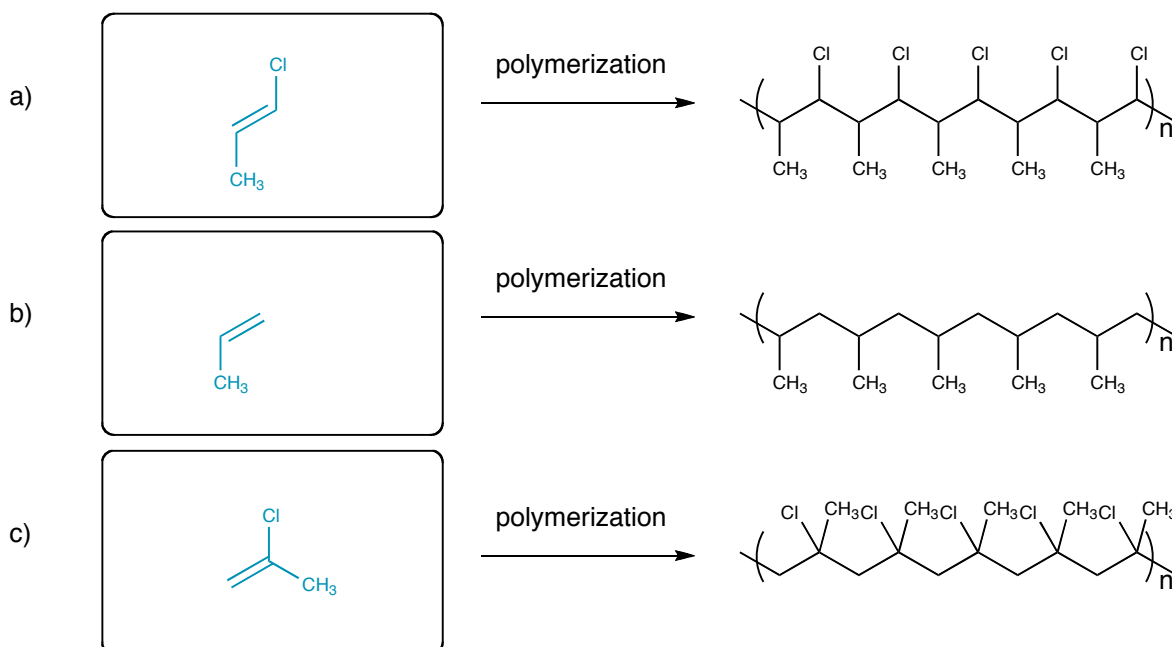
Draw the structures of the starting material and the product of ozonolysis.



6. Draw the **Major Organic Product** for each of the following reactions. Please show any stereochemistry *clearly* with bold/dashed bonds. (30 pts)



7. Draw the alkene starting material that was used to produce the following polymers. (6 pts)



BONUS (5 pts)

The 2007 Nobel Prize in Chemistry was awarded to Gerhardt Ertl for his contributions to understanding surface science and catalysis.

Two other science prizes were awarded. Name at least one winner of a 2007 Nobel Prize in Medicine or Physics.

MEDICINE: “for their discoveries of principles for introducing specific gene modifications in mice by the use of embryonic stem cells”

Mario Capecchi, University of Utah

Sir Martin Evans, Cardiff University

Oliver Smithies, University of North Carolina, Chapel Hill

Physics: “for the discovery of Giant Magnetoresistance”

Albert Fert, Univeristé Paris-Sud

Peter Grünberg, Forschungszentrum Jülich