



## CHE 322 Second Exam

March 18, 2009

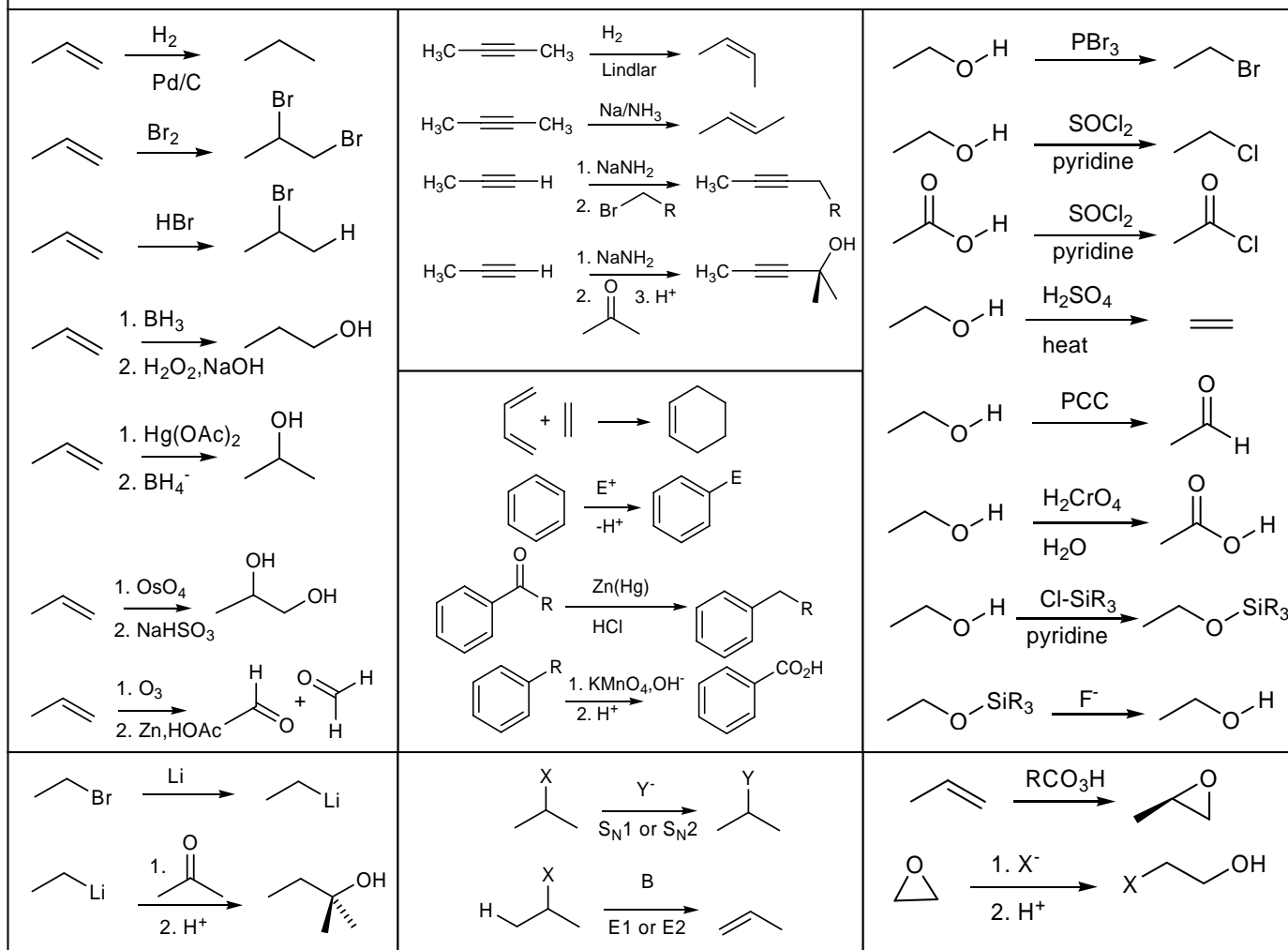
The first 14 questions are 3 or 5 point multiple choice questions. Questions 15-19 are short answer questions worth either 5 or 10 points as indicated

Form 0

	I	II	Transition elements										III	IV	V	VI	VII	VIII
1	1 H																	2 He
2	3 Li	4 Be											5 B	6 C	7 N	8 O	9 F	10 Ne
3	11 Na	12 Mg											13 Al	14 Si	15 P	16 S	17 Cl	18 Ar
4	19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr
5	37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe
6	55 Cs																85 At	86 Rn

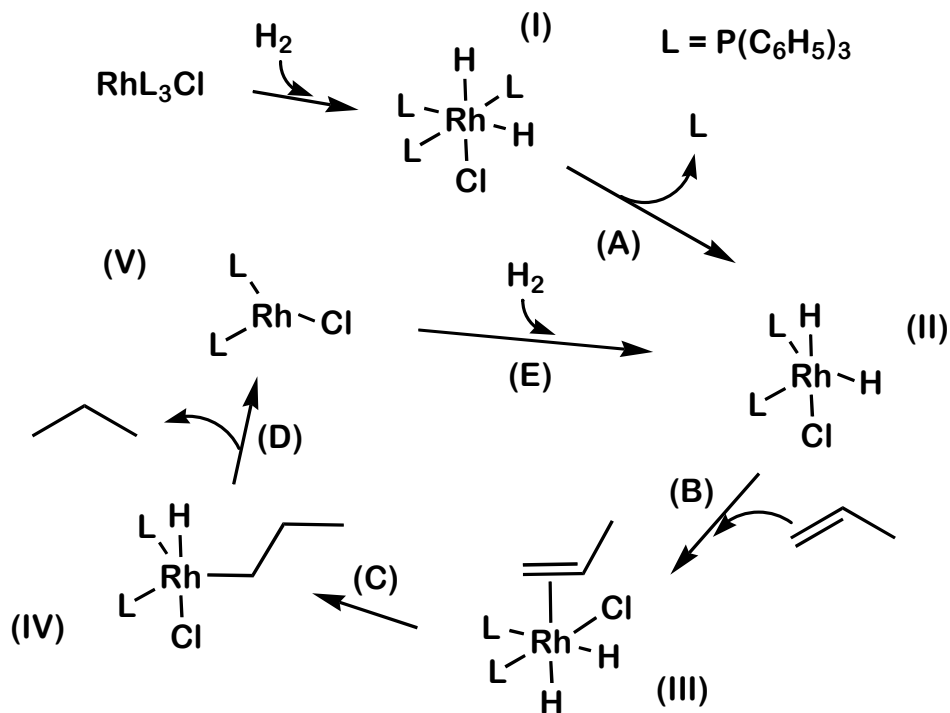
Metals  
 Metalloids  
 Nonmetals

### Selected Reactions of CHE 321-322



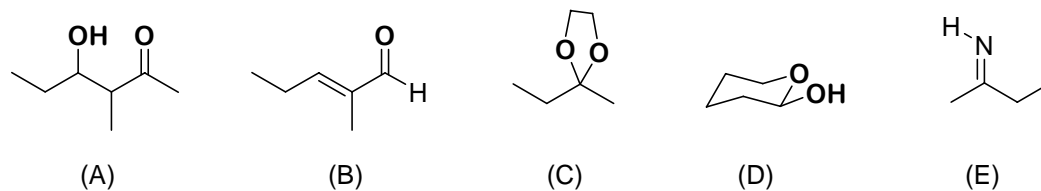
Question 1-5 are worth 3 points each. Questions 6-14 are worth 5 points each.

The following scheme illustrates a catalytic cycle for the hydrogenation of propene using a rhodium catalyst,  $\text{Rh}[\text{P}(\text{C}_6\text{H}_5)_3]_3\text{Cl}$ . The next three questions refer to this scheme.



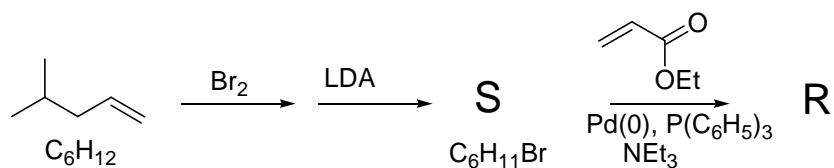
- Which of the labeled steps in the above catalytic cycle is an *oxidative addition* reaction?
  - Which of the labeled steps in the above catalytic cycle is a *reductive elimination* reaction?
  - Which of the rhodium complexes is a 14 electron complex?
- A. (I)      B. (II)      C. (III)      D. (IV)      E. (V)

Consider the following molecules.

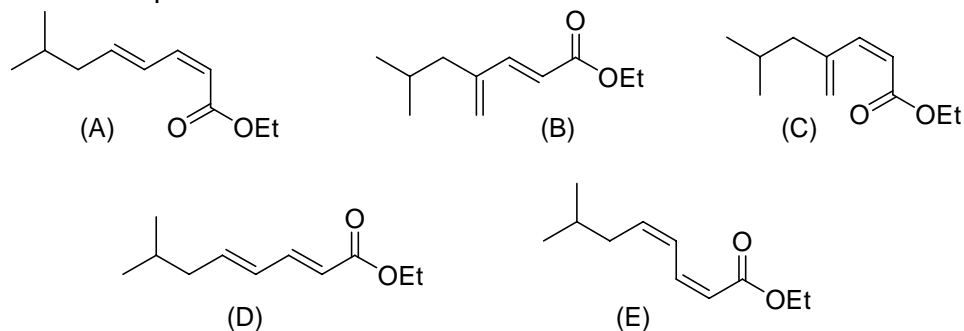


- Which of the above molecules is a *enal*?
- Which of the above molecules is a *hemiacetal*?

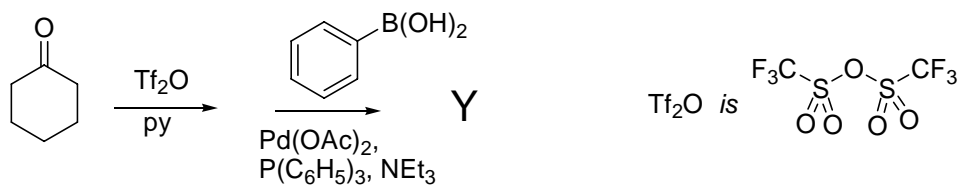
6. Consider the following reaction scheme.



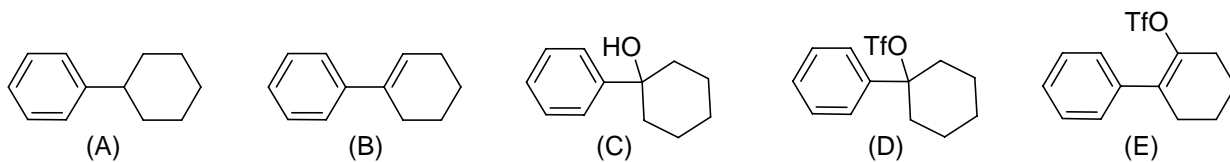
Predict the product R.



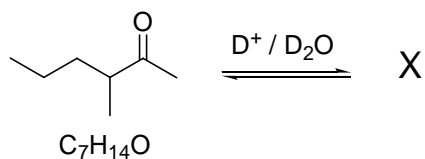
7. Consider the following reaction scheme.



Predict the product Y.

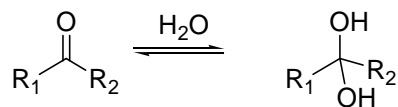


8. The following compound was exposed to acid catalyzed deuterium exchange conditions. Predict the formula of the resulting compound.

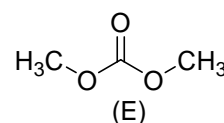
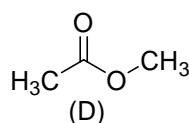
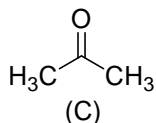
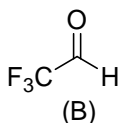
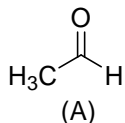


- (A)  $\text{C}_7\text{H}_{13}\text{D}_1\text{O}$     (B)  $\text{C}_7\text{H}_{11}\text{D}_3\text{O}$     (C)  $\text{C}_7\text{H}_{10}\text{D}_4\text{O}$     (D)  $\text{C}_7\text{H}_7\text{D}_6\text{O}$     (E)  $\text{C}_7\text{H}_7\text{D}_7\text{O}$

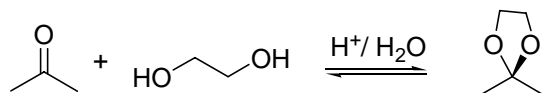
9. Carbonyl compounds can react with water to form a diol.



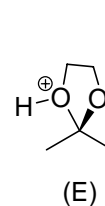
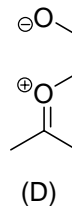
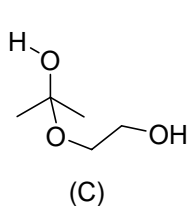
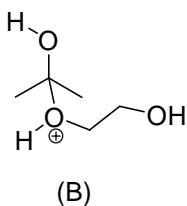
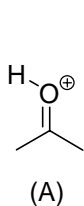
Which of the following compounds would be anticipated to have the largest equilibrium constant,  $K_{eq}$ , for this hydration reaction?



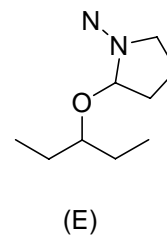
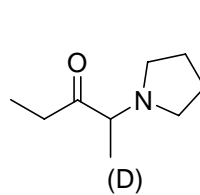
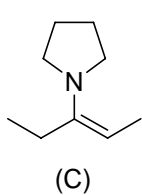
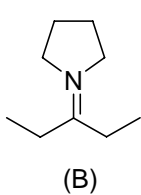
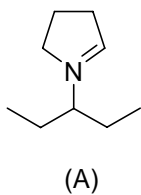
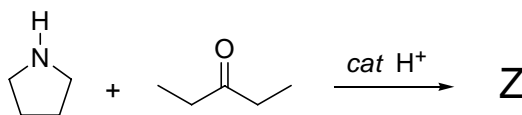
10. A student was asked to write a mechanism for the following reaction.



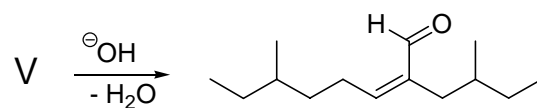
Which of the following intermediates would be the least likely to be found in a correct mechanism?



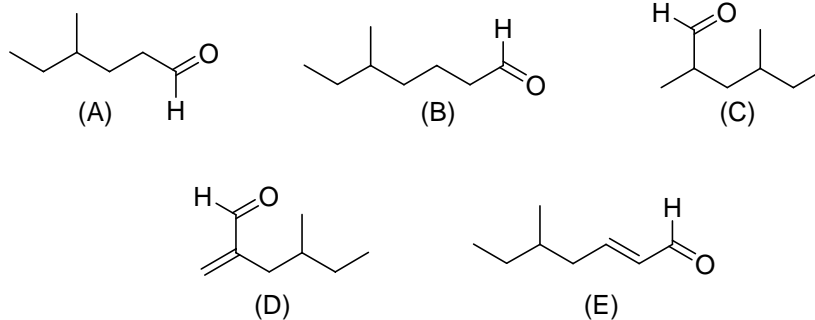
11. Predict the product, **Z**, of the following reaction.



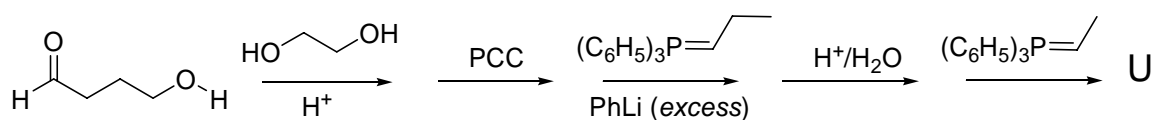
12. Aldehyde **V** was treated with base to give the product shown.



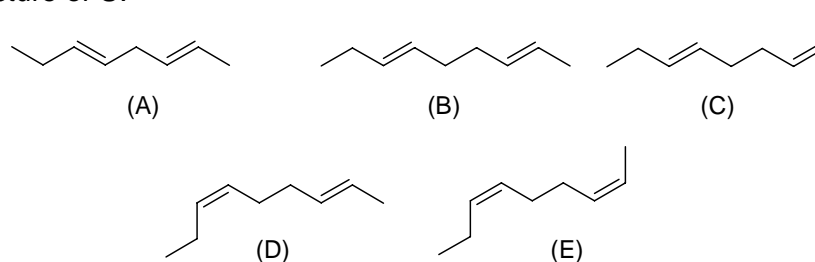
Which of the following aldehydes is compound **V**?



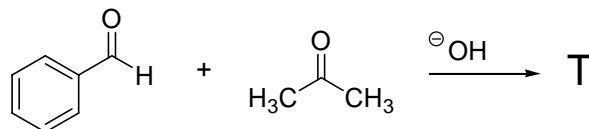
13. The following reaction sequence yields compound **U**.



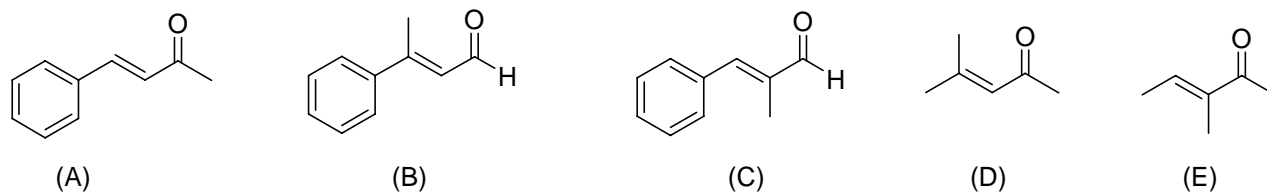
Predict the structure of **U**.



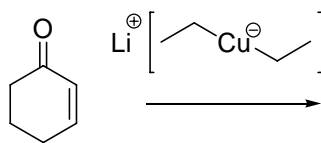
14. The following reaction yields compound **T** predominately.



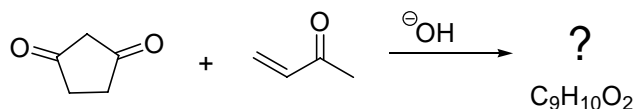
Predict the main product **T**.



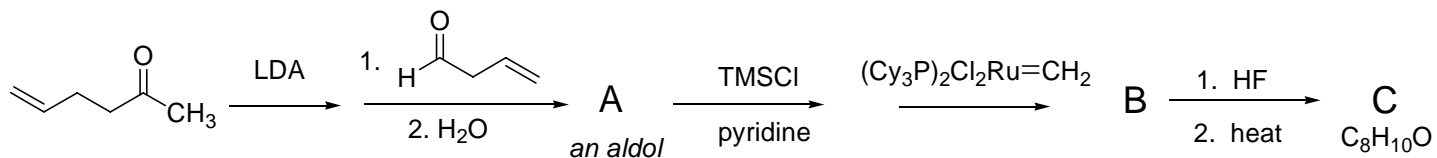
15. Predict the product of the following reaction. (5 pts)



16. Predict the product of the following reaction. (5 pts)

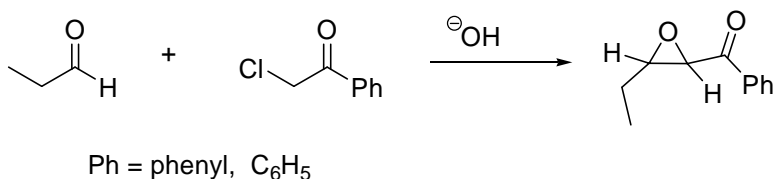


17. Predict the products, **A**, **B**, and **C** of the following synthetic roadmap. (10 pts)



18. The following reaction is one that you have not seen before. It is an epoxide synthesis known as the Darzens condensation. Write a curved arrow mechanism for the reaction. In a good mechanism all important intermediates should be drawn separately. (10 pts)

Hint: Remove the most acidic hydrogen first.



19. Propose a synthesis of the following compound. All starting materials must be of four carbons or less. (10 pts)

