

CHEM 3311

HARRINGTON

Exam 2 7:00 – 8:30 PM March 14, 2017 in HUMN1B50

Instructions. No notes, books, laptops, phones, calculators, models or drawing stencils.

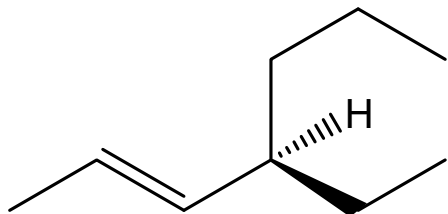
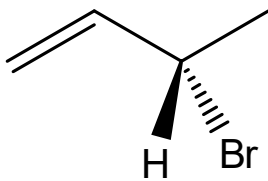
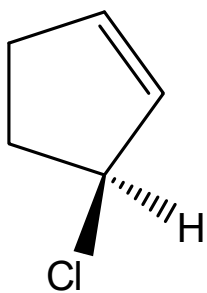
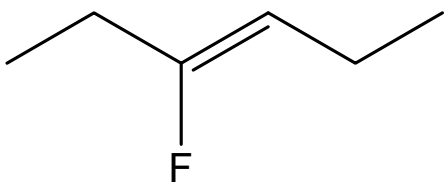
Periodic Table and electronegativity chart and Table of Bond Dissociation Energies are provided.

NAME:

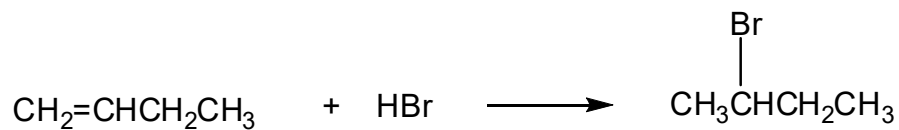
Recitation TA Name:

	Points Possible	Score
1	18	
2	11	
3	14	
4	15	
5	14	
6	16	
7	12	
Exam 2 Total Raw Score	100	
Curve		
Exam 2 Curved Score		
Exam 2 Letter Grade		

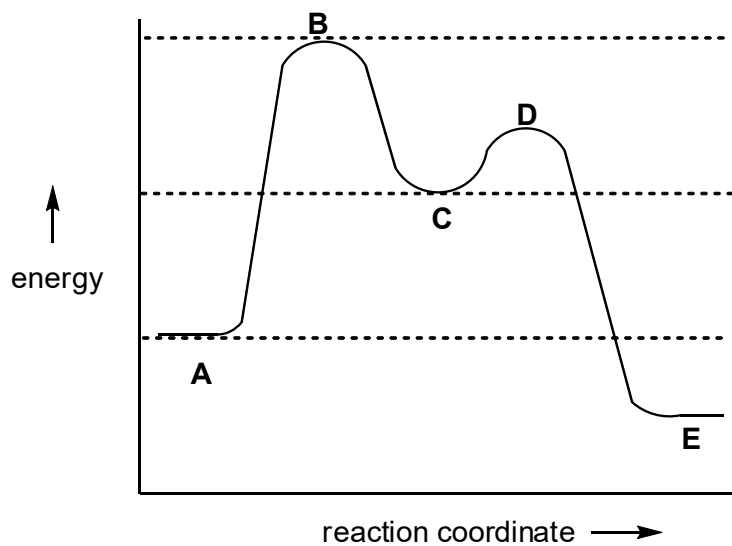
1 (18 points) Name each compound using the IUPAC system.



2. (11 points) For the reaction:



The reaction coordinate-energy diagram is shown below.



How many steps are there in the mechanism?

Which step is the slow step in the mechanism?

Which location(s) on the diagram correspond to transition states?

Which location(s) on the diagram correspond to intermediates?

Draw structures which correspond to locations **B**, **C**, and **D** on the diagram.

B

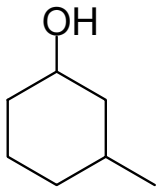
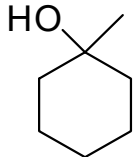
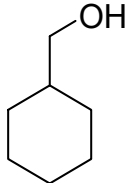
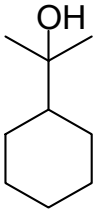
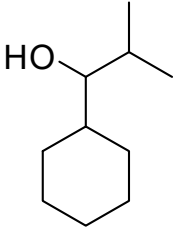
C

D

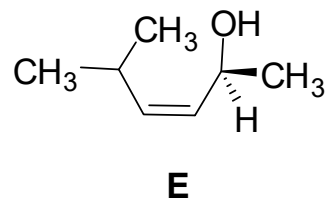
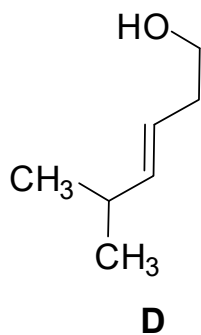
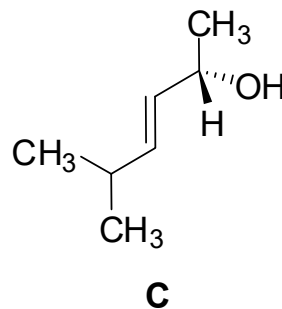
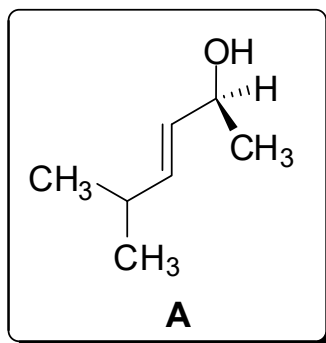
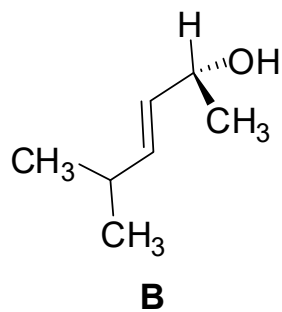
3. (14 points) The objective in the preparation of an organic molecule is to convert a starting material to a single product or to a product contaminated with only trace amounts of side products. Consider the five alcohol products in the Table below.

For each alcohol product which could be efficiently prepared by hydroboration-oxidation [1)BH₃-THF, 2) H₂O₂, NaOH in THF-H₂O] of an alkene, draw the alkene starting material in the box provided. Write **NO** in the box if the alcohol could not be efficiently prepared by this method.

For each alcohol product which could be efficiently prepared by acid-catalyzed hydration [H₂O, H₂SO₄ catalyst] of an alkene, draw the alkene starting material in the box provided. Write **NO** in the box if the alcohol could not be efficiently prepared by this method.

Alcohol Product	Hydroboration-Oxidation Alkene Starting Material	Acid-Catalyzed Hydration Alkene Starting Material
		
		
		
		
		

4. (15 points) How are compounds **B**, **C**, **D**, and **E** related to compound **A**?
 (Hint: There are four possible answers: they are identical, constitutional isomers, diastereomers, or enantiomers.)



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	Relationship
A and B	
A and C	
A and D	
A and E	

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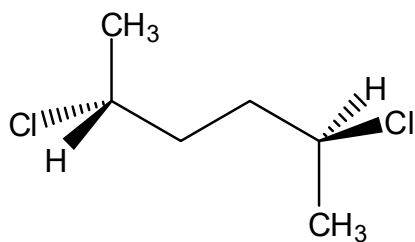
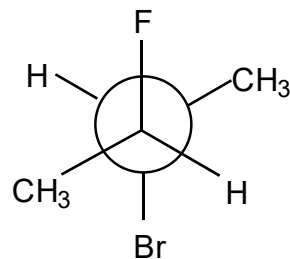
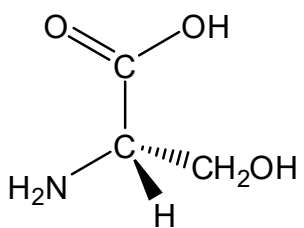
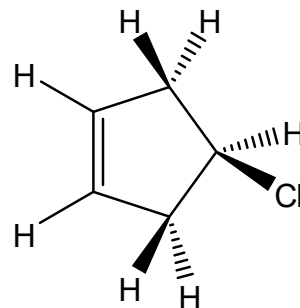
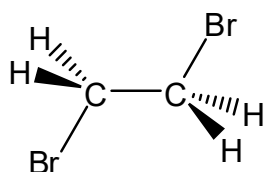
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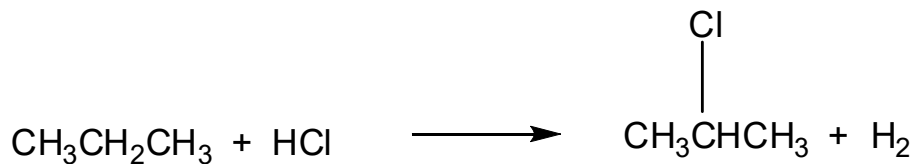
5. (14 points) For each structure:

- Label each asymmetric carbon with an asterisk (*).
- Identify all planes of symmetry and centers of symmetry in the conformation shown. Label them as a plane or center. Draw them and/or describe them in ten words or less.
- Label the structure as chiral or achiral.
- Label any meso compounds.



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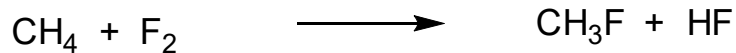
7. (12 points) Estimate the ΔH° (kJ/mol) for each of the following gas-phase reactions using bond dissociation energies from the **Table** provided. Show your calculations. Is each reaction exothermic or endothermic?



$\Delta H^\circ =$

This reaction is

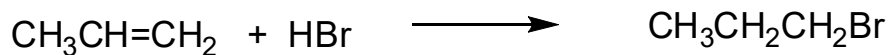
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$\Delta H^\circ =$

This reaction is

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$\Delta H^\circ =$

This reaction is

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