Chemistry 140B  
Whitesell  
Winter Quarter, 2015  
First Midterm Exam, Monday February 2, 2015

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<th>Quest</th>
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Your answers to this exam are to be *only* your own work. You may use no written or electronic information during this test period other than the five pages of this exam. You may not use the back of any pages for answers. Up to one week (exactly 168 hours) after your exam is returned you may submit it for regrading if and only if you have made NO marks on the exam except for a star (*) ON THIS PAGE next to the number(s) of the question(s) you would like regarded and your signature(s) and check(s) below. You must place your exam in the drop box on the sixth floor of PAC Hall.

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*your signature (read the above before signing)*

To request regrading, sign below and check the appropriate box(es).

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*your signature*

I would like the questions marked with a star (*) regraded (check box at right)

If you feel that we have made an addition error in your score, check the box at the right

If we have recorded your grade on TED in error, check the box at the right
1. The absorption in the infrared at 1720 is indicative of the presence of a:

- Alcohol
- Carbonyl group
- Nitrile
- Amine

A broad absorption in the infrared centered at 3500 is indicative of the presence of a:

- Alcohol
- Carbonyl group
- Nitrile
- Amine

The contribution of a C–C bond is:

- 99 kcal/mole
- 146 kcal/mole
- 83 kcal/mole
- 63 kcal/mole

The reduction of a simple C=C π bond is:

- is endothermic by 30 kcal/mole
- is exothermic by 63 kcal/mole
- is exothermic by 30 kcal/mole
- is endothermic by 63 kcal/mole

The difference in energy between 1-butene and trans-2-butene is:

- 2.7 kcal/mole
- 1.0 kcal/mole
- 0.9 kcal/mole
- 1.7 kcal/mole
The correct order of stability of carbocations is:

- □ 1° > 2° > 3°
- □ 2° > 3° > 1°
- □ 3° > 2° > 1°

The methyl groups of an isopropyl group [(CH₃)₂CH—] will appear in the proton NMR as a:

- □ singlet
- □ doublet
- □ triplet
- □ quartet

The methyl group of an ethyl group [CH₃CH₂—] will appear in the proton NMR as a:

- □ singlet
- □ doublet
- □ triplet
- □ quartet

At equilibrium, two compounds that differ in energy by 4.1 kcal/mole will be in a ratio of approximately:

- □ 1:1
- □ 100:1
- □ 10:1
- □ 1000:1
2. Provide a complete mechanism including curved arrows showing the flow of all electrons for all bond changes for the following reaction. Your answer must fit within the box provided.

3. Provide a complete mechanism including curved arrows showing the flow of all electrons for all bond changes for the following reaction. Your answer must fit within the box provided.

Your signature (in ink)______________________________
4. Provide the expected major organic product from for the following reactions. You need to show stereochemistry ONLY when two stereo centers are formed in the reaction. You must place your answer in the box provided. Answers outside the boxes will not receive credit.

- Reaction with HBr:

- Reaction with B₂H₆ and H₂O₂ NaOH:

- Reaction with Br₂:

- Reaction with H₂ and Pt:

- Reaction with H⁺ and H₂O:

- Reaction with HBr and radicals:
5. The proton nmr spectrum shown below was obtained on an unknown compound. Provide a structure **in the box** provided that is consistent with the spectrum.