Name _____ Slayter Box _____

Examination II October 25, 2012

Organic Chemistry II (CHEM 251-02)

Dr. Fantini

Please do not open until instructed

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Notes:

• This exam consists of **9 questions**. Please check to make sure that you have a complete copy of the exam.

• Please do not simply give me answers. Give me well-supported answers. Answers that are not backed by explanations will receive minimal credit.

• Please write clearly; if I can't read your answer, I can't give you credit for your answer.
• Please note that different questions are worth different numbers of points. Plan your time accordingly.
• Remember to include units and significant figures where appropriate.
• No books or notes are to be used on this exam.
• Please do NOT share calculators; if you need a calculator but do not have one, please let me know!

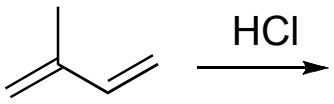
• *If you feel that you would be better able to answer **any** question if you had additional information, please do not hesitate to ask for it*. I will happily provide any information that I feel will help you answer the question without compromising the efficacy and fairness of the test.

Question	Possible	Score
1	6	
2	8	
3	16	
4	8	
5	16	
6	16	
7	10	
8	8	
9	12	
TOTAL	100	
	Approx. Letter:	

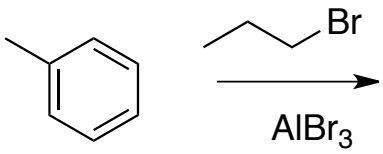
6 1. Nomenclature. Please give name for structure or structure for name.

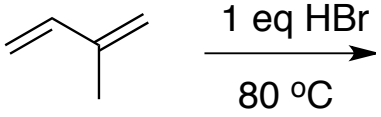
1-bromo-3-nitrobenzene	*(2Z,4E)*-2-chloro-3-methyl-2,4-hexadiene

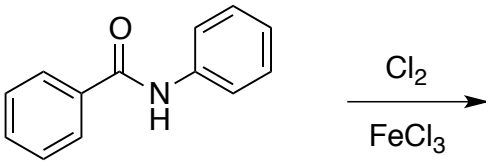
8 2. Please predict the kinetic and thermodynamic products formed when isoprene (shown below) reacts with HCl. Justify your choices.

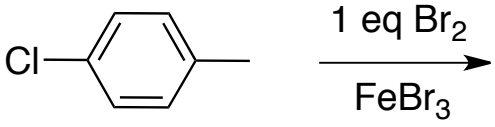


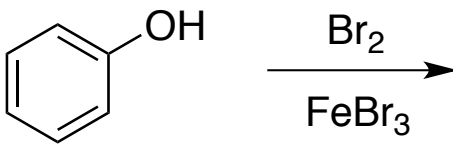
163. Fill in any of the missing starting material(s), reagent(s), and/or dominant product(s) for each single reaction. Please specifically denote all stereochemistry.



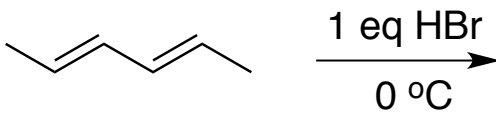


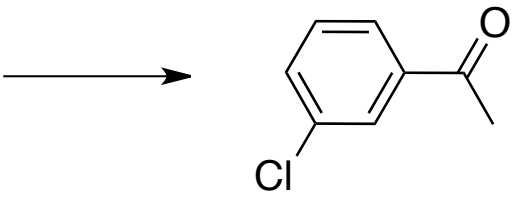


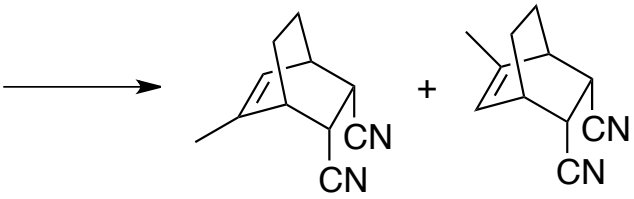




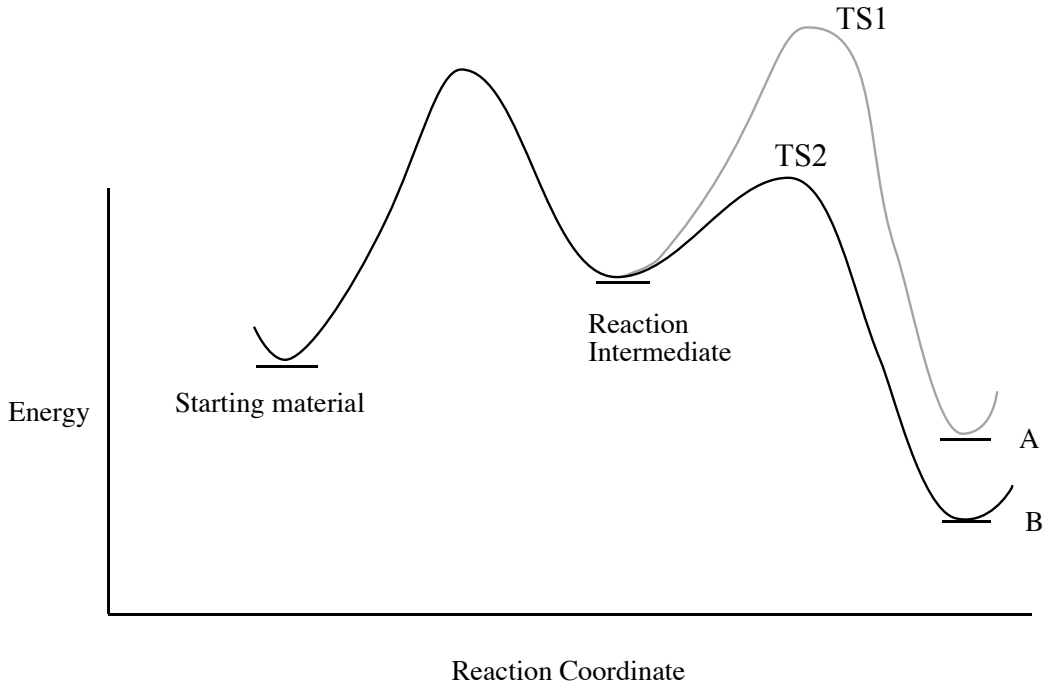
Question 3 continued.



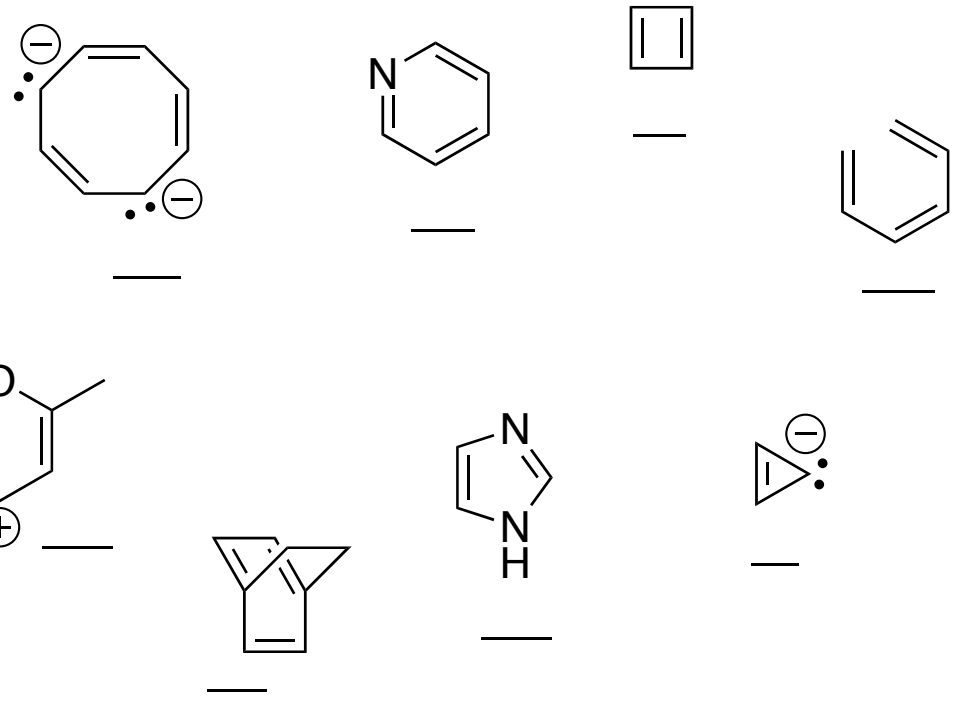




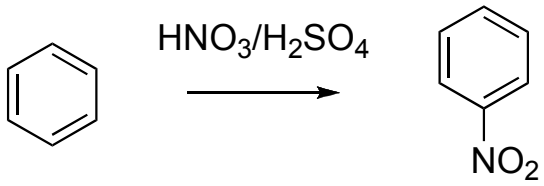
84. ***PAY ATTENTION TO ALL DIRECTIONS!!!***
Below is an Energy vs Reaction Coordinate diagram for a reaction with two possible products, **A** and **B**. Circle the product that is favored if the reaction is run at high temperature. Draw an X through the transition state that is kinetically favored. Draw an arrow pointing to the product that is favored at low temperature. Draw a smiley face next to the product that is thermodynamically favored. :)

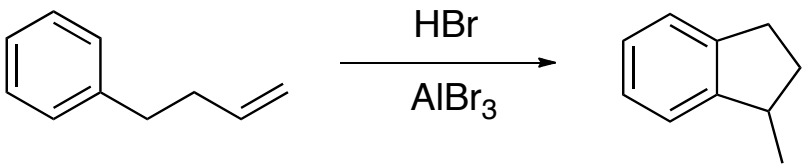


165. Under each molecule, write the # of π electrons in each molecule. Circle each molecule that is **aromatic**, put a box around each molecule that is **not aromatic**, and put an X through each molecule that is **anti-aromatic**.

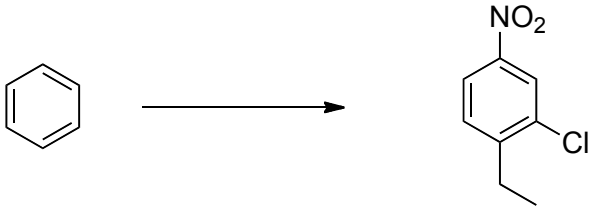


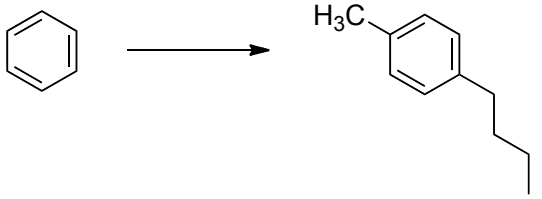
16. Please draw a stepwise electron pushing mechanism for the reactions shown below.

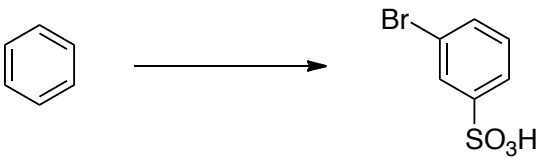




10 7. Synthesis! Please write a series of reactions that will produce the product from benzene. You may use any other reagent in your synthesis. You must draw every molecule along the way.

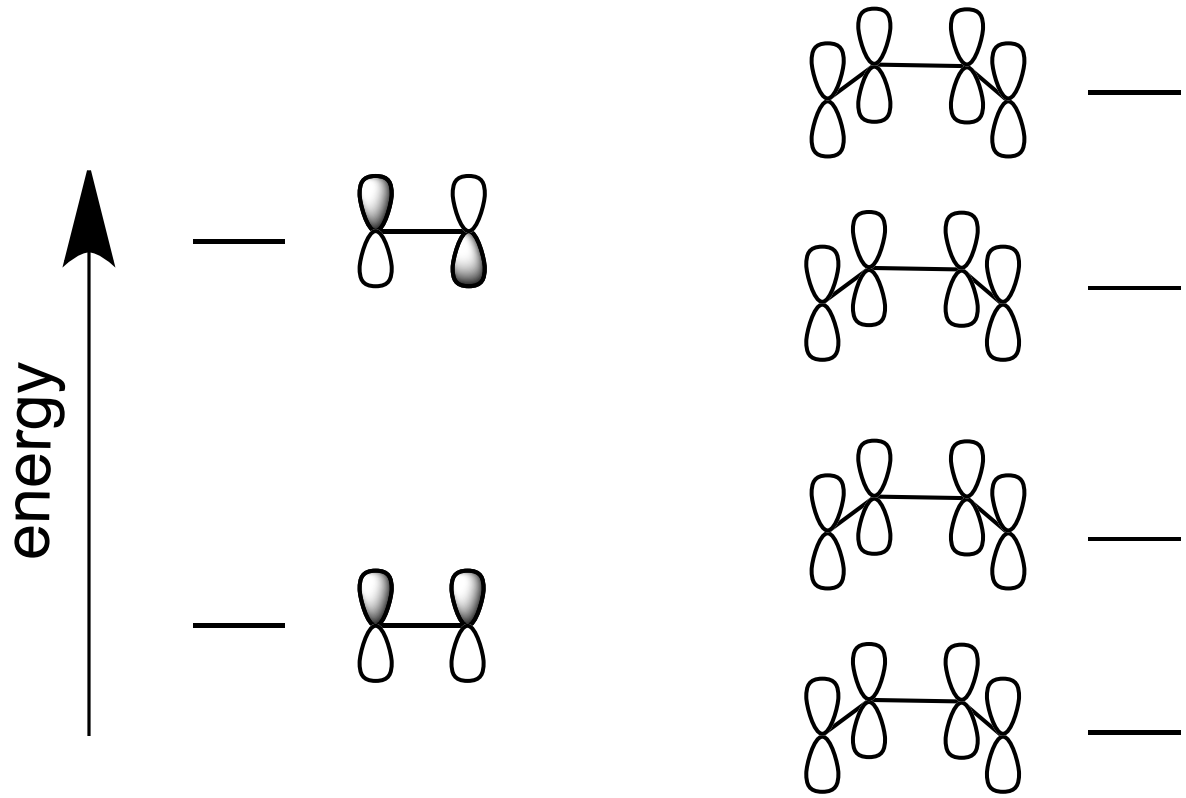






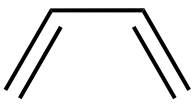
8. These are the π-molecular orbital diagrams for ethene and 1,3-butadiene. The MO diagram for ethene has been completed, but ***the diagram for 1,3-butadiene is not complete***.

(a) Shade the lobes of the 1,3-butadiene molecular orbitals correctly.
(b) Use dashed lines to show where nodes are present in the molecular orbitals.
(c) Fill in the electrons in each diagram.
(d) Identify the LUMO of ethene and the HOMO of 1,3-butadiene.

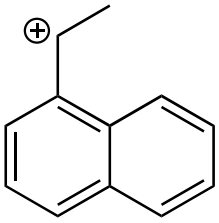


ethene 1,3-butadiene

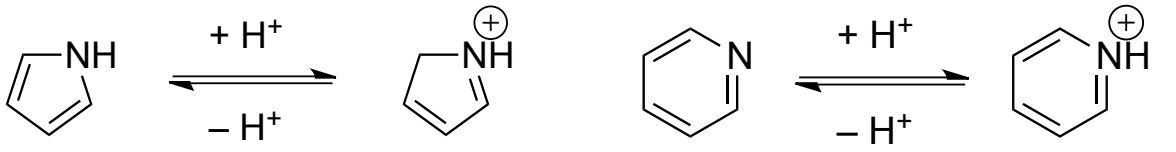
$H_2C{=}CH_2$



129. Please draw all of the resonance structures for the following molecule. Used curved arrows to show how you move elections to each new structure.



Of the two molecules below, one is a much better base. If you make the conjugate acid for each, one has a pK_a of about 5 (less acidic), and the other of about –4 (more acidic) ! Assign the correct pK_a to each conjugate acid, and briefly state why this is so.



pK_a _____ pK_a _____