CHM 2220 EXAM 1 May 25, 2017

Last Name (printed): Bhagirath First Name (printed): Neha

Access ID (ex. xx1234) fv6870 Section: 002 004 005 006 007 008 010 (ENG)

You must have the correct section number to earn credit for your exam.

Signature: neha B.

Please write your answers neatly in the spaces provided. There are 24 questions.

Academic Integrity Pledge

During the exam I will

- turn off my cell phone and put it away (out of sight and not on my person)
- close all books, notebooks, etc. and put them under the seat in which I sit
- keep my eyes down and focused on my own paper
- keep my answers covered
- sit in the area assigned to my section

I will stop writing when time is called.

I will hand in my paper when told to do so.

During the exam I will not

- have any papers other than those provided
- have any writing on my clothing or person or desk
- talk to anyone other than the instructor

I understand that the ***minimum consequence*** of any behavior contrary to this pledge is that I will receive a ***zero on this exam*** that will not be replaced by the percent earned on my final exam.

Name (sign) neha B.

Scoring

Page 2 12 / 15 points

Page 3 6 / 9 points

Page 4 9 / 12 points

Page 5 27 / 31 points

Page 6 21 / 21 points

Page 7 22 / 22 points

Total 97 / 100 points)

CIRCLE THE CORRECT ANSWER (3 points each)

1. Which of the following would most readily react with a strong base, such as $NaNH_2$, to form a carbanion?

A) 

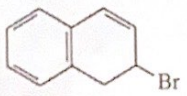
B) 

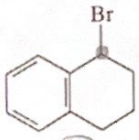
C) 

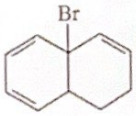
D) 

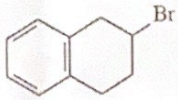
A) A B) B C) C D) D

2. Predict the major organic product in the following reaction.

A) 

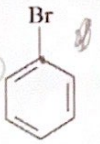
B) 

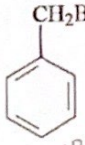
C) 

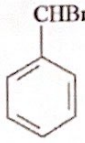
D) 

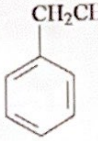
A) A B) B C) C D) D

3. Which of the following has the fastest rate of S_N1 hydrolysis in aqueous acetone?

I. 

II. 

III. 

IV. 

A) I B) II C) III D) IV

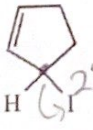
4. Which of the following would be a correct number of π electrons for a planar, monocyclic, completely conjugated polyene to be aromatic?

A) 3 B) 8 C) 18 D) 24

5. Which of these would be most reactive with pure methanol?

A 

B 

C 

D: none would react

A) A B) B C) C D) D

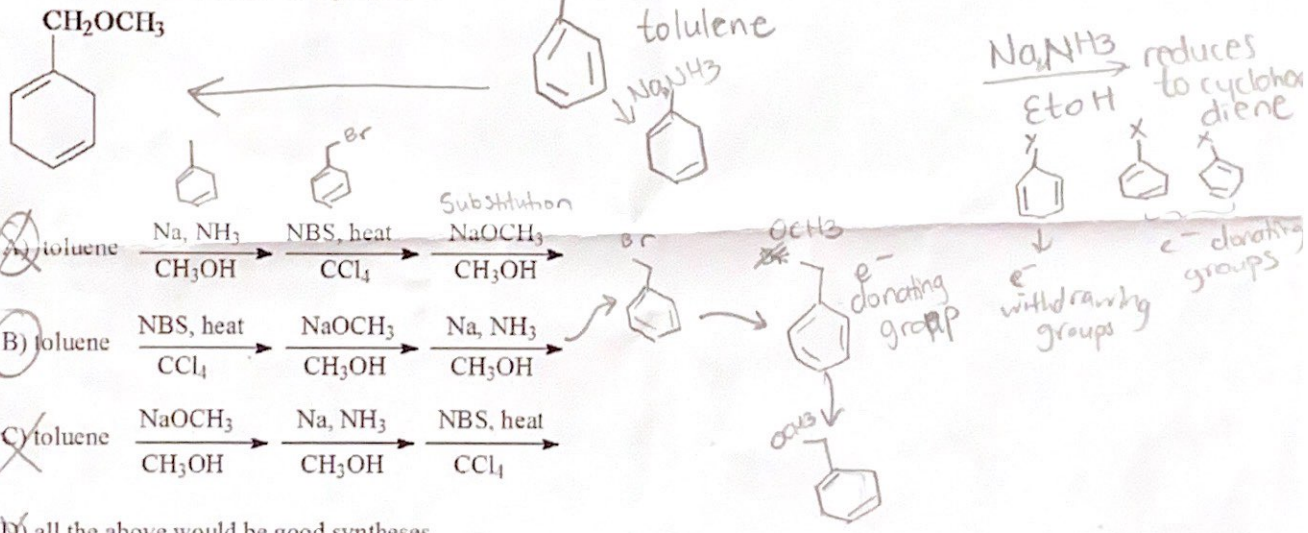
6. In which of the following are carbon-carbon bond lengths arranged in the correct order?

	shortest		longest
A)	benzene	ethylene	cyclohexane
B)	ethylene	cyclohexane	benzene
C)	cyclohexane	benzene	ethylene
D)	ethylene	benzene	cyclohexane

benzene = all same bond lengths → not as short as alkene
alkanes → longest bonds
alkene → shortes bonds

A) A B) B C) C D) D

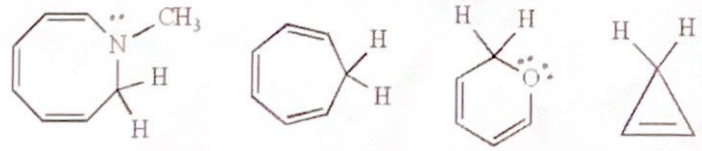
7. Starting with toluene, which sequence of reactions below works best to prepare the following cyclohexadiene compound?



D) all the above would be good syntheses

A) A B) B C) C D) D

8. Considering aromaticity, which of these would be the most acidic?

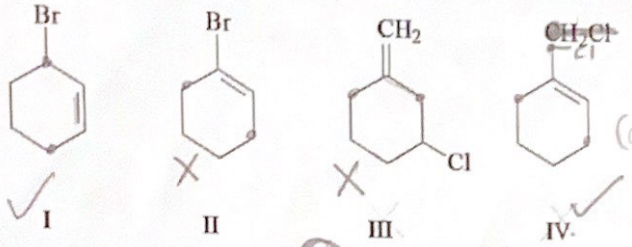


least nucleophile
e⁻ pror

A) A B) B C) C D) D

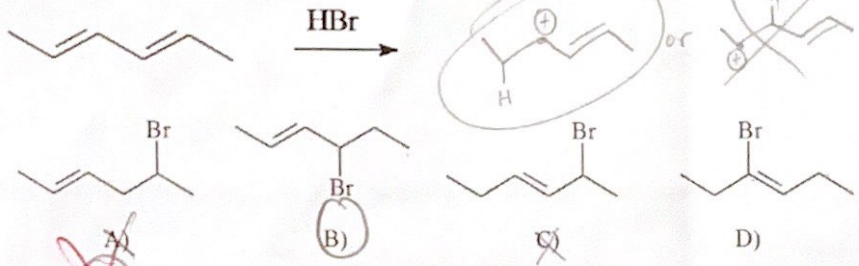
6

9. Identify the allylic halide(s).



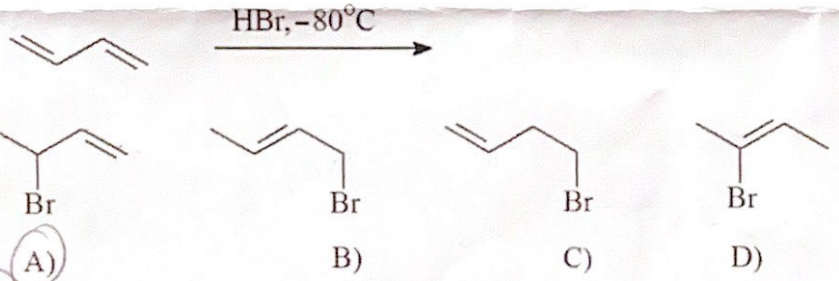
A) only II B) I and II C) I and IV D) I, III, and IV

10. Which of the following is the 1,4-addition product in the reaction shown below?



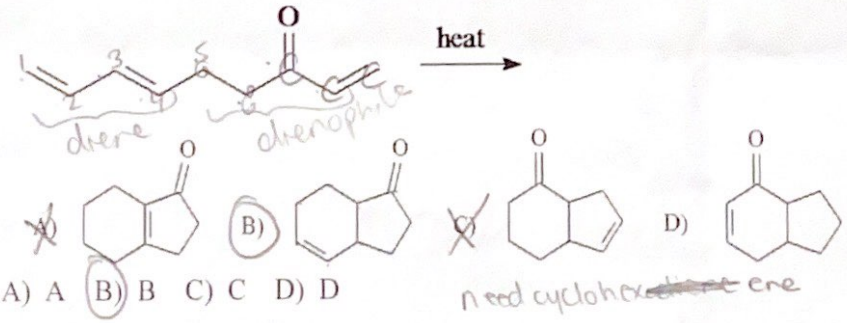
A) A B) B C) C D) D

11. What is the kinetically controlled product in the following reaction?



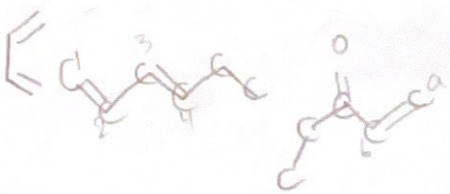
A) A B) B C) C D) D

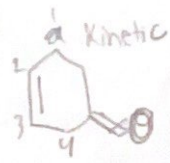
12. Which of the following is the product of the intramolecular Diels-Alder reaction shown below?



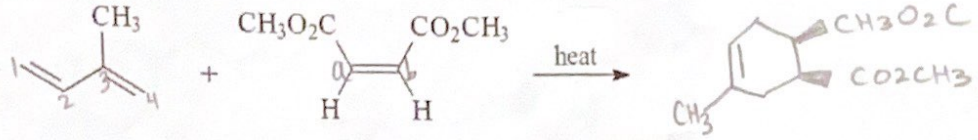
A) A B) B C) C D) D

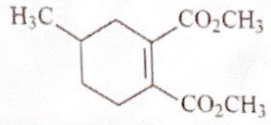
need cyclohexene

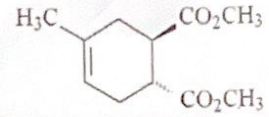


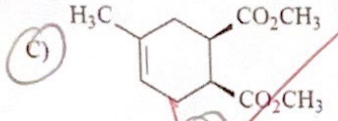


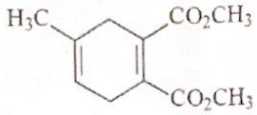
13. What is the product of the following Diels-Alder reaction?



A) 

B) 

C) 

D) 

A) A B) B C) C D) D

14. (8 points) Label the following planar compounds as aromatic or not aromatic.

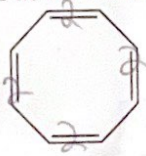
NOT aromatic

$4n+2=4$ pi e⁻

$4n=4-2$

$4n=2$

$n=2/4=1/2$



$4n+2$ pi e⁻ → has 8

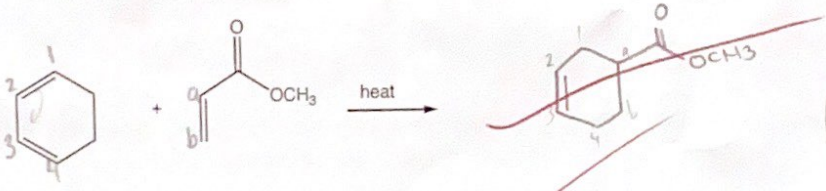
$4n+2=8$ pi e⁻

$4n=6$

$n=6/4=(3/2)$ NOT aromatic

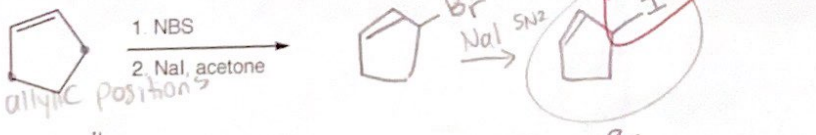
Write the major organic product formed in the following reactions. Assume that you have enough of each reagent/reactant to drive the reaction to completion. (4 points each)

15.

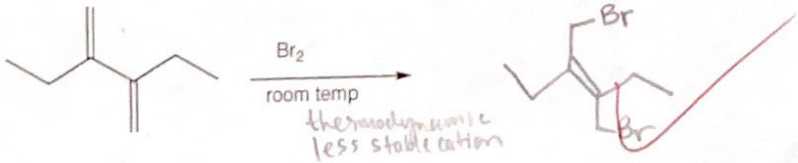


16.

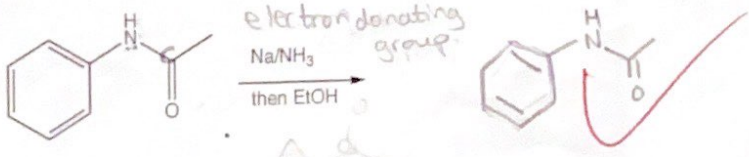
17.

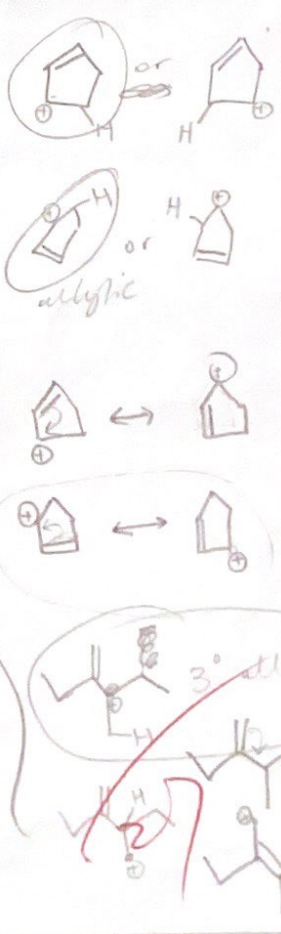


18.

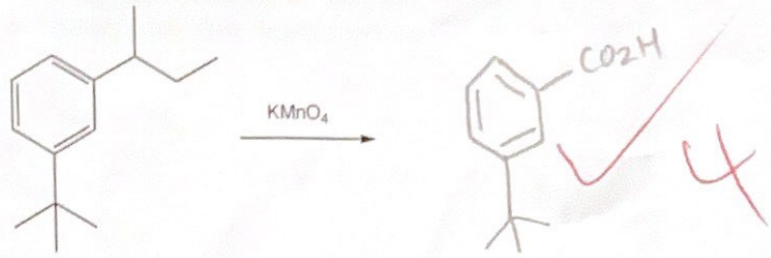


19.



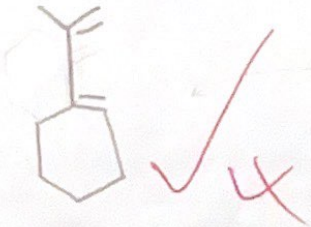


20.

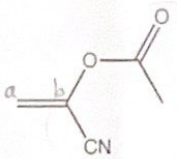


4

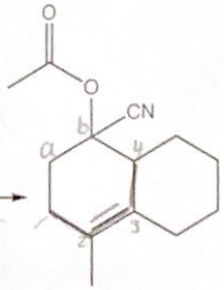
21. Draw the diene that would react with the dienophile shown to give the following product using the Diels Alder reaction. (8 pts)



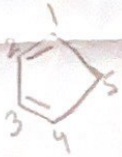
diene and



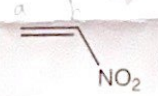
heat



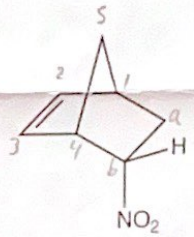
4



diene and.

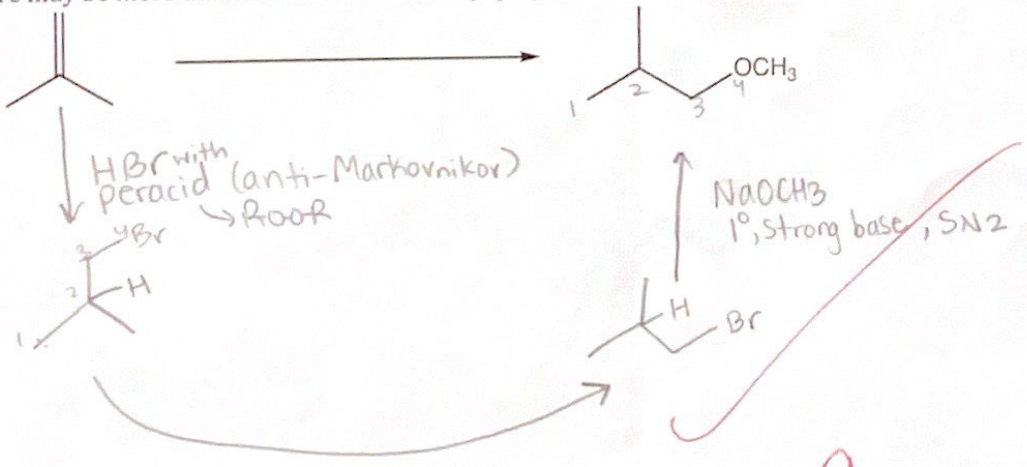


heat



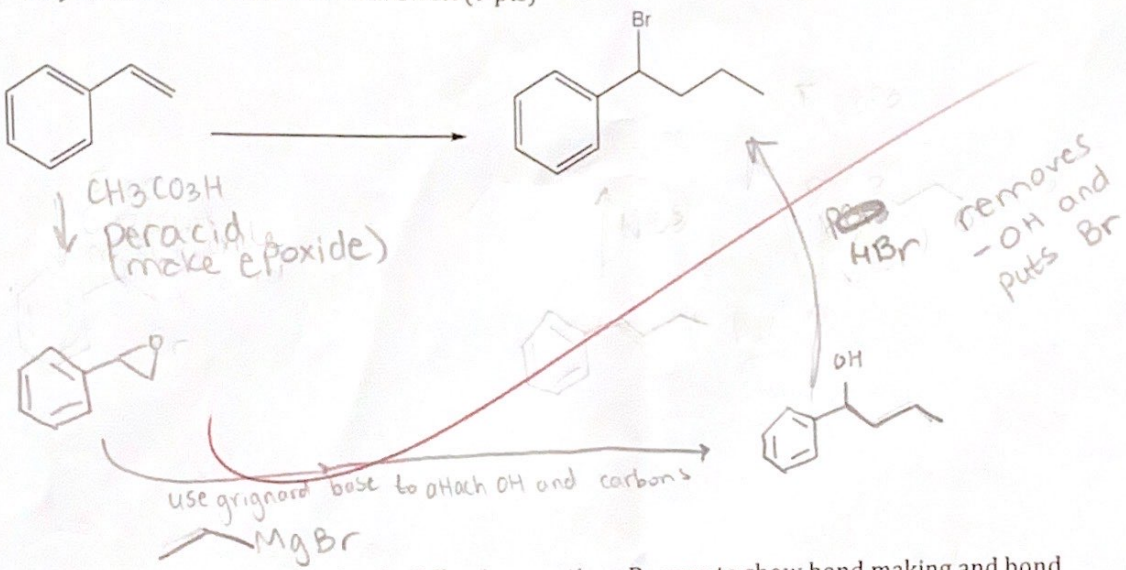
4

22. Provide reagents necessary to carry out the following transformations. Several steps may be required and there may be more than one correct answer. (9 pts)



9

23. Provide reagents necessary to carry out the following transformations. Several steps may be required and there may be more than one correct answer. (9 pts)



24. Indicate a plausible mechanism for the following reaction. Be sure to show bond making and bond breaking as well as all electron movement. Every arrow counts. Be precise! Don't forget to show charges where necessary. (13 points)