

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*

Please write your answers neatly in the spaces provided. There are 29 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*

Scoring

Page 2 15 / 15 points

Page 6 11 / 14 points

Page 3 6 / 9 points

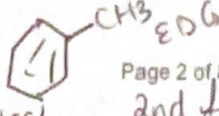
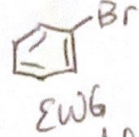
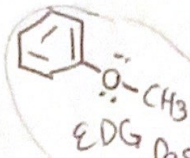
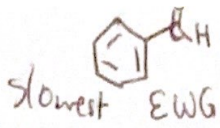
Page 7 2 / 12 points

Page 4 14 / 14 points

Page 8 7 / 16 points

Page 5 28 / 32 points

Total 83 / 100 points)



Circle the correct choice (3 points each).

J. Arrange the following compounds in order of increasing reaction rate with $\text{HNO}_3/\text{H}_2\text{SO}_4$.

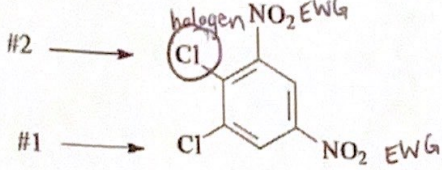
- I. $\text{C}_6\text{H}_5\text{CH}=\text{O}$ II. $\text{C}_6\text{H}_5\text{OCH}_3$ III. $\text{C}_6\text{H}_5\text{Br}$ IV. $\text{C}_6\text{H}_5\text{CH}_3$

- (A) I < III < IV < II ✓
 (B) I < IV < III < II
 (C) III < I < II < IV
 (D) III < I < IV < II ✓

EDG benzene halogen EWG

slowest → fastest

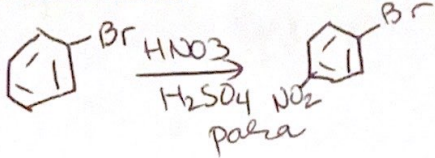
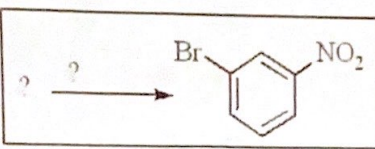
2. Which chlorine is most susceptible to nucleophilic substitution with NaOCH_3 in methanol?



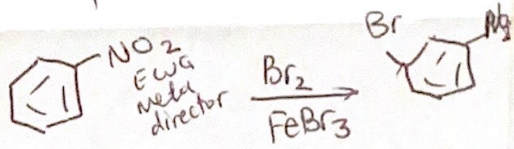
Which Cl has N.A.S?
 Whichever is para to the NO_2 , the EWG

- (A) #1
 (B) #2
 (C) #1 and #2 are equally susceptible.
 (D) No substitution is possible.

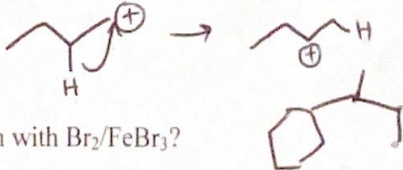
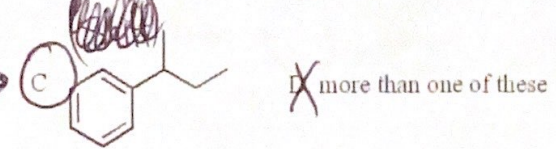
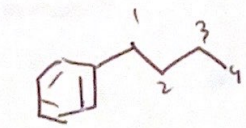
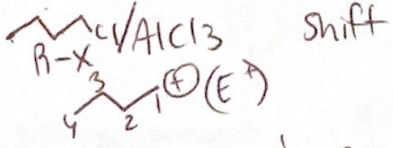
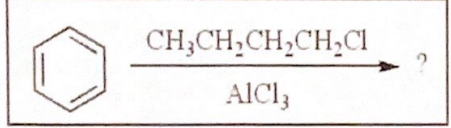
3. What would be the most efficient way to make meta-nitrobromobenzene?



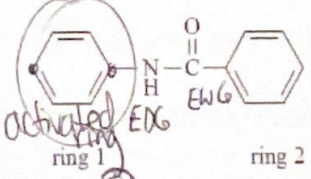
- (A) bromobenzene + $\text{HNO}_3/\text{H}_2\text{SO}_4$
 (B) nitrobenzene + $\text{Br}_2/\text{FeBr}_3$
 (C) either of these approaches would work
 (D) neither of these approaches would work



4. What major product(s) would you expect from this reaction?



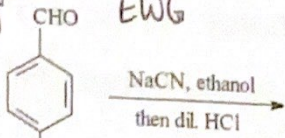
5. Where would the compound shown below undergo bromination with $\text{Br}_2/\text{FeBr}_3$?



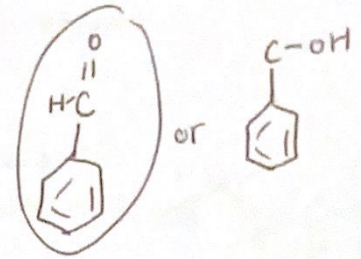
NH is the EDG

- (A) ortho/para position on ring 1
 (B) meta position on ring 1
 (C) ortho/para position on ring 2
 (D) meta position on ring 2

6. What is the product of the reaction below?



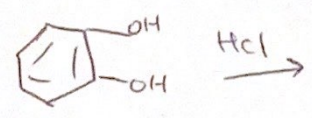
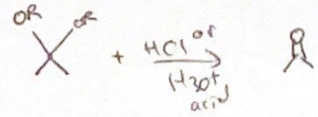
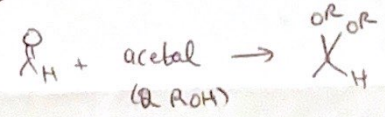
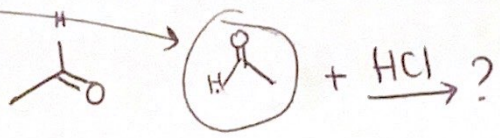
EWG
 halogen, para N.A.S.



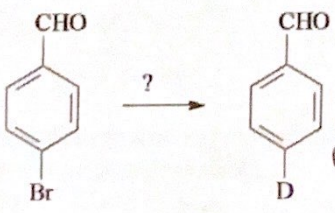
- ~~A) O=Cc1ccc(Br)cc1~~
 ~~B) O=Cc1ccc(Br)cc1~~
 ~~C) O=Cc1ccc(Br)cc1~~
 ~~D) O=Cc1ccc(Br)cc1~~

7. Which one of the following gives ethanal, $\text{CH}_3\text{CH}=\text{O}$, (as one of two products) when added to an aqueous solution of HCl?

- ~~A) CC1(O)C(=O)C2=CC=CC=C12~~
~~B) CC1(O)C(O)C2=CC=CC=C12~~
 C) CC1(O)C(=O)C2=CC=CC=C12
~~D) CC1(O)C(O)C2=CC=CC=C12~~



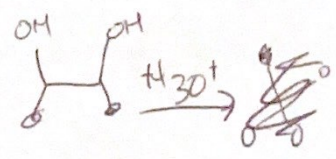
8. Which synthetic method below correctly does the following conversion?



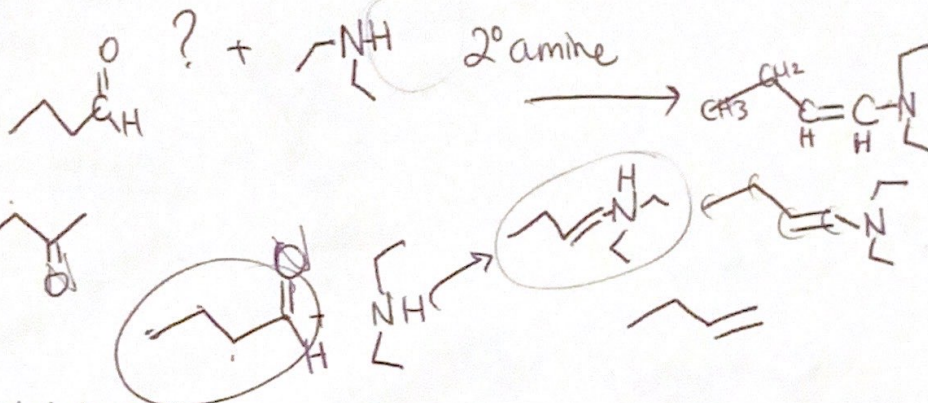
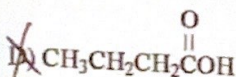
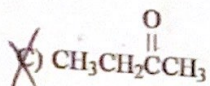
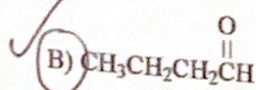
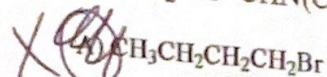
EWG
 Protect with acetal
O=Cc1ccccc1 MgBr

If this can be done you don't protect it with acetal

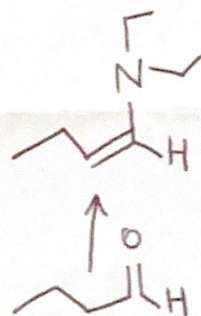
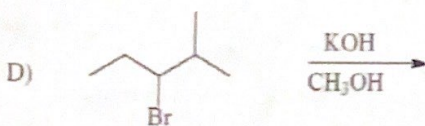
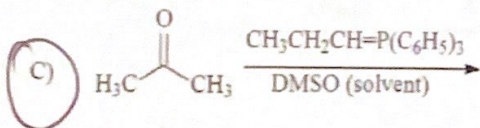
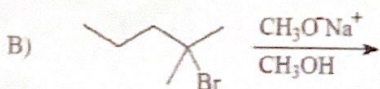
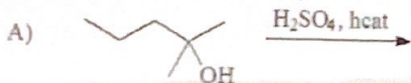
- ~~A) (1) Mg, diethyl ether (2) D_2O~~
~~B) (1) LiAlD_4 , diethyl ether (2) D_2O~~
 C) (1) $\text{HOCH}_2\text{CH}_2\text{OH}, \text{H}^+$ (2) Mg, diethyl ether (3) D_2O (4) $\text{H}_2\text{O}, \text{H}^+$
~~D) (1) $\text{HOCH}_2\text{CH}_2\text{OH}, \text{H}^+$ (2) DCl (3) $\text{H}_2\text{O}, \text{H}^+$~~



9. Which of the following reacts with $(\text{CH}_3\text{CH}_2)_2\text{NH}$ to give the compound shown below?

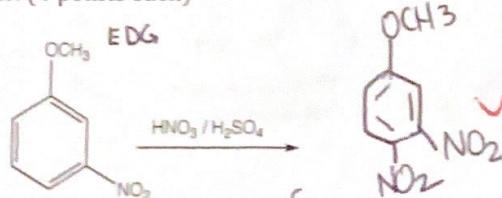


10. Which of the following is the best method to synthesize 2-methyl-2-pentene, shown below, with little or no by-product formation?

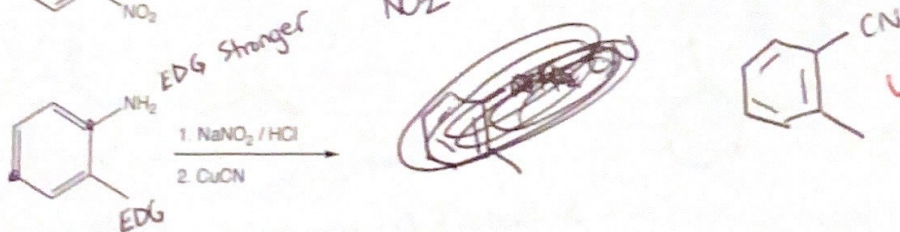


Write the major organic product formed in the following reactions. Write NR if you expect NO REACTION to occur. (4 points each)

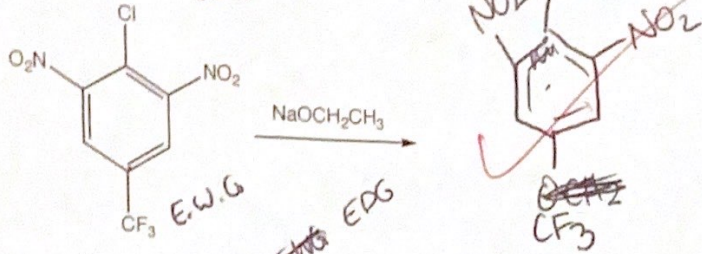
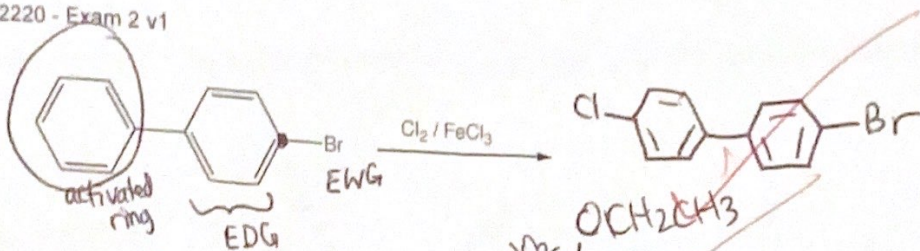
11.



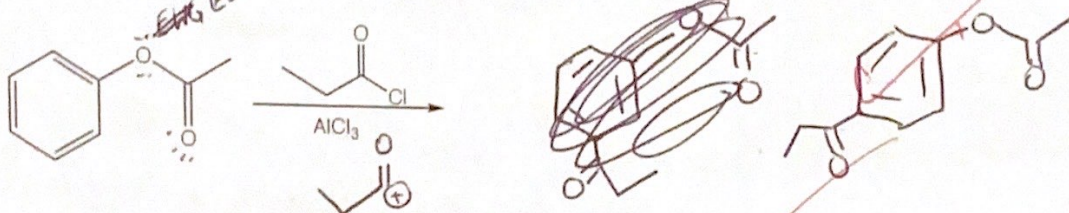
12.



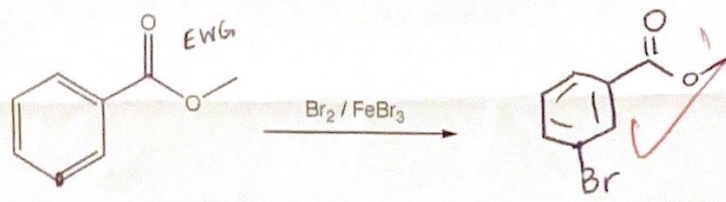
12.
14.
?



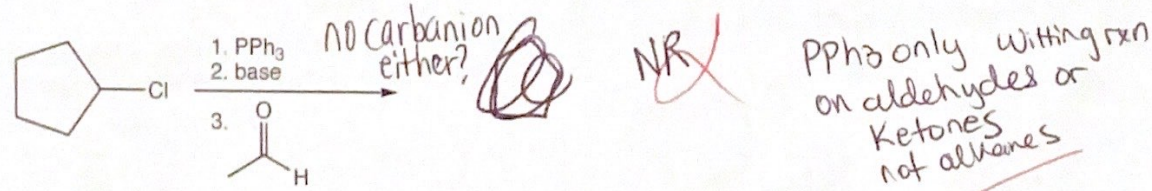
15.



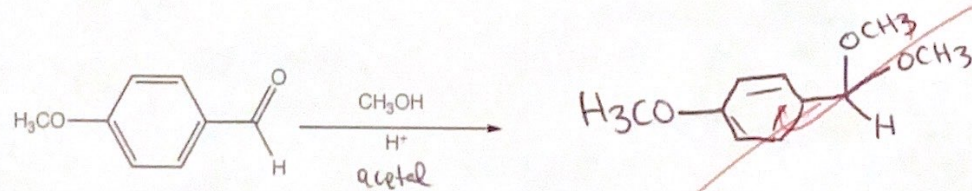
16.



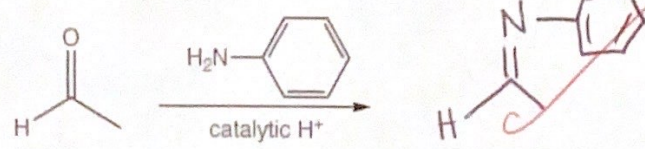
17.



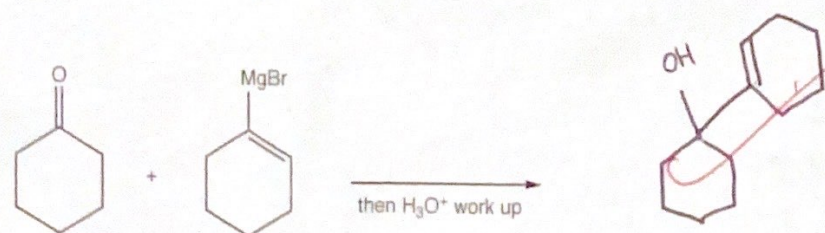
18.



19.



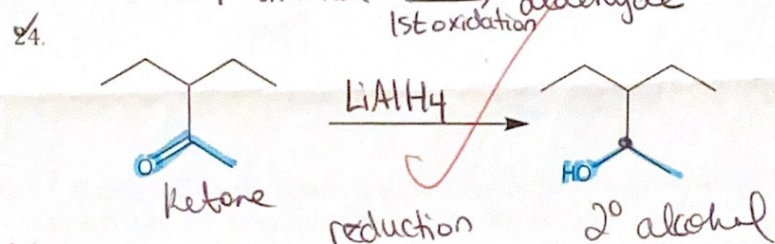
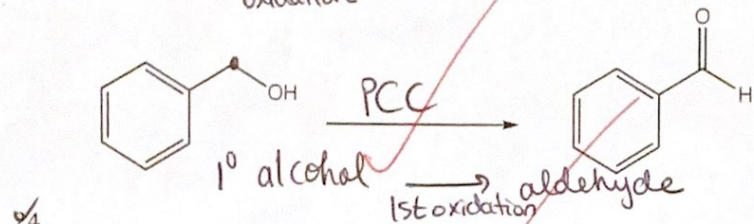
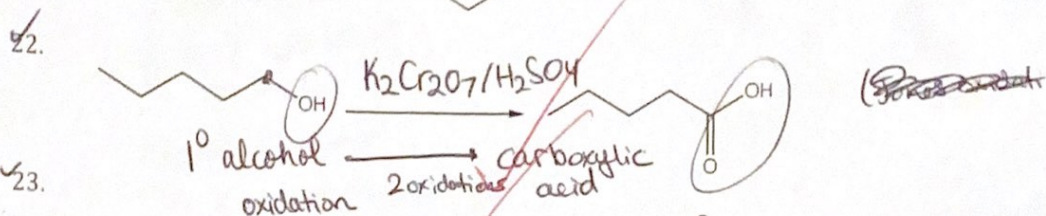
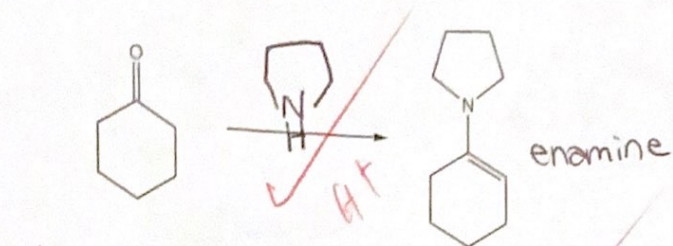
20.



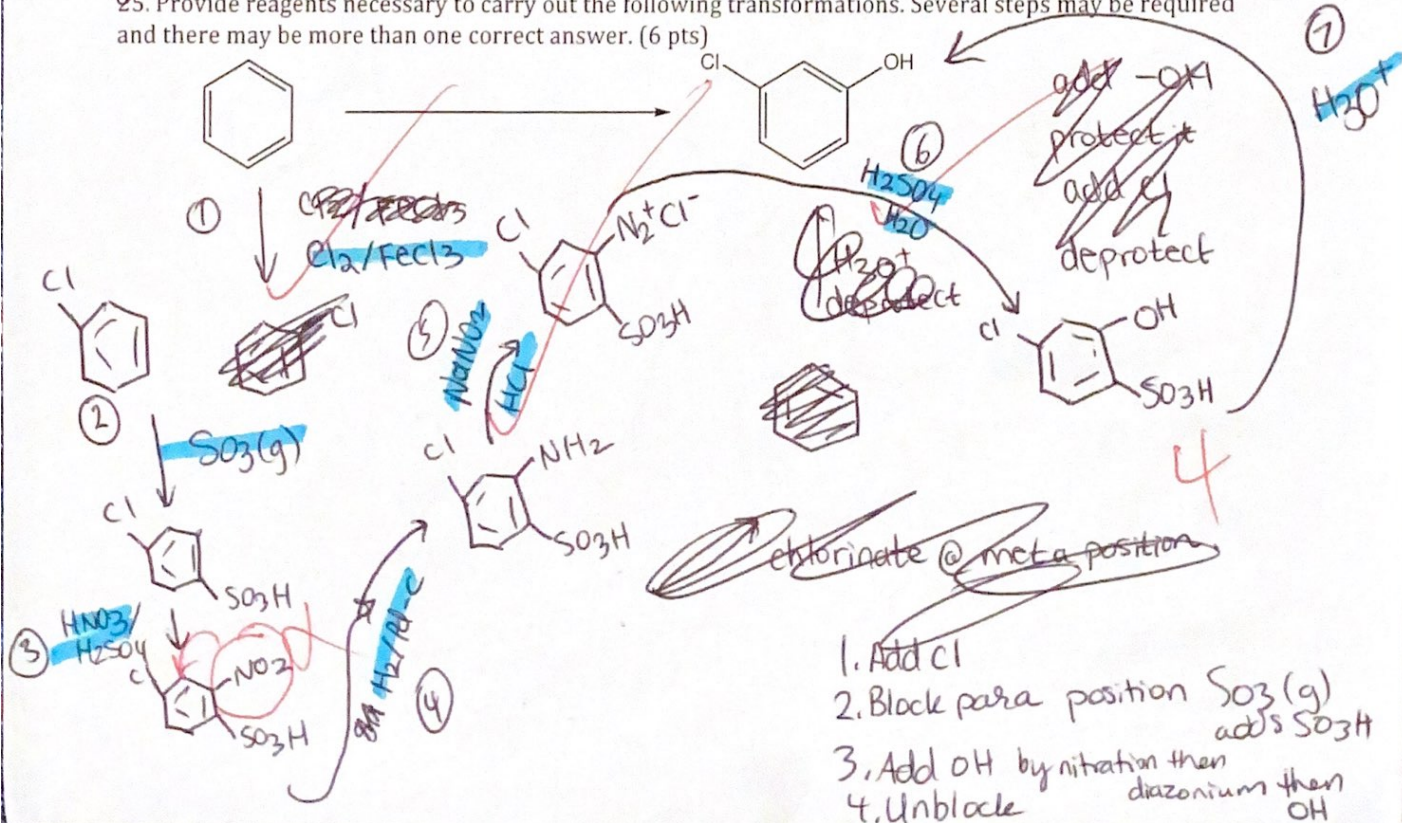
ketone + grignard → 3° alcohol

28

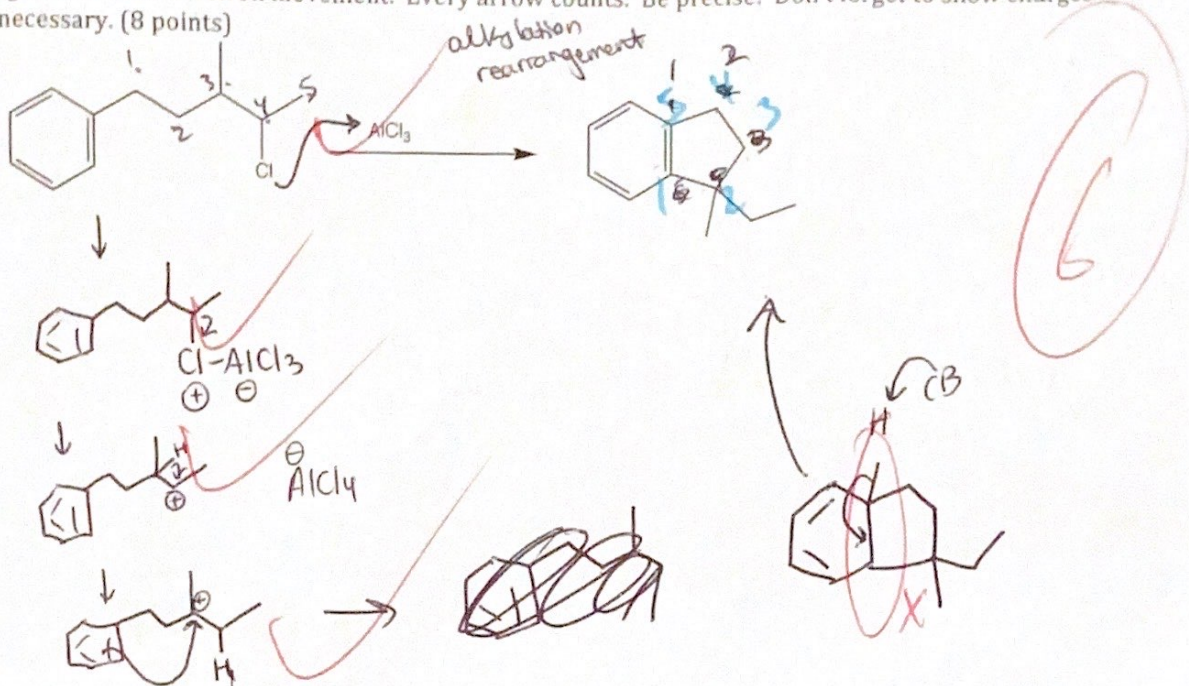
Provide reagents necessary to carry out the following one step transformations. (2 points each)



25. Provide reagents necessary to carry out the following transformations. Several steps may be required and there may be more than one correct answer. (6 pts)



28. 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. (8 points)



29. 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. (9 points)

