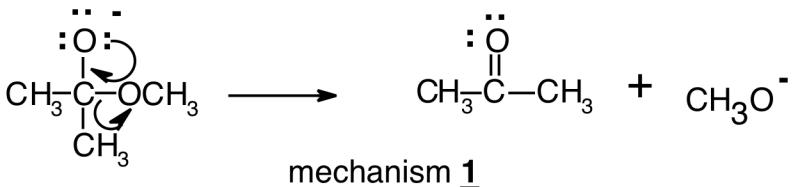
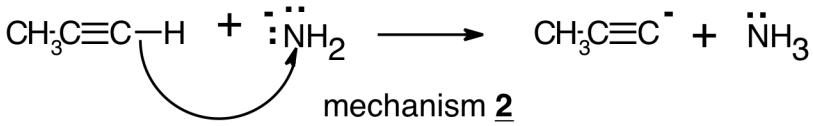
"Grade or Education" = 1

CHEM 2261/01
Summer 08
Exam 2
Chapters 4-6

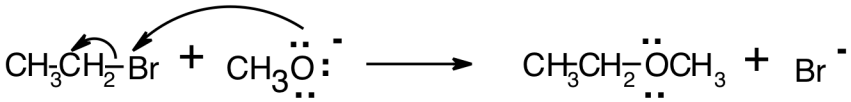
1. Examine the three curved-arrow mechanisms shown below and choose the statement which is CORRECT about one or more of these mechanisms.



mechanism **1**



mechanism **2**



mechanism **3**

__ A. Mechanism 3 is correct except that the arrows are drawn backwards.

__ B. The arrows are drawn backwards in mechanism 1.

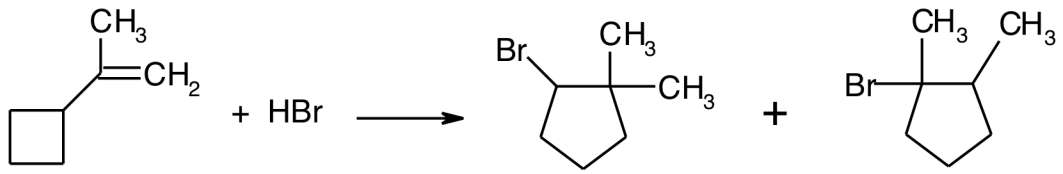
__ C. Mechanism 1 is drawn correctly.

__ D. Mechanism 3 is drawn correctly.

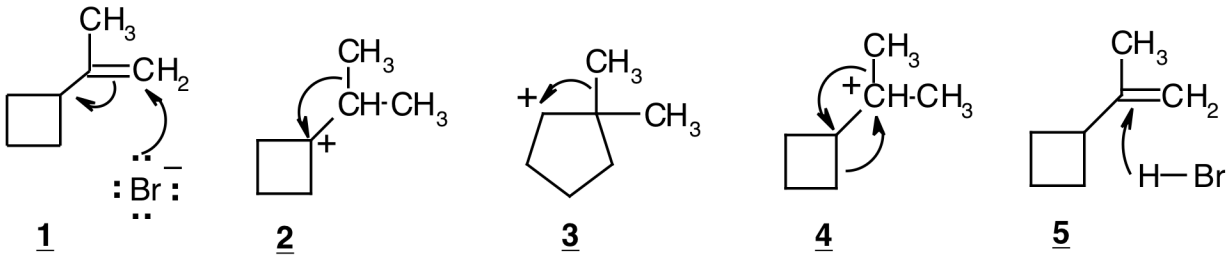
__ E. Mechanism 2 is correct except that the arrow is drawn backwards.

Rationale:
Chapter 4 Problem 46

2. Work out the curved arrow mechanism for the reaction below, which involves carbocation rearrangements.



Choose the drawing below which CORRECTLY depicts the electron movement involved in ONE of the steps of your mechanism.



__ A. The electron movement depicted in 4 is involved in this mechanism.

__ B. The electron movement depicted in 3 is involved in this mechanism.

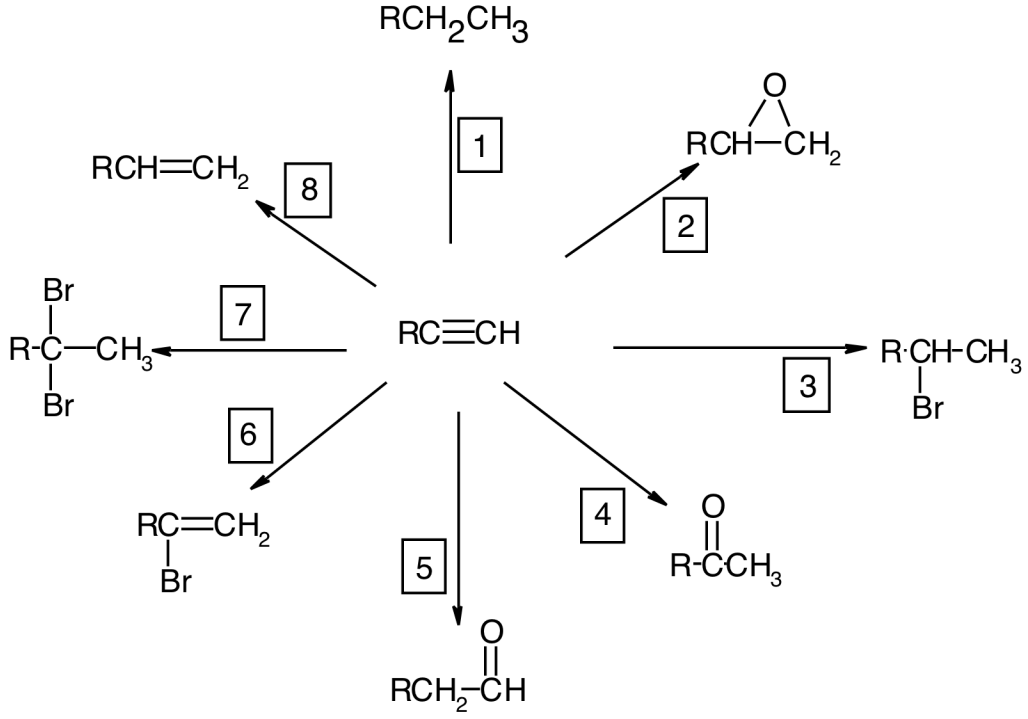
__ C. The electron movement depicted in 1 is involved in this mechanism.

__ D. The electron movement depicted in 2 is involved in this mechanism.

__ E. The electron movement depicted in 5 is involved in this mechanism.

Rationale:
Chapter 4 Problem 62

3. Figure out what reagents could be used to carry out the syntheses shown below. Pick the choice which specifies the CORRECT reagent(s) for one of these syntheses.



__ A. The reagent used to carry out the synthesis associated with box 1 is H_2/Lindlar catalyst.

__ B. The reagents used to carry out the synthesis associated with box 3 are excess H_2 with Pd/C followed by HBr.

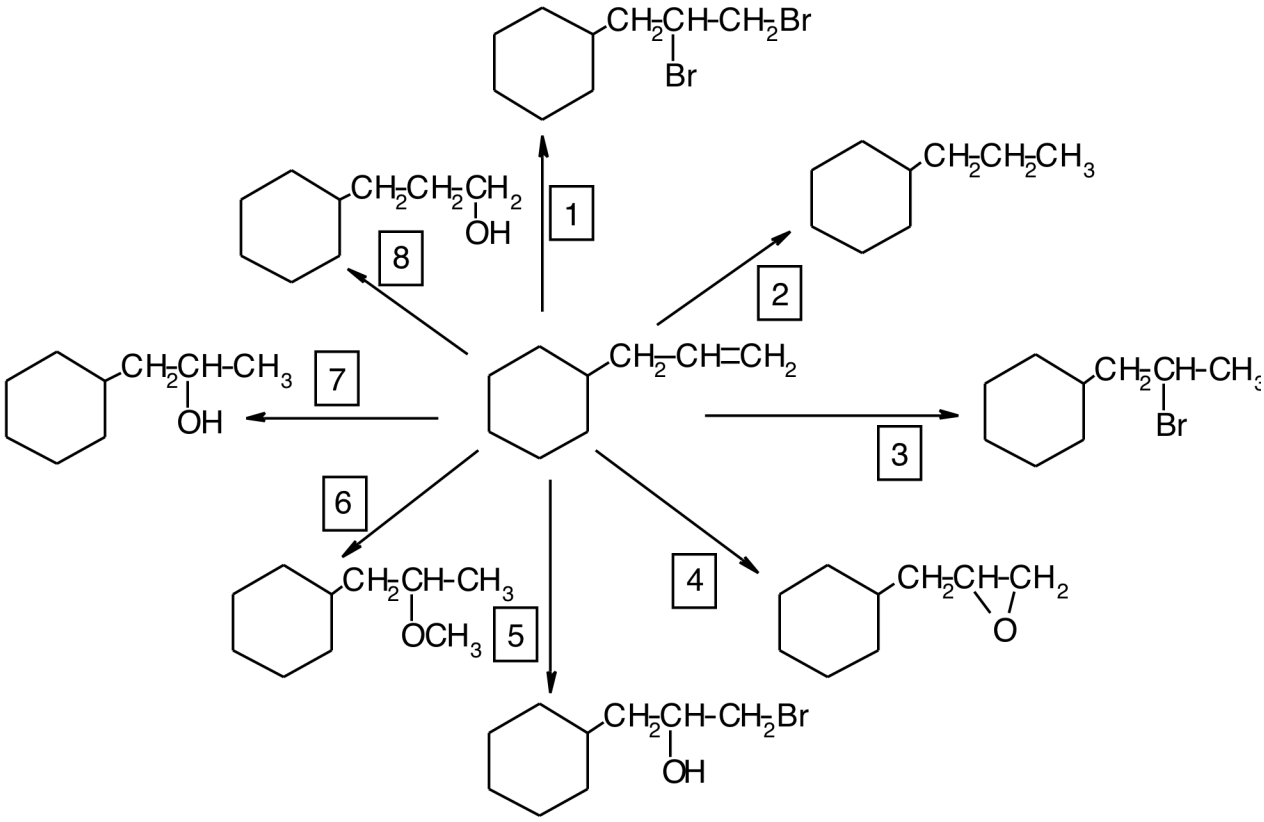
__ C. The reagent used to carry out the synthesis associated with box 7 is Br_2 in CH_2Cl_2.

__ D. The reagent used to carry out the synthesis associated with box 8 is excess H_2 with Pd/C.

__ E. The reagents used to carry out the synthesis associated with box 5 are disiamylborane followed by HO^-, H_2O_2, and H_2O.

Rationale:
Chapter 6 Problem 29

4. Figure out the reagents that would be required to carry out the following syntheses. The reagent(s) required to make the substance with the topmost structure from the substance with the structure in the middle of the diagram is represented by the number 1 (boxed). The reagent(s) required to convert the middle substance into the substance one position closkwise from the topmost substance is represented by the number 2, etc. Which of the multiple choices gives the WRONG reagent(s) for the boxed number mentioned? (Pick the choice which is FALSE .)



__ A. The reagents represented by box 2 are H_2 and Pt/C

__ B. The reagent represented by box 3 is HBr.

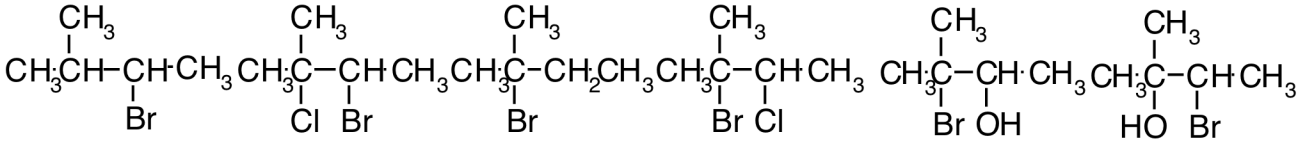
__ C. The reagents represented by box 7 are BH_3 followed by H_2O_2 and HO^-.

__ D. The reagents represented by box 6 are H^+ and CH_3OH

__ E. The reagents represented by box 5 are Br_2 followed by H_2O.

Rationale:
similar to Chapter 4 Problem 47

5. FIgure out what will be the major product of the reaction of 2-methyl-2-butene with each of the reagents given in the multiple choices. Pick the choice which CORRECTLY matches the product structure with one of the structures shown below.



1 **2** **3** **4** **5** **6**

__ A. HBr will react to give 3 as the major product.

__ B. Br_2/CH_3OH will react to give 6 as the major product.

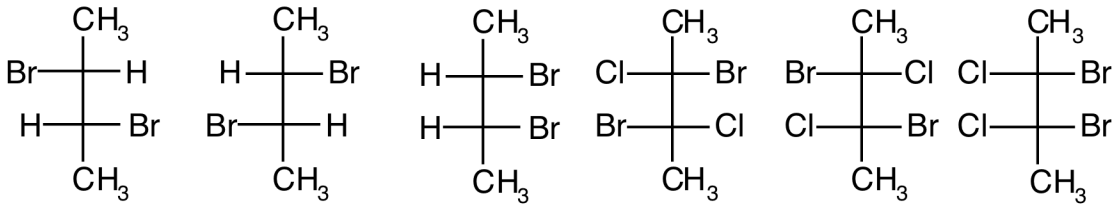
__ C. Br_2/H_2O will react to give 5 as the major product.

__ D. Br_2/NaCl will react to give 4 as the major product.

__ E. Br_2/CH_2Cl_2 will react to give 2 as the major product.

Rationale:
Chapter 4 Problem 40(a,g,j,k,l)

6. Examine the Fischer projections below. Which of the multiple choices gives the number(s) associated with the Fischer projection(s) of the CORRECT stereoisomer(s) obtained from the reaction of 2-butyne with the reagents specified?



1 **2** **3** **4** **5** **6**

__ A. Reaction with, 1. H_2/Lindlar catalyst, followed by 2. Br_2/CH_2Cl_2 gives the product with structure 3 only.

__ B. Reaction with, 1. Na/NH_3(liq), followed by 2. Br_2/CH_2Cl_2 gives the product with structure 6 only.

__ C. Reaction with, 1. Cl_2/CH_2Cl_2, followed by 2. Br_2/CH_2Cl_2 gives the products with structures 4 and 5 only.

__ D. Reaction with, 1. Na/NH_3(liq), followed by 2. Br_2/CH_2Cl_2 gives the products with structures 1 and 2 only.

__ E. Reaction with, 1. Na/NH_3(liq), followed by 2. Br_2/CH_2Cl_2 gives the product with structure 3 only.

Rationale:
Chapter 6 Problem 44

7. Assign relative priorities to the groups within the set shown below.

-CH=O -OH $-CH_3$ $-CH_2OH$

__ A. $-CH_3 > -CH{=}O > -CH_2OH > -OH$

__ B. $-CH{=}O > -OH > -CH_2OH > -CH_3$

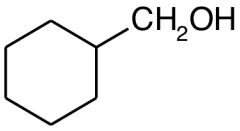
__ C. $-OH > -CH{=}O > -CH_2OH > -CH_3$

__ D. $-OH > -CH_2OH > -CH{=}O > -CH_3$

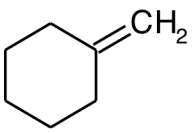
__ E. $-CH_3 > -CH_2OH > -CH{=}O > -OH$

Rationale:
Chapter 5 Problem 11b

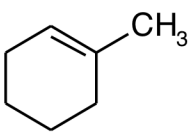
8. Look at the numbered structures below and figure out how to prepare the compound with structure 1 from either compound 2 or compound 3. Pick the choice which CORRECTLY describes how this might be done.



1



2



3

__ A. Treat 2 with BH_3/THF followed by H_2O_2, HO^-, and H_2O.

__ B. Treat 2 with H^+, and CH_3OH.

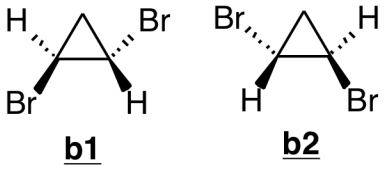
__ C. Treat 3 with BH_3/THF followed by H_2O_2, HO^-, and H_2O.

__ D. Treat 2 with H^+, and H_2O.

__ E. Treat 3 with H^+, and H_2O.

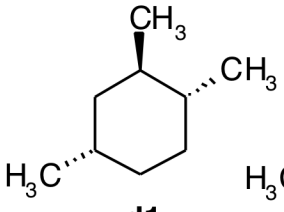
Rationale:
Chapter 4 Problem 50c

9. Figure out whether each of the following pairs of compounds are identical or are enantiomers, diastereomers, or constitutional isomers. Pick the choice which gives the CORRECT relationship between one of these pairs.

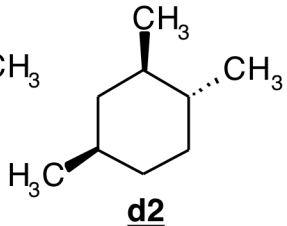


b1

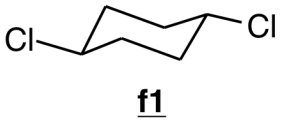
b2



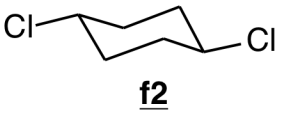
d1



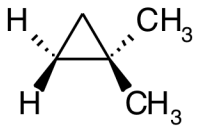
d2



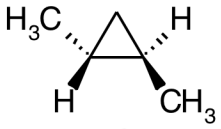
f1



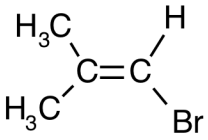
f2



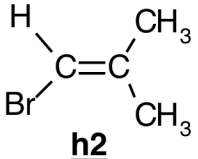
c1



c2



h1



h2

__ A. b1 and b2 are identical.

__ B. c1 and c2 are diastereomers.

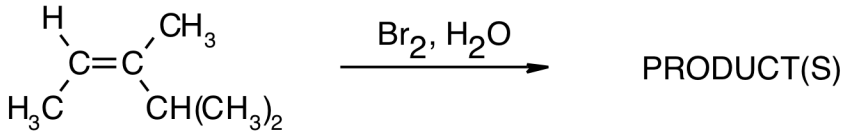
__ C. d1 and d2 are enantiomers.

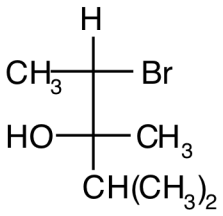
__ D. f1 and f2 are identical.

__ E. h1 and h2 are enantiomers.

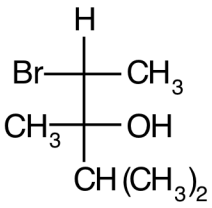
Rationale:
similar to Chapter 5 Problem 67(b,c,d,f,h)

10. Find the structure(s) of the product(s) of the reaction shown below. Pick the choice which references ALL of the CORRECT reaction products.

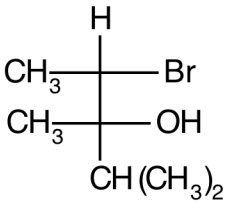




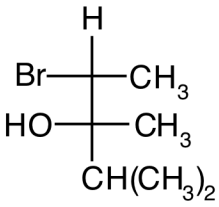
1



2



3



4

__ A. This reaction produces products 2 and 3.

__ B. This reaction produces products 2 and 4.

__ C. This reaction produces products 1 and 3.

__ D. This reaction produces products 1 and 2.

__ E. This reaction produces products 3 and 4.

Rationale:
Chapter 5 Problem 93

11. Draw or analyze all of the stereoisomers for each of the compounds named in the multiple choices. Which choice gives the CORRECT number of stereoisomers that exist for the compound named?

__ A. 2,4-dichloroheptane has three stereoisomers.

__ B. 2,4-dichloropentane has three stereoisomers.

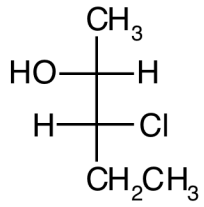
__ C. 1,4-dichlorocyclohexane has three stereoisomers.

__ D. 3-chloro-3-methylpentane has two stereoisomers.

__ E. 3,4-dichlorohexane has four stereoisomers.

Rationale:
Chapter 5 Problem 34

12. Choose the CORRECT name of the substance whose molecular structure is shown in the Fischer projection below.



__ A. (2R,3S)-3-chloro-2-pentanol

__ B. (2S,3S)-3-chloro-2-pentanol

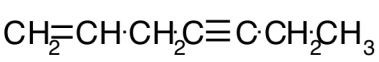
__ C. (2S,3R)-3-chloro-2-pentanol

__ D. (1R,2S)1-methyl-2-chloro-1-butanol

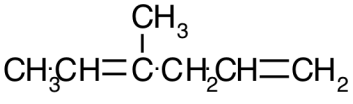
__ E. (2R,3R)-3-chloro-2-pentanol

Rationale:
Chapter 5 Problem 65c

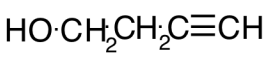
13. Which of the compounds whose structures are shown below is named CORRECTLY in the multiple choices?



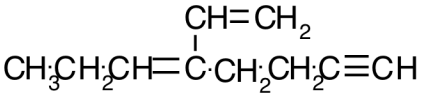
1



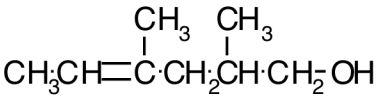
2



3



4



5

__ A. Compound 4 is 3-propyl-1,3-heptadien-6-yne.

__ B. Compound 1 is 3-heptyn-6-ene.

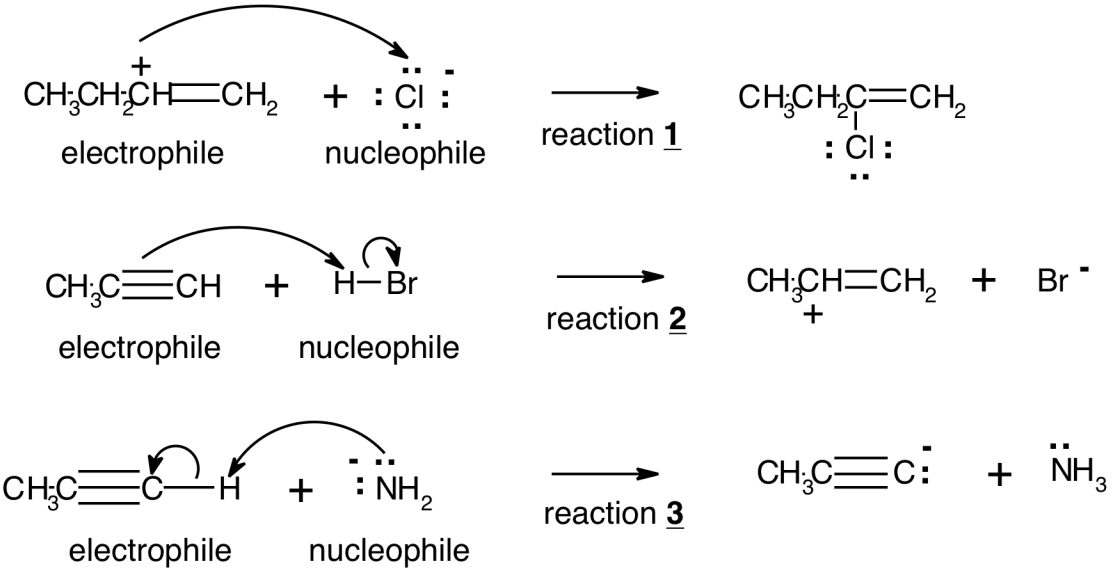
__ C. Compound 2 is 3-methyl-2,5-hexadiene.

__ D. Compound 3 is 3-butyn-1-ol.

__ E. Compound 5 is 3,5-dimethyl-2-hexen-6-ol.

Rationale:
Chapter 6 Problem 6(a,b,c,d,f)

14. Identify the electrophile and the nucleophile CORRECTLY in each of the following reactions. Then figure out how to draw curved arrows which CORRECTLY illustrate the bond-making and bond-breaking processes involved in these reactions. Pick the choice which ACCURATELY describes what is correct and what is wrong about the way in which one of these three reactions is laid out.



__ A. In reaction 3 the electrophile and nucleophile are labelled correctly but the curved arrows are drawn incorrectly.

__ B. Both the curved arrows and the electrophile and nucleophile labels are correctly laid out in reaction 2.

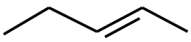
__ C. Both the curved arrows and the electrophile and nucleophile labels are correctly laid out in reaction 3.

__ D. In reaction 1 the electrophile and nucleophile labels are reversed and the curved arrow is drawn backwards.

__ E. The curved arrow is correctly drawn in reaction 1 but the electrophile and nucleophile labels are reversed.

Rationale:
Chapter 6 Problem 27

15. Using ethyne as the starting material, pick the choice which CORRECTLY describes how the compound with the structure shown below can be prepared.



__ A. First steps: 1. $NaNH_2$, 2. CH_3Br; Next step: Na/NH_3; Final steps: 1. $NaNH_2$, 2. CH_3CH_2Br

__ B. First steps: 1. $NaNH_2$, 2. CH_3Br; Next steps: 1. $NaNH_2$, 2. CH_3CH_2Br; Final step: H_2/Lindlar catalyst

__ C. First steps: 1. $NaNH_2$, 2. CH_3Br; Next steps: 1. $NaNH_2$, 2. CH_3CH_2Br; Final step: Na/NH_3

__ D. First steps: 1. $NaNH_2$, 2. CH_3Br; Next step: H_2/Lindlar catalyst; Final steps: 1. $NaNH_2$, 2. CH_3CH_2Br

__ E. First steps: 1. $NaNH_2$, 2. CH_3Br; Next steps: 1. $NaNH_2$, 2. CH_3CH_2Br; Final step: H_2 and Pd/C

Rationale:
Chapter 6 Problem 43d

Answer Key

"Grade or Education" = 1

CHEM 2261/01
Summer 08
Exam 2
Chapters 4-6

1. C
2. B
3. E
4. C
5. A
6. E
7. C
8. A
9. D
10. E
11. B
12. E
13. D
14. C
15. C