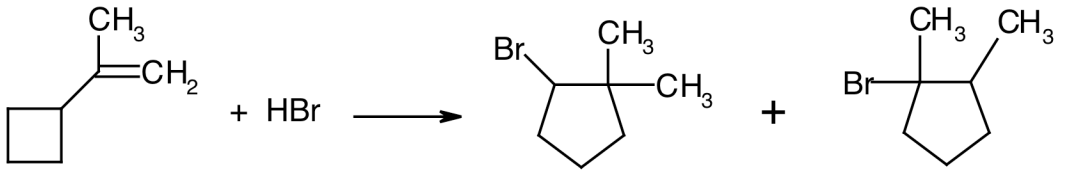
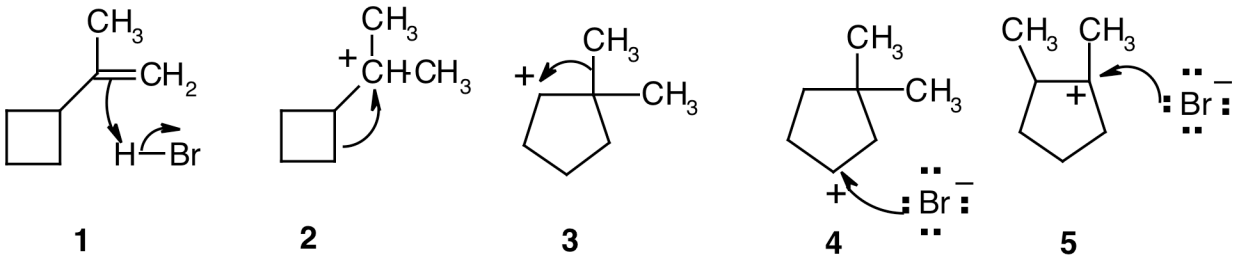
"Grade or Education" = 1

CHEM 2261/01
Summer 09
Exam 2
Chapters 4-6

1. Draw out the mechanism for the reaction shown below. Use this mechanism along with the numbered figures below to find the number representing a process which does **NOT** occur in the reaction mechanism.





__ A. Process 3 does not occur in this mechanism.

__ B. Process 5 does not occur in this mechanism.

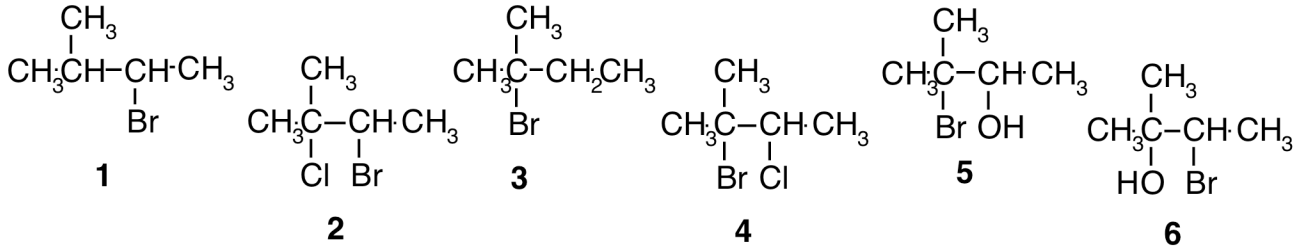
__ C. Process 1 does not occur in this mechanism.

__ D. Process 4 does not occur in this mechanism.

__ E. Process 2 does not occur in this mechanism.

Rationale:
Chapter 4 Problem 62a

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

__ B. Br_2/CH_3OH will react to give **5** as the major product.

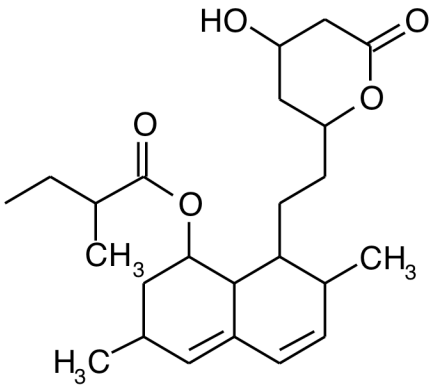
__ C. HBr will react to give **1** as the major product.

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

__ E. Br_2/H_2O will react to give **6** as the major product.

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

3. Mevacor, shown below, is used clinically to lower serum cholesterol levels. How many asymmetric centers does Mevacor have?



Mevacor

__ A. 8

__ B. 9

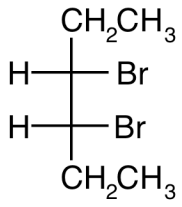
__ C. 6

__ D. 10

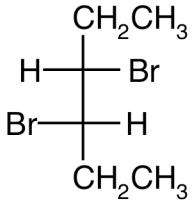
__ E. 7

Rationale:
Chapter 5 Problem 66

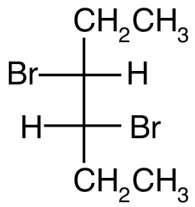
4. Find the structures of the products of the reactions given in the multiple choices among the Fisher projections numbered **1**, **2**, and **3** below. Pick the choice which indicates the **CORRECT** product(s) of the reaction given.



1



2



3

__ A. trans-3-hexene + Br_2/CH_2Cl_2 → product **3**

__ B. cis-3-hexene + Br_2/CH_2Cl_2 → product **1** and **3**

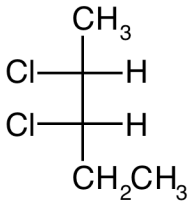
__ C. trans-3-hexene + Br_2/CH_2Cl_2 → product **1**

__ D. cis-3-hexene + Br_2/CH_2Cl_2 → product **1**

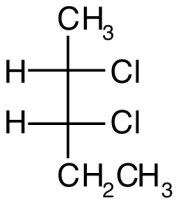
__ E. trans-3-hexene + Br_2/CH_2Cl_2 → products **2** and **3**

Rationale:
Chapter 5 Problem 82(e,f)

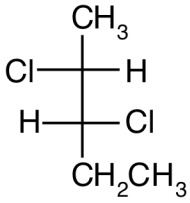
5. Which of the numbered structures shown below is (2R,3R)-2,3-dichloropentane?



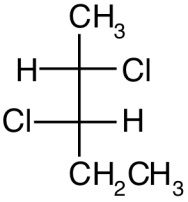
1



2



3



4

__ A. None of these structures is correct.

__ B. **1**

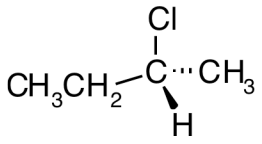
__ C. **4**

__ D. **2**

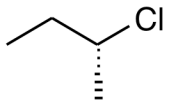
__ E. **3**

Rationale:
Chapter 5 Problem 88b

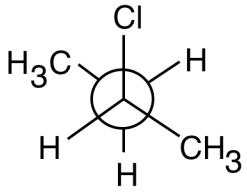
6. Which of the structures below is/are (S)-2-chlorobutane?



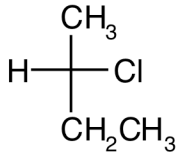
a



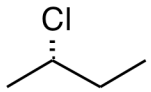
c



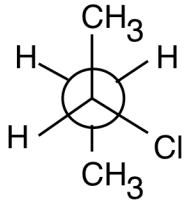
e



b



d



f

__ A. Only **b** is (S)-2-chlorobutane.

__ B. Structures **b** and **c** are (S)-2-chlorobutane.

__ C. Structures **a**, **c**, and **d** are (S)-2-chlorobutane.

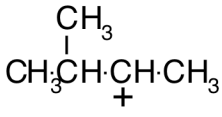
__ D. Structures **b**, **d** and **f** are (S)-2-chlorobutane.

__ E. Only **c** is (S)-2-chlorobutane.

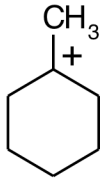
Rationale:
Chapter 5 Problem 78

7. Which of the cations whose structures are shown below **WOULD** be expected to rearrange?

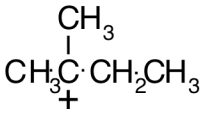
a



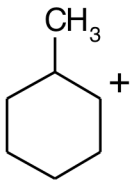
b



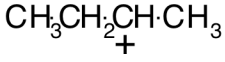
c



d



e



f

__ A. Only the cation labelled **b** would be expected to rearrange.

__ B. Only the cation labelled **d** would be expected to rearrange.

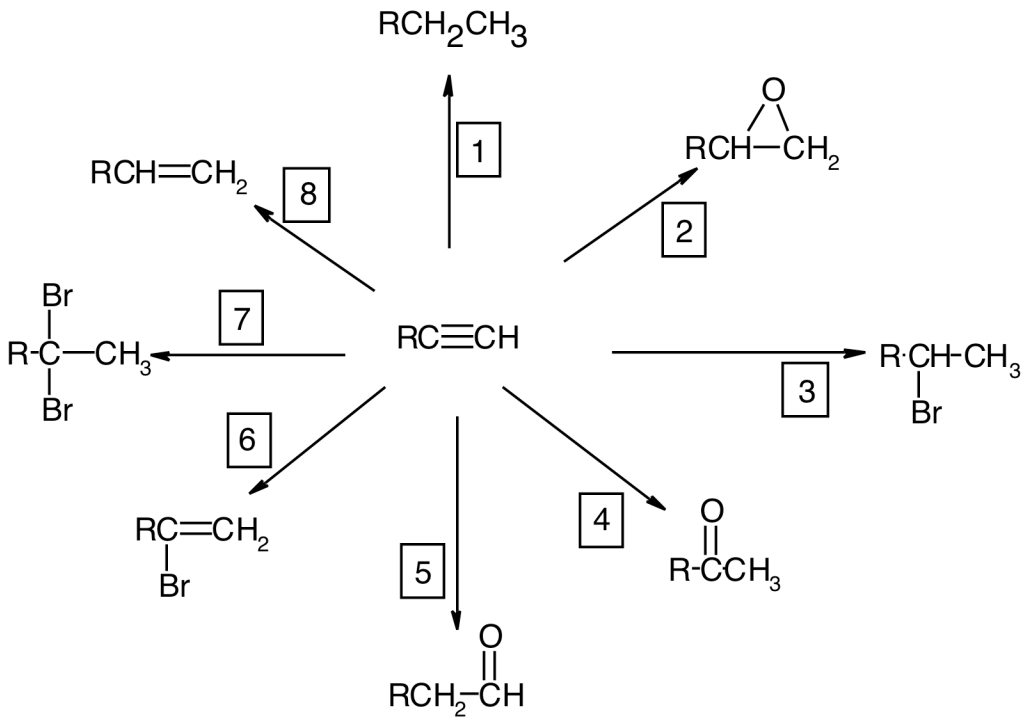
__ C. The cations labelled **a**, **b**, and **e** would be expected to rearrange.

__ D. The cations labelled **c**, **d**, and **f** would be expected to rearrange.

__ E. All of these cations would be expected to rearrange.

Rationale:
Chapter 4 Problem 15

8. 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 7 is Br_2 in CH_2Cl_2.

__ B. The reagent used to carry out the synthesis associated with box 1 is excess H_2 with Pd/C.

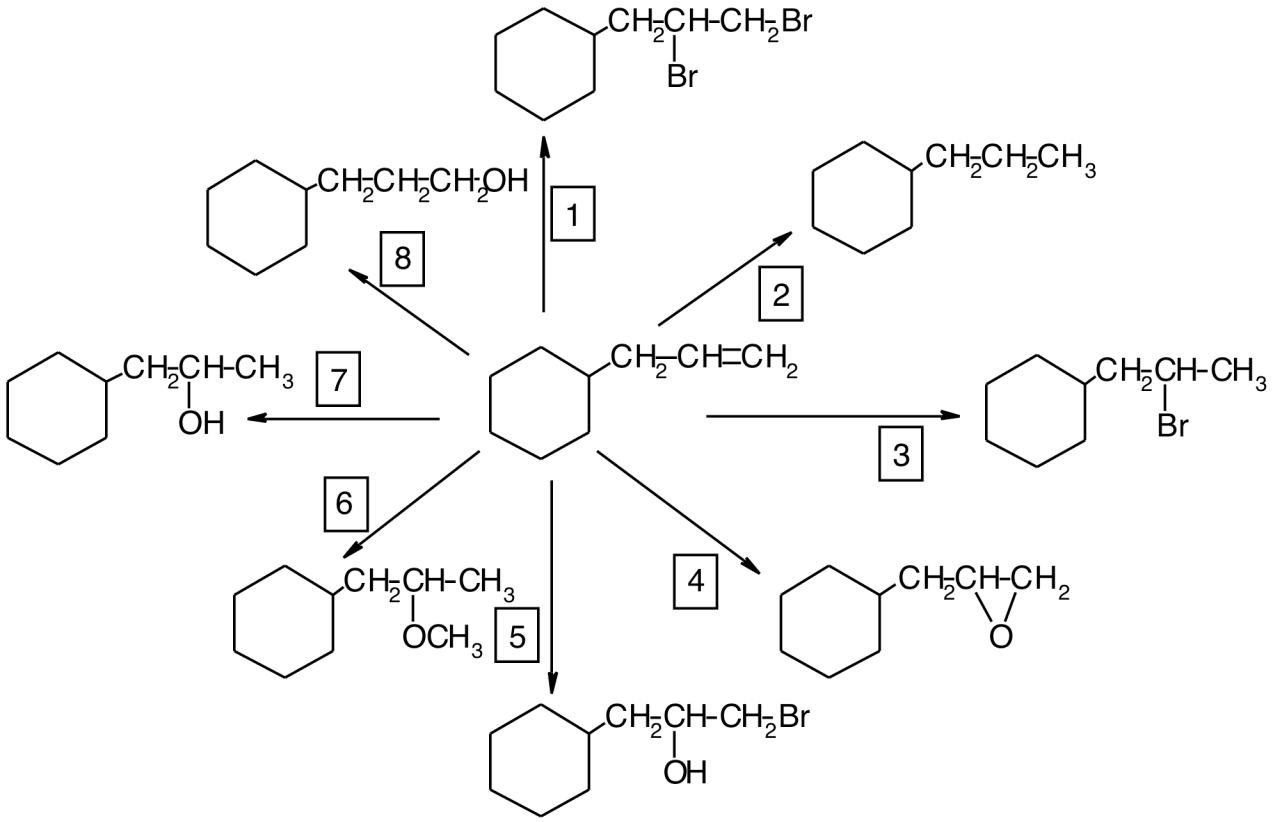
__ C. The reagent used to carry out the synthesis associated with box 8 is excess H_2 with Pd/C.

__ D. The reagents used to carry out the synthesis associated with box 5 are BH_3 followed by HO^-, H_2O_2, and H_2O.

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

Rationale:
Chapter 6 Problem 29

9. The compound whose structure is shown in the center of the figure following can be converted into all of the other outer compounds whose structures are shown. Conversion number 1 transforms the center compound into the topmost compound in the figure (see boxed number 1). Conversion number 2 transforms the center compound into the outer compound one position clockwise from the topmost compound, etc. (ie. the conversion numbers are arranged in a clockwise pattern). Use this information to find the multiple choice answer which is **CORRECT**.



__ A. Conversion number 3 can be carried out using Br_2/CH_2Cl_2.

__ B. Conversion number 1 can be carried out using Br_2 and H_2O.

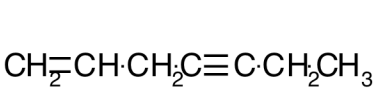
__ C. Conversion number 5 can be carried out using Br_2 and CH_3OH.

__ D. Conversion number 2 can be carried out using H_2SO_4/H_2O.

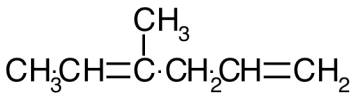
__ E. Conversion number 8 can be carried out using BH_3 followed by H_2O_2 and base (HO^-).

Rationale:
similar to Chapter 4 Problem 47

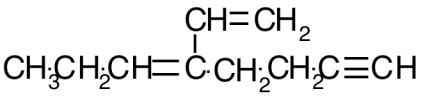
10. Pick the choice which gives a **CORRECT** systematic name for one of the compounds whose structures are shown below.



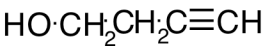
a



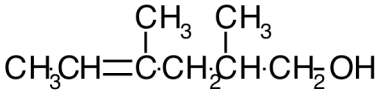
b



c



d



f

__ A. Compound **d** is 1-butyn-4-ol.

__ B. Compound **f** is 2,4-dimethyl-4-hexen-1-ol.

__ C. Compound **c** is 3-(3-butynyl)-1,3-hexadiene.

__ D. Compound **b** is 3-methyl-2,5-hexadiene.

__ E. Compound **a** is 3-heptyn-6-ene.

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

11. Pick the choice which **CORRECTLY** describes how cis-2-octene could be synthesized starting with acetylene.

__ A. First react the acetylene with $^{-}NH_2$. Next react with $CH_3CH_2CH_2CH_2CH_2CH_2Br$. Finally react with H_2/Lindlar catalyst to form cis-2-octene.

__ B. First react the acetylene with $^{-}NH_2$. Next react with $CH_3CH_2CH_2CH_2CH_2CH_2Br$. Finally react with H_2 and Pt/C to form cis-2-octene.

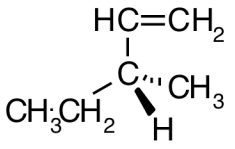
__ C. First react the acetylene with $^{-}NH_2$. Next react with $CH_3CH_2CH_2CH_2CH_2CH_2Br$. Finally react with $Na/NH_3(l)$ catalyst to form cis-2-octene.

__ D. First react the acetylene with $^{-}NH_2$. Next react with CH_3Br. Next react with more $^{-}NH_2$. Next react with $CH_3CH_2CH_2CH_2CH_2Br$. Finally react with H_2/Lindlar catalyst to form cis-2-octene.

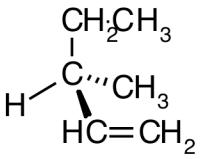
__ E. First react the acetylene with $^{-}NH_2$. Next react with CH_3Br. Next react with more $^{-}NH_2$. Next react with $CH_3CH_2CH_2CH_2CH_2Br$. Finally react with $Na/NH_3(l)$ to form cis-2-octene.

Rationale:
Chapter 6 Problem 51a

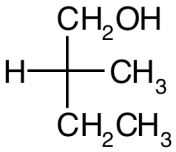
12. Figure out whether each of the following pairs of compounds are identical, or are enantiomers, diastereomers, or constitutional isomers. Pairs of compounds share the same letter, like **a1** and **a2**. Choose the **CORRECT** statement from the multiple choices.



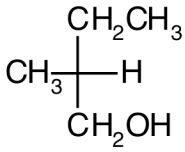
a1



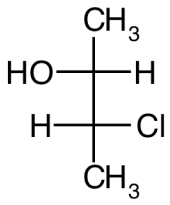
a2



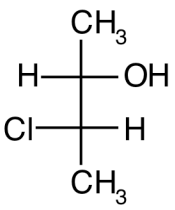
b1



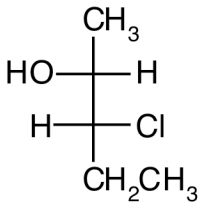
b2



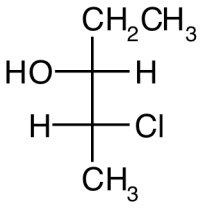
c1



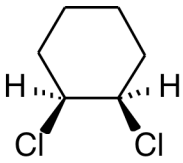
c2



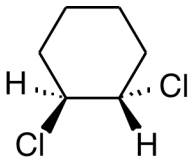
d1



d2



f1



f2

__ A. **a1** and **a2** are identical.

__ B. **c1** and **c2** are diasteriomers.

__ C. **b1** and **b2** are enantiomers.

__ D. **f1** and **f2** are enantiomers.

__ E. **d1** and **d2** are diasteriomers.

Rationale:
similar to Chapter 5 Problem 76 (a,b,c,d,f)

13. Pick the choice which **CORRECTLY** describes how 4-bromo- 3-hexanol could be synthesized starting with acetylene.

__ A. First react the acetylene with $^{-}NH_2$. Next react with CH_3CH_2Br. Next react with more $^{-}NH_2$. Next react with more CH_3CH_2Br. Next react with Br_2/CH_2Cl_2. Finally react with H_2/Pd/C to form 4-bromo- 3-hexanol.

__ B. First react the acetylene with $^{-}NH_2$. Next react with CH_3CH_2Br. Next react with more $^{-}NH_2$. Next react with more CH_3CH_2Br. Next react with H_2 and Pd/C. Finally react with Br_2/CH_2Cl_2 to form 4-bromo- 3-hexanol.

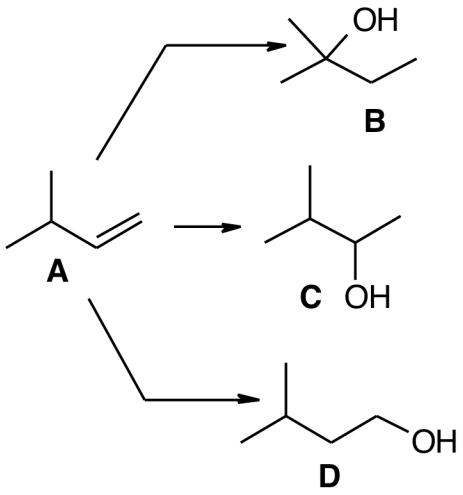
__ C. First react the acetylene with $^{-}NH_2$. Next react with CH_3CH_2Br. Next react with more $^{-}NH_2$. Next react with more CH_3CH_2Br. Next react with Br_2/H_2O. Finally react with $Na/NH_3(l)$ catalyst to form 4-bromo- 3-hexanol.

__ D. First react the acetylene with $^{-}NH_2$. Next react with CH_3CH_2Br. Next react with more $^{-}NH_2$. Next react with more CH_3CH_2Br. Next react with Br_2/H_2O. Finally react with H_2/Lindlar catalyst to form 4-bromo- 3-hexanol.

__ E. First react the acetylene with $^{-}NH_2$. Next react with CH_3CH_2Br. Next react with more $^{-}NH_2$. Next react with more CH_3CH_2Br. Next react with H_2/Lindlar catalyst. Finally react with Br_2/H_2O to form 4-bromo- 3-hexanol.

Rationale:
Chapter 6 Problem 51c

14. Figure out what reagents are required to convert the alkene labelled **A** shown below into the alcohols labelled **B**, **C**, and **D**. Choose the **CORRECT** statement from the multiple choices.



__ A. Alkene **A** will react with: 1. BH_3/THF; followed by 2. H_2O_2, HO^{-}, H_2O to form alcohol **C**.

__ B. Alkene **A** will react with: 1. $Hg(OAc)_2$, H_2O/THF; followed by 2. $NaBH_4$ to form alcohol **D**.

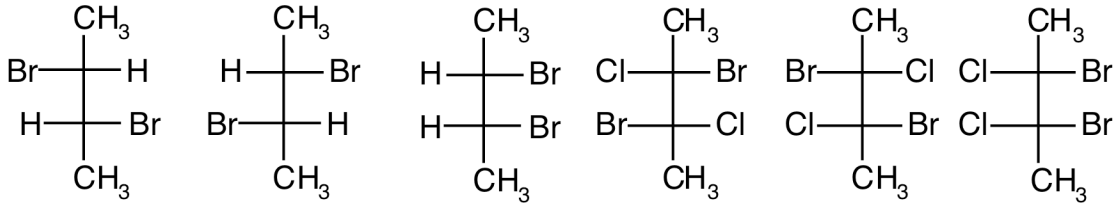
__ C. Alkene **A** will react with H_2O and H_2SO_4 to form alcohol **C**.

__ D. Alkene **A** will react with H_2O and H_2SO_4 to form alcohol **D**.

__ E. Alkene **A** will react with H_2O and H_2SO_4 to form alcohol **B**.

Rationale:
Chapter 4 Problem 43

15. 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. $Na/NH_3(liq)$, followed by 2. Br_2/CH_2Cl_2 gives the products with structures **4** and **5** only.

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

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

__ D. Reaction with, 1. Cl_2/CH_2Cl_2, followed by 2. Br_2/CH_2Cl_2 gives the products with structure **6** only.

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

Rationale:
Chapter 6 Problem 44

Answer Key

"Grade or Education" = 1

CHEM 2261/01
Summer 09
Exam 2
Chapters 4-6

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