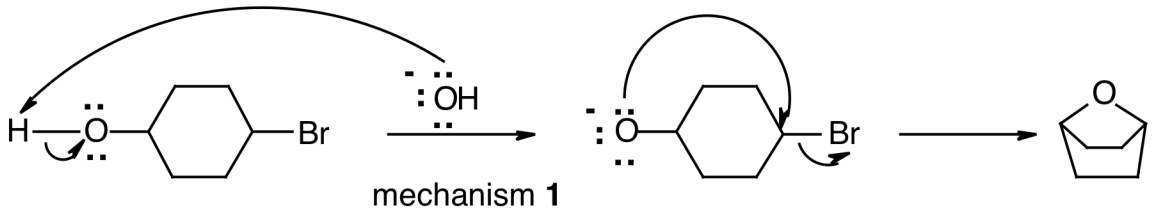
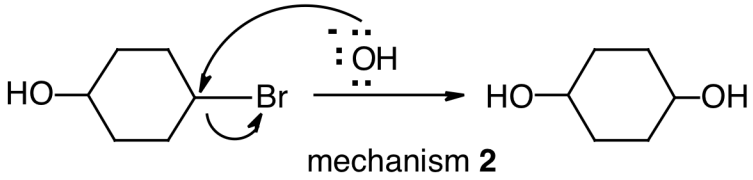
"Grade or Education" = 1

CHEM 2261/01
Summer 10
Exam 3
Chapters 7-9

1. Two curved-arrow mechanisms are shown for the reaction of 4-bromocyclohexanol with HO^- to form substitution products. Figure out the substitution mechanism(s) for the reaction of cis-4-bromocyclohexanol and trans-4-bromocyclohexanol with HO^- to form product(s). Choose the **CORRECT** statement from the multitple choices.





__ A. trans-4-bromocyclohexanol cannot react by either mechanism.

__ B. cis-4-bromocyclohexanol undergoes mechanism **1** .

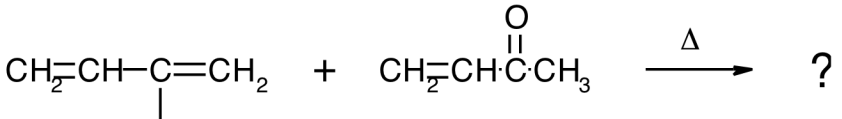
__ C. Both cis-4-bromocyclohexanol and trans-4-bromocyclohexanol undergo mechanism **1** .

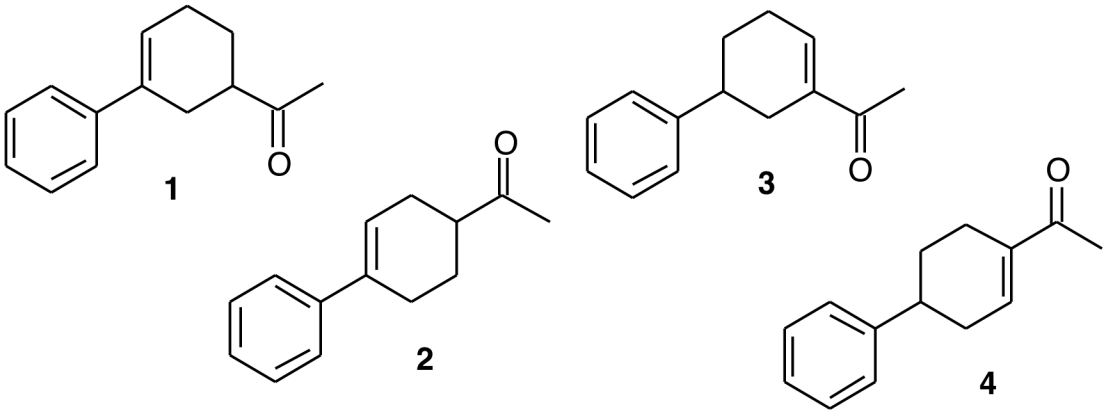
__ D. Neither cis-4-bromocyclohexanol nor trans-4-bromocyclohexanol undergo mechanism **2** .

__ E. cis-4-bromocyclohexanol undergoes mechanism **2** .

Rationale:
Chapter 9 Problem 55a

2. Find the **MAJOR** product of the Diels-Alder reaction shown below among the numbered structures shown below the reaction. Make certain that you use the preferred alignment of the reactants to generate the major product. Pick the choice which gives the number found under the correct structure of this product.





__ A. **4**

__ B. **3**

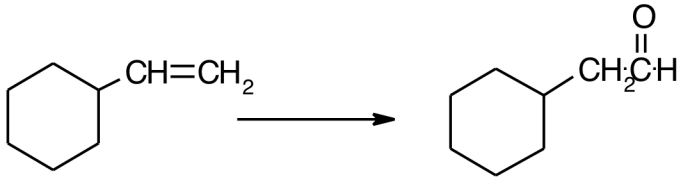
__ C. None of the numbered structures is the major product of this reaction.

__ D. **2**

__ E. **1**

Rationale:
Chapter 7 Problem 71b

3. For the target compound whose structure is shown below choose the multistep synthesis which could be used to prepare it from the given starting material.



__ A. First: Br_2/CH_2Cl_2; Next: excess $^-NH_2$; Finally: H_2SO_4/H_2O

__ B. First: Br_2/CH_2Cl_2; Next: excess $^-NH_2$; Finally: $H_2SO_4/HgSO_4$

__ C. First: Br_2/CH_2Cl_2; Next: excess $^-NH_2$; Finally: 1. disiamylborane and 2. HO^-, H_2O_2, H_2O

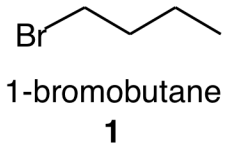
__ D. First: Br_2/H_2O; Next: $^-NH_2$

__ E. First: HBr/CH_2Cl_2; Next: $^-NH_2$; Finally: 1. BH_3/THF and 2. HO^-, H_2O_2, H_2O

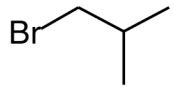
Rationale:
Chapter 9 Problem 31b

4. Indicate whether the alkyl halides listed in the table below will give primarily substitution products (S), only elimination products (E), both substitution and elimination products (S & E), or no products (X) when they are treated with the reagents under the reaction conditions shown in the table below. Put the correct abbreviations for substitution (S), Elimination (E) or no reaction (X) in the product column of the table for each reaction shown. These reactions are designated **a1** through **b4** in the multiple choices as presented in the table. Pick the **CORRECT** statement from the multiple choices.

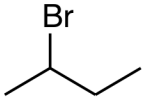
Rxn	Alkyl Halide	Reaction Conditions	Products
a1	1-bromobutane	methanol under $S_N1/E1$	
a2	1-bromo-2-methylpropane	methanol under $S_N1/E1$	
a3	2-bromobutane	methanol under $S_N1/E1$	
a4	2-bromo-2-methylpropane	methanol under $S_N1/E1$	
b1	1-bromobutane	sodium methoxide under $S_N2/E2$	
b2	1-bromo-2-methylpropane	sodium methoxide under $S_N2/E2$	
b3	2-bromobutane	sodium methoxide under $S_N2/E2$	
b4	2-bromo-2-methylpropane	sodium methoxide under $S_N2/E2$	



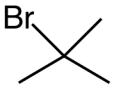
1-bromobutane
1



1-bromo-2-methylpropane
2



2-bromobutane
3



2-bromo-2-methylpropane
4

__ A. Reaction **b4** gives primarily substitution products.

__ B. Reaction **a2** gives both substitution and elimination products.

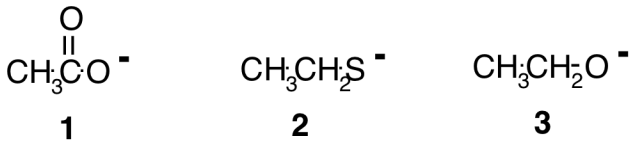
__ C. Reaction **a1** gives no products.

__ D. Reaction **b3** gives only elimination products.

__ E. Reaction **a4** gives no products.

Rationale:
Chapter 9 Problem 22

5. Rank the ions whose structures are shown below in order of **DECREASING** nucleophilicity in methanol (strongest nucleophile listed first).



1 **2** **3**

__ A. **1** > **3** > **2**

__ B. **3** > **2** > **1**

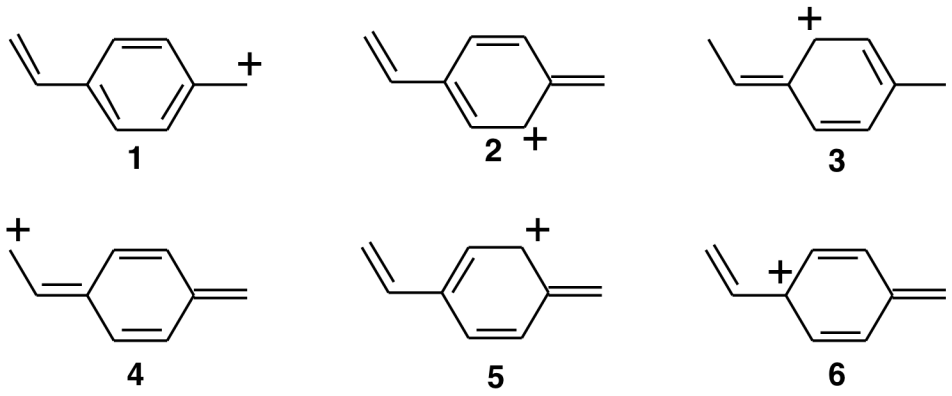
__ C. **2** > **1** > **3**

__ D. **1** > **2** > **3**

__ E. **2** > **3** > **1**

Rationale:
Chapter 8 Problem 42a

6. Pick the number of the structure which is **NOT** a correct resonance contributor for the ion labelled **1** , shown below.



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

__ A. **5**

__ B. **2**

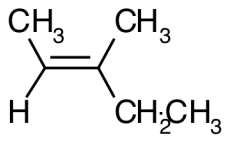
__ C. **4**

__ D. **6**

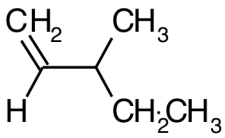
__ E. **3**

Rationale:
Chapter 7 Problem 44b

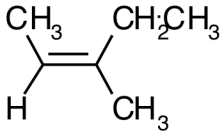
7. Find the elimination product(s) of (2S,3S)-2-chloro-3-methylpentane + high concentration of CH_3O^- among the numbered structures below. Choose the **CORRECT** product(s) of this reaction.



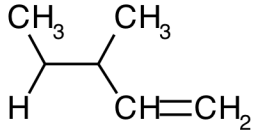
1



2



3



4

__ A. **1** and **3** are both products of this reaction.

__ B. **4** is the product of this reaction.

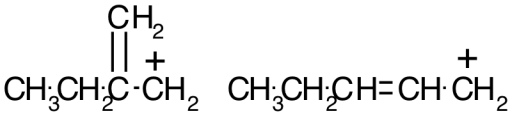
__ C. **1** is the product of this reaction.

__ D. **2** is the product of this reaction.

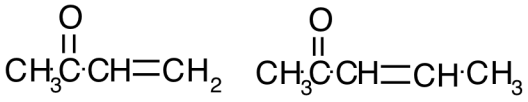
__ E. **3** is the product of this reaction.

Rationale:
Chapter 9 Problem 48a

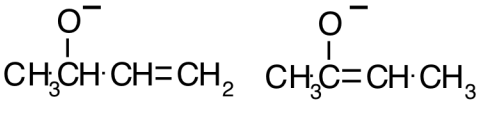
8. Figure out which species is the more stable of each of the labelled pairs shown below. A pair of species share the same letter, like **a1** and **a2**. Choose the statement which is **CORRECT** about the relative stabilities of these pairs of species.



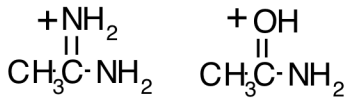
a1 **a2**



b1 **b2**



c1 **c2**



d1 **d2**

__ A. **c1** is more stable than **c2**.

__ B. None of the other choices is correct.

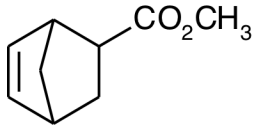
__ C. **d2** is more stable than **d1**.

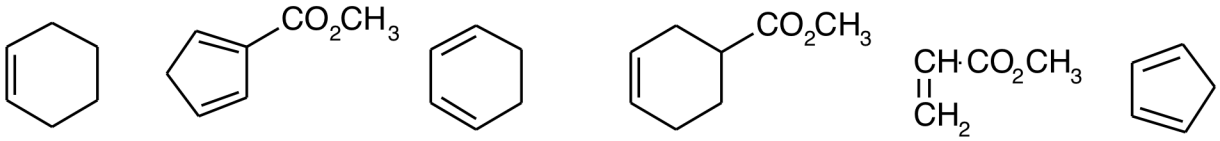
__ D. **a1** is more stable than **a2**.

__ E. **b2** is more stable than **b1**.

Rationale:
Chapter 7 Problem 7

9. How could the compound below be synthesized using a Diels-Alder reaction? Choose the **CORRECT** structures of the two substances which react with one another to form this Diels-Alder product.





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

__ A. Compounds **5** and **6** can be used in this reaction.

__ B. Compounds **1** and **2** can be used in this reaction.

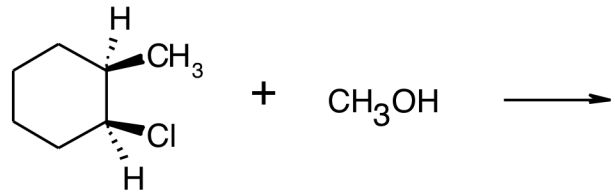
__ C. Compounds **4** and **6** can be used in this reaction.

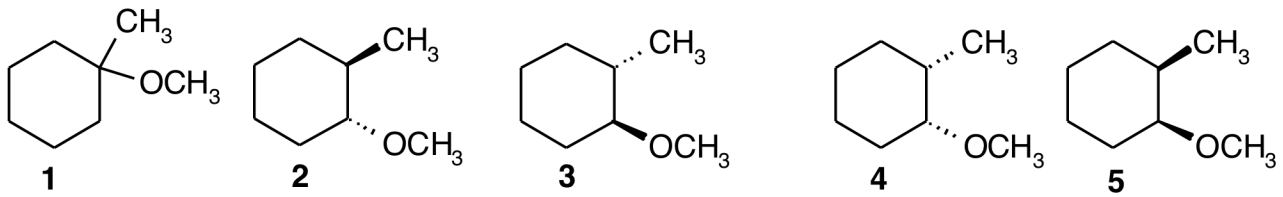
__ D. Compounds **3** and **4** can be used in this reaction.

__ E. Compounds **5** and **3** can be used in this reaction.

Rationale:
Chapter 7 Problem 64b

10. Choose the **CORRECT** major substitution product(s) of the reaction shown below. Choose the correct stereoisomer(s) if stereoisomer(s) is/are produced.





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

__ A. **2** and **5** are the major substitution products of this reaction.

__ B. **1** , **2** , **3** , **4** and **5** are the major substitution products of this reaction.

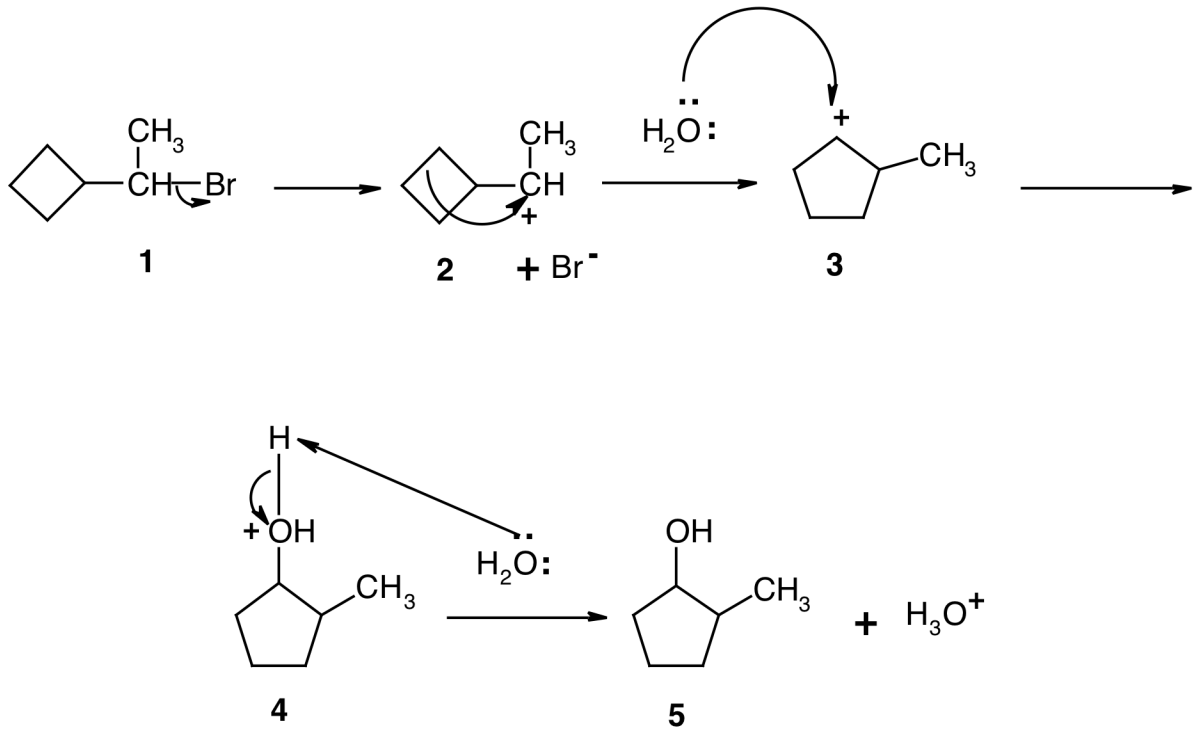
__ C. **1** is the major substitution product of this reaction.

__ D. **2** , **3** , **4** and **5** are the major substitution products of this reaction.

__ E. **3** and **4** are the major substitution products of this reaction.

Rationale:
similar to Chapter 8 Problem 25d

11. Shown below is a curved-arrow mechanism for converting structure **1** into structure **5** . Which structure has the curved arrow(s) associated with it drawn **INCORRECTLY**?



__ A. **1**

__ B. **4**

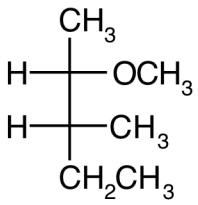
__ C. **5**

__ D. **2**

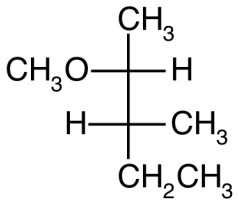
__ E. **3**

Rationale:
Chapter 8 Problem 62a

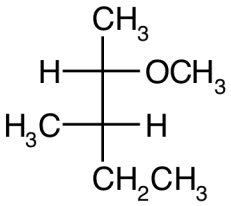
12. Choose the **CORRECT** substitution product(s) of the reaction of (2S,3S)-2-chloro-3-methylpentane with a high concentration of CH_3O^- from below. Choose the correct stereoisomer(s) if stereoisomer(s) is/are produced.



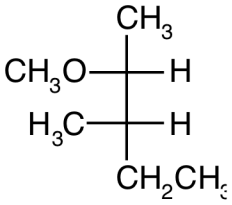
1



2



3



4

__ A. **2** is produced by this reaction.

__ B. **3** is produced by this reaction.

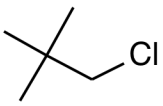
__ C. **1** and **2** are produced by this reaction.

__ D. **4** is produced by this reaction.

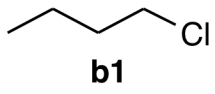
__ E. **3** and **4** are produced by this reaction.

Rationale:
Chapter 8 Problem 52a

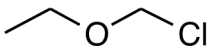
13. Use the numbered structures shown below to choose the **CORRECT** statement from the multiple choices.



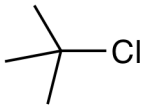
a



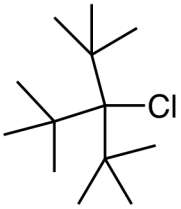
b1



b2



c1



c2

__ A. **c2** will react with H_2O faster than **c1** will.

__ B. $(CH_3)_3CBr$ will react faster with CH_3CH_2OH than it will with H_2O.

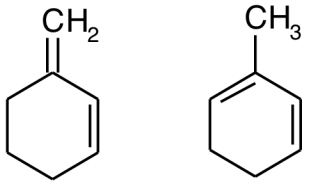
__ C. **b1** will react with HO^- faster than **b2** will.

__ D. $(CH_3)_2CHS^-$ will react faster with **a** than CH_3S^- will.

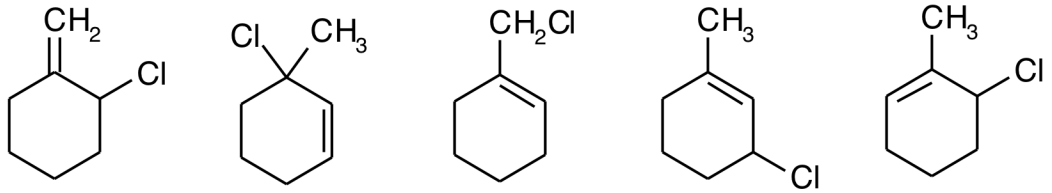
__ E. **b2** will not react with HO^-.

Rationale:
Chapter 8 Problem 48

14. Find the structures of the major 1,2 and 1,4 addition products resulting from the reaction of diene **a** (shown below) with HCl. Figure out which structure is the kinetic product of this reaction and which structure is the thermodynamic product. Choose the **CORRECT** statement from the multiple choices.



a **c**



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

__ A. The kinetic product has structure **2** and the thermodynamic product has structure **4** .

__ B. The kinetic product has structure **4** and the thermodynamic product has structure **2** .

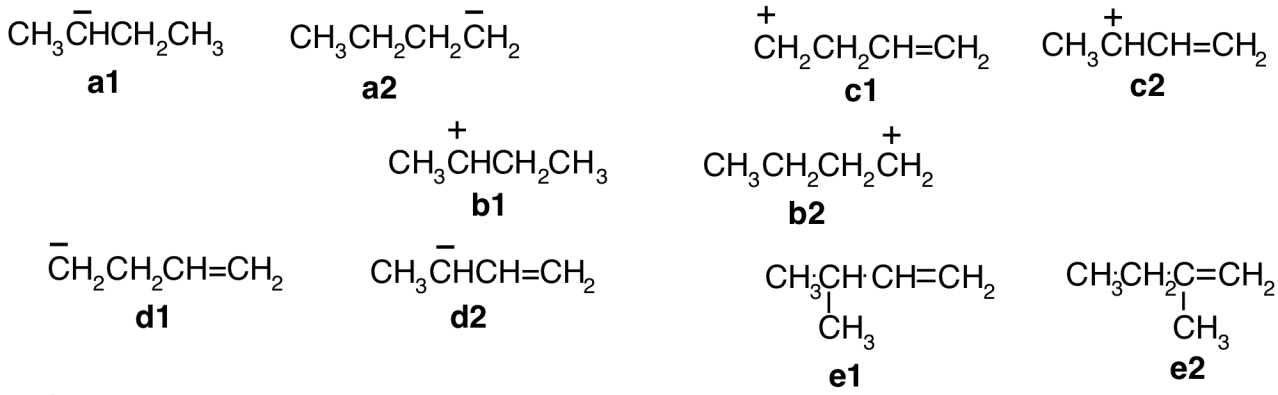
__ C. Both the kinetic and the thermodynamic products have structure **5** .

__ D. The kinetic product has structure **1** and the thermodynamic product has structure **3** .

__ E. The kinetic product has structure **3** and the thermodynamic product has structure **1** .

Rationale:
Chapter 7 Problem 31a

15. Figure out which speciec in each of the pairs shown below is more stable. Pairs of structures share the same letter, like **a 1** and **a 2** . Pick the **CORRECT** statement from the multiple choices.



a1 **a2** **c1** **c2**

b1 **b2**

d1 **d2** **e1** **e2**

__ A. **c 1** is more stable than **c 2** .

__ B. **d 2** is more stable than **d 1** .

__ C. **e 1** is more stable than **e 2** .

__ D. **a 1** is more stable than **a 2** .

__ E. **b 2** is more stable than **b 1** .

Rationale:
Chapter 9 Problem 35(a,b,c,d,e)

Answer Key

"Grade or Education" = 1

CHEM 2261/01
Summer 10
Exam 3
Chapters 7-9

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