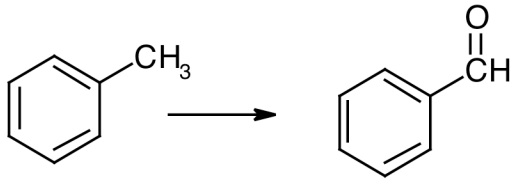
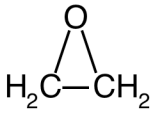
"Grade or Education" = 1

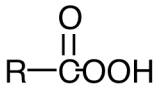
CHEM 2261/01
Summer 09
Exam 4
Chapters 10, 11, 14

1. Pick the choice which **CORRECTLY** describes how the following synthesis could be carried out. Note the abbreviations used in the multiple choices for several reagents or solvents whose structures are shown below the synthesis.

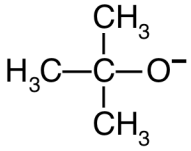




EO

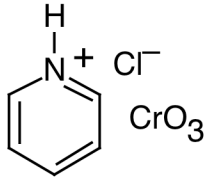


RCO_3H



***tert*-BuO^-**

Et_2O



PCC

__ A. First: $Br_2/h\nu$; Next: HO^-; Finally: H_2CrO_4

__ B. First: $Br_2/h\nu$; Next: HO^-; Finally: **PCC**

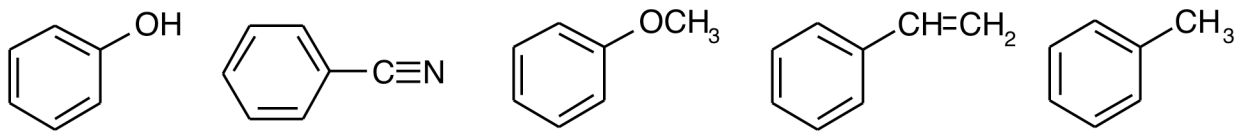
__ C. First: $Br_2/h\nu$; Next: **tert-BuO$^-$** ; Next: **EO** ; Finally: HO^-

__ D. First: $Br_2/h\nu$; Next: Mg/**Et_2O** ; Next: H_2O; Finally: H_2CrO_4

__ E. First: $Br_2/h\nu$; Next: Mg/**Et_2O** ; Next: H_2O; Finally: **PCC**

Rationale:
Chapter 11 Problem 19b

2. Figure out the names of the five compounds whose structures are shown below. Choose the one which is **CORRECTLY** named in the multiple choices.



a **c** **e** **f** **g**

__ A. Compound **e** is styrene.

__ B. Compound **a** is phenol.

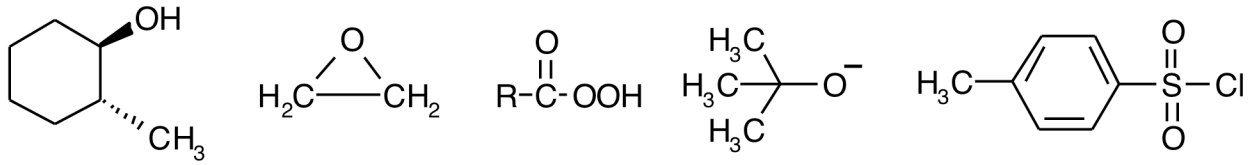
__ C. Compound **g** is anisole.

__ D. Compound **c** is phenylnitrile.

__ E. Compound **f** is toluene.

Rationale:
Chapter 14 Problem 35(a,c,e,f,g)

3. Pick the choice which **CORRECTLY** describes how bromocyclohexane can be converted into the compound whose structure, labelled **51c**, is shown below Note that abbreviations have been used for some reagents used in the proposed syntheses; structures of these reagents are also shown below..



51c **EO** **RCO_3H** **tert-BuO^-** **TsCl**

__ A. First react the bromocyclohexane with **TsCl**. Next react with **EO**. Next react with **tert-BuO^-**. Finally react with **RCO_3H**.

__ B. First react the bromocyclohexane with **tert-BuO^-**. Next react with **EO**. Finally react with: 1. CH_3MgBr, followed by 2. H^+.

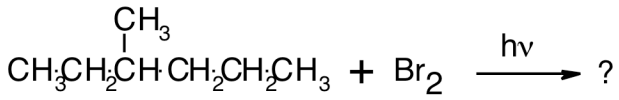
__ C. First react the bromocyclohexane with **tert-BuO^-**. Next react with **RCO_3H**. Finally react with: 1. CH_3MgBr, followed by 2. H^+.

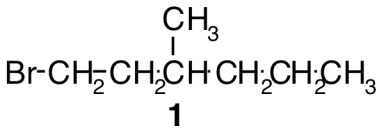
__ D. First react the bromocyclohexane with ^-OH. Next react with **TsCl**. Finally react with CH_3MgBr.

__ E. First react the bromocyclohexane with Mg/ether. Next react with **EO**. Finally react with CH_3Br followed by H^+.

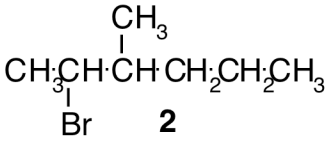
Rationale:
not in current text

4. Find the major product of the reaction shown below. Ignore stereochemistry.

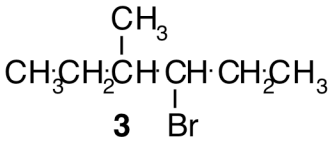




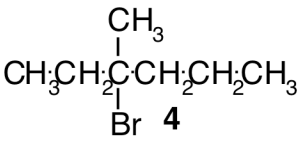
1



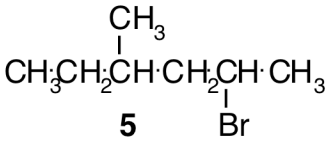
2



3



4



5

__ A. **1** is the major product of this reaction.

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

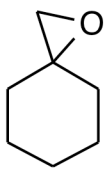
__ C. **3** is the major product of this reaction.

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

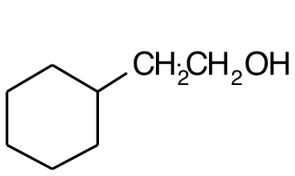
__ E. **5** is the major products of this reaction.

Rationale:
similar to Chapter 11 Problem 22c

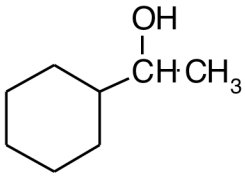
5. By looking at the labelled structures below figure out which of the multiple choices specifies the **CORRECT** product of a reaction.



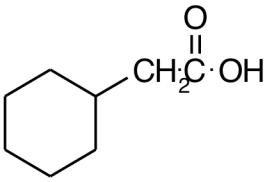
ef



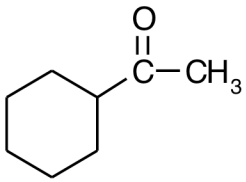
d



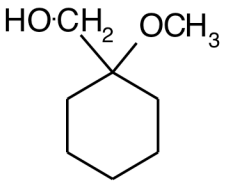
i



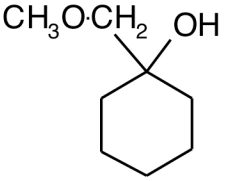
1



2



3



4

__ A. **ef** + $H^+/CH_3OH \rightarrow$ **d**

__ B. **ef** + $H^+/CH_3OH \rightarrow$ **4**

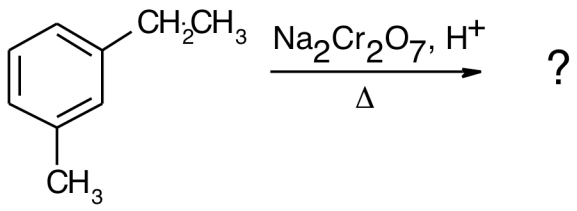
__ C. **ef** + $CH_3O^-/CH_3OH \rightarrow$ **4**

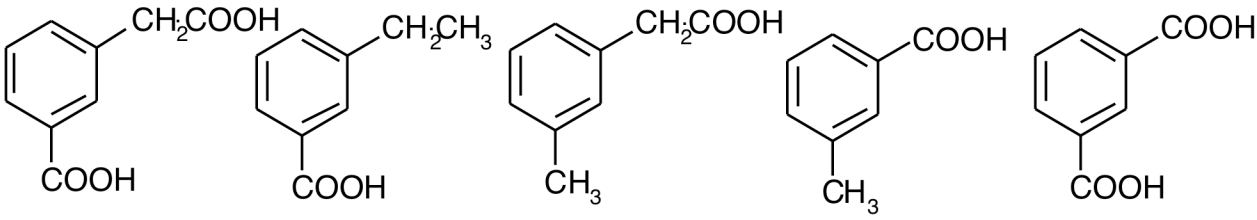
__ D. **d** + $H_2CrO_4 \rightarrow$ **2**

__ E. **i** + $H_2CrO_4 \rightarrow$ **1**

Rationale:
similar to Chapter 10 Problem 38

6. Choose number of the **CORRECT** structure of the product of the following reaction:





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

__ A. **3**

__ B. **5**

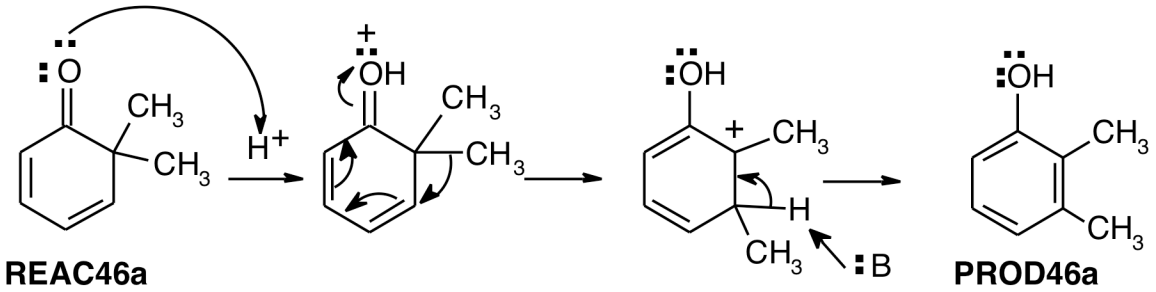
__ C. **2**

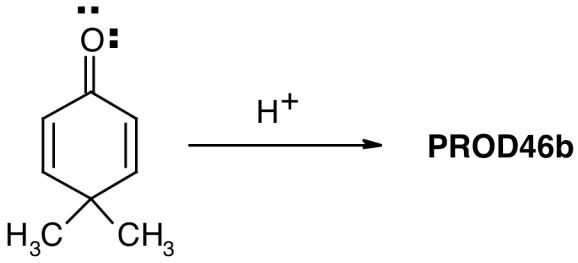
__ D. **4**

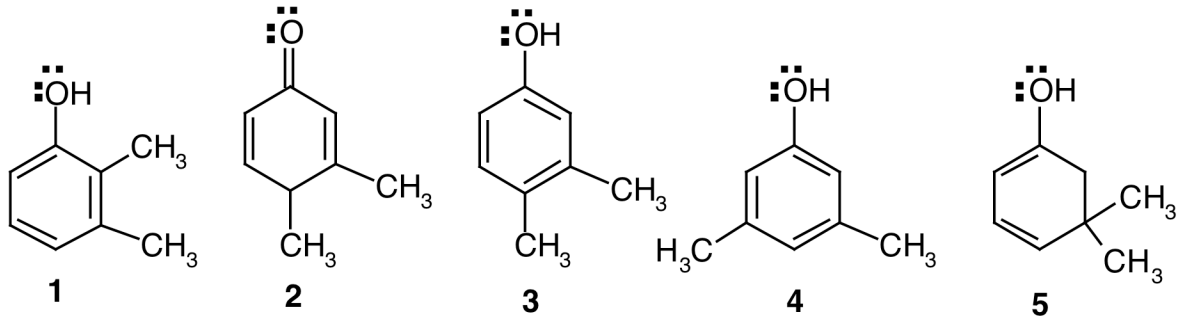
__ E. **1**

Rationale:
moved to Chapter 16

7. Examine the reaction mechanism shown below for the conversion of **REAC46a** into **PROD46a**. Based on this mechanism what is the **CORRECT** structure of **PROD46b**?







__ A. **2**

__ B. **4**

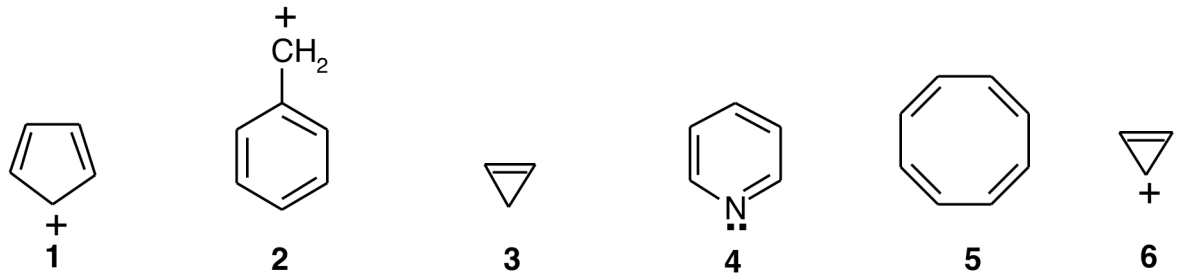
__ C. **1**

__ D. **3**

__ E. **5**

Rationale:
Chapter 14 Problem 51b

8. Classify each of the five numbered structures below as aromatic, nonaromatic, or antiaromatic. (Hint: If possible a ring will be nonplanar to avoid being antiaromatic.) Choose the **CORRECT** statement.



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

__ A. **1** is nonaromatic.

__ B. **3** and **5** are antiaromatic.

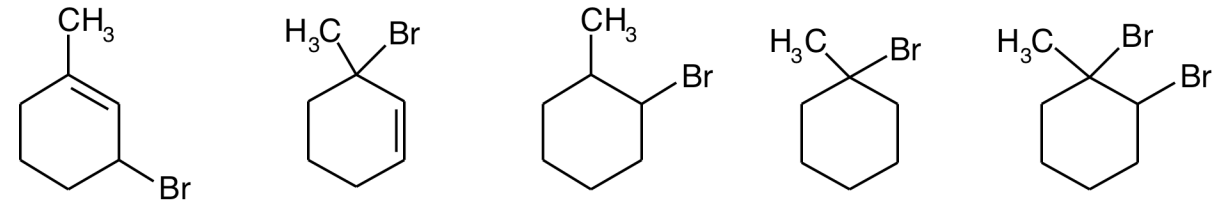
__ C. **1**, **3**, and **5** are aromatic.

__ D. **2**, **4**, and **6** are aromatic.

__ E. **5** is antiaromatic.

Rationale:
Chapter 14 Problem 36

9. Find the major products of the reaction of 1-methylcyclohexene with the reagents specified in the multiple choices. Choose the response which **CORRECTLY** matches one or more structures below with a particular reaction. Ignore stereochemistry.



Product 1 Product 2 Product 3 Product 4 Product 5

__ A. Products 1 and 2 are major products of the reaction of 1-methylcyclohexene with Br_2/CH_2Cl_2.

__ B. Product 3 is the major product of the reaction of 1-methylcyclohexene with HBr.

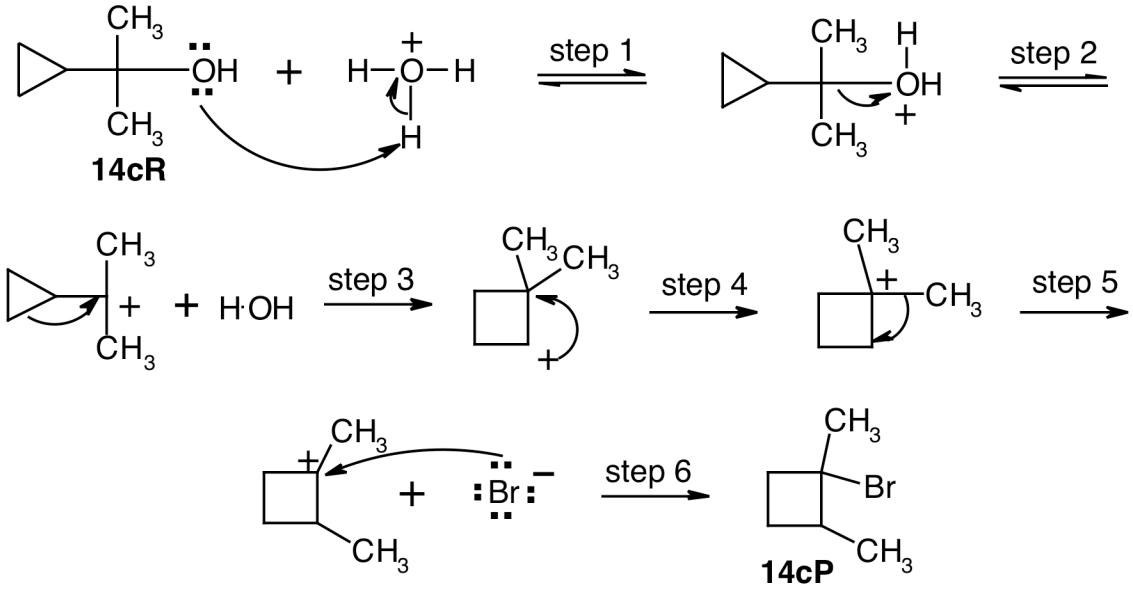
__ C. Products 3 and 4 are major products of the reaction of 1-methylcyclohexene with Br_2/CH_2Cl_2.

__ D. Product 4 is the major product of the reaction of 1-methylcyclohexene with NBS/Δ/peroxide.

__ E. Product 3 is the major product of the reaction of 1-methylcyclohexene with HBr/peroxide.

Rationale:
Chapter 11 Problem 18

10. Examine the proposed 6-step mechanism shown below for the conversion of alcohol **14cR** into bromide **14cP** in the presence of HBr. Which of the steps shown below is/are **WRONG** for this reaction?



__ A. Step 1 is wrong.

__ B. Step 2 is wrong.

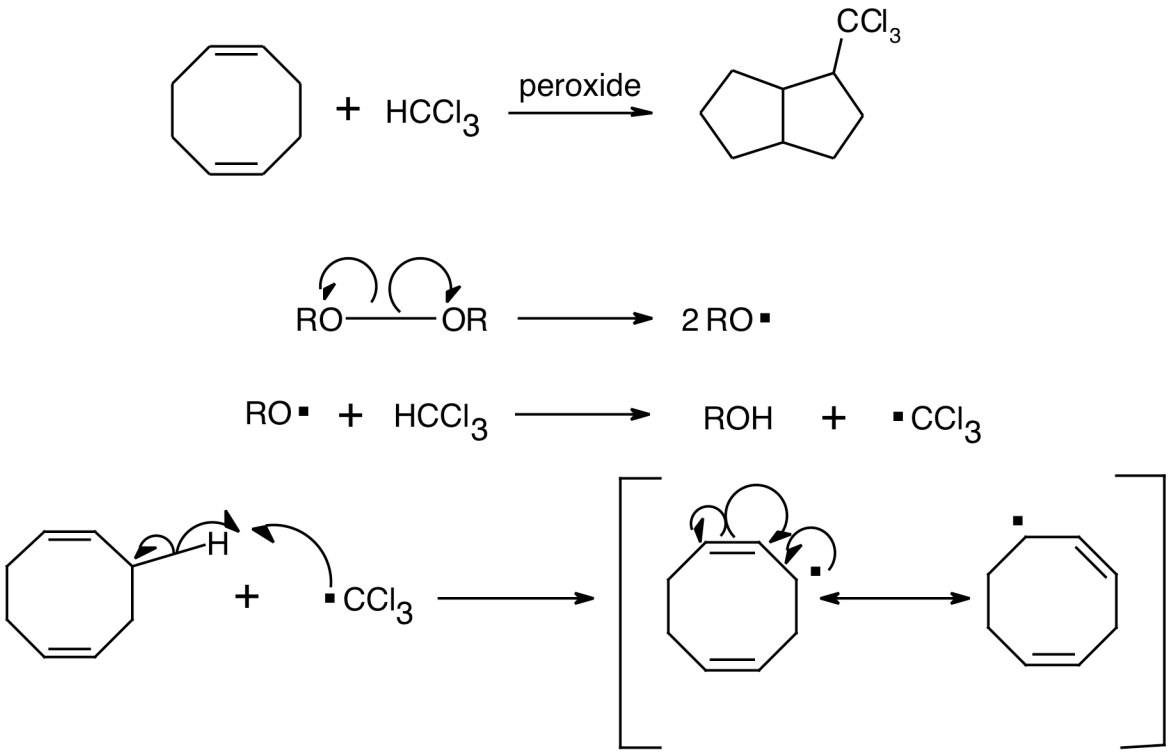
__ C. Steps 1, 2, and 3 are wrong.

__ D. Step 6 is wrong.

__ E. Steps 4 and 5 are wrong.

Rationale:
Chapter 10 Problem 12c

11. Part of the mechanism is shown for the reaction in the figure below. Which of the choices **BEST** describes what happens in the very next step of the mechanism (not shown)?



__ A. The 8-membered ring radical abstracts a hydrogen atom from an $HCCl_3$ molecule.

__ B. The 8-membered ring radical abstracts a hydrogen atom from an ROH molecule.

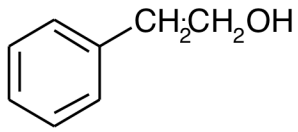
__ C. The lone electron (radical) in the position represented by the rightmost resonance structure attacks the more remote double bond on the exact opposite side of the 8-membered ring forming a structure with two connected 5-membered rings.

__ D. A 1,2 shift of a hydrogen atom occurs, moving the free radical electron one position further counterclockwise along the 8-membered ring.

__ E. The radical on the 8-membered ring attacks a peroxide molecule attaching an OR group to the ring.

Rationale:
Chapter 11 Problem 41

12. Choose the synthetic sequence which gives a **CORRECT** method for preparing 2-phenyl-1-ethanol from benzene.



2-phenyl-1-ethanol

__ A. First: CH_3CH_2Cl and $AlCl_3$; next: NBS/Δ and peroxide; next: tert-BuO^-; finally: H_2O and H_2SO_4.

__ B. First: CH_3CH_2COCl and $AlCl_3$; next: NBS/Δ and peroxide; next: tert-BuO^-; finally: 1. BH_3 followed by 2. HO^-, H_2O_2, H_2O.

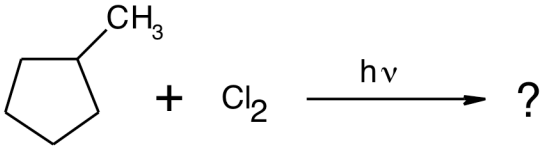
__ C. First: CH_3CH_2Cl and $AlCl_3$; next: NBS/Δ and peroxide; next: tert-BuO^-; next: HBr/CH_2Cl_2; finally: HO^-.

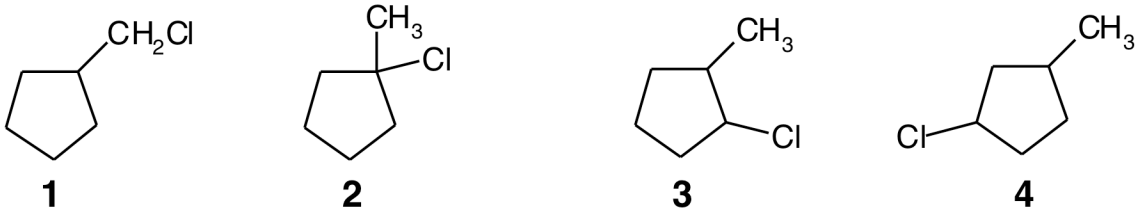
__ D. First: CH_3CH_2COCl and $AlCl_3$; next: Zn(Hg) and HCl/Δ; next: tert-BuO^-; finally: 1. BH_3 followed by 2. HO^-, H_2O_2, H_2O.

__ E. First: CH_3CH_2Cl and $AlCl_3$; next: NBS/Δ and peroxide; next: tert-BuO^-; finally: 1. BH_3 followed by 2. HO^-, H_2O_2, H_2O.

Rationale:
moved to Chapter 16

13. Find the product(s) of the reaction shown below and select the answer which indicates the **CORRECT** product(s).





__ A. The compound labelled **2** is the only correct product.

__ B. The compound labelled **3** is the only correct product.

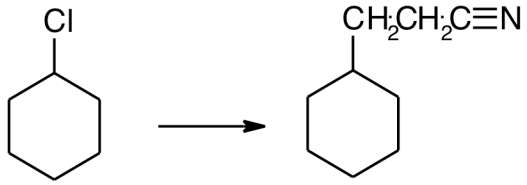
__ C. All four products are formed by this reaction..

__ D. The compound labelled **4** is the only correct product.

__ E. The compound labelled **1** is the only correct product.

Rationale:
Chapter 11 Problem 22f

14. Using the starting material with the structure shown in the figure below, any necessary inorganic reagents, and any carbon-containing compounds with no more than two carbon atoms, figure out how to synthesize the product having the structure shown in the figure. Pick the choice which **CORRECTLY** describes how this synthesis might be accompliched.



__ A. First treat the starting compound with Mg and Et_2O. Next treat the resulting compound with TsCl. Next react with: 1. ethylene oxide, followed by 2. H^+. Finally react with $^-C{\equiv}N$.

__ B. First treat the starting compound with Mg and Et_2O. Next treat the resulting compound with: 1. ethylene oxide, followed by 2. H^+. Next react with TsCl. Finally react with $^-C{\equiv}N$.

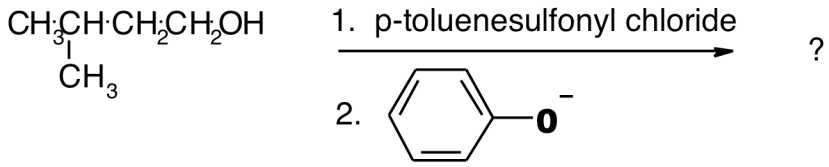
__ C. First treat the starting compound with $CH_2{=}CH_2C{\equiv}N$ and $(Ph_3P)_4Pd/Et_3N$. Then treat the resulting compound with excess $H_2/Pd/C$.

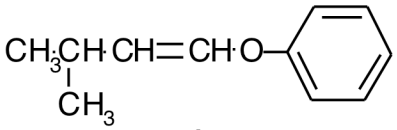
__ D. First treat the starting compound with tert-butoxide. Next react with H_2O/H_2SO_4. Next react with TsCl. Next react with $NaC{\equiv}CH$. Finally react with HCN.

__ E. First treat the starting compound with ^-OH. Next react with TsCl. Next react with: 1. ethylene oxide, followed by 2. H^+. Finally react with $^-C{\equiv}N$.

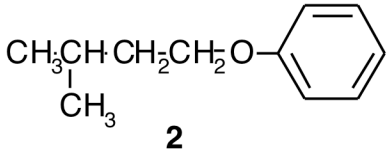
Rationale:
similar to Chapter 11 Problem 25d

15. Choose the **CORRECT** structure of the major product of the reaction shown below.

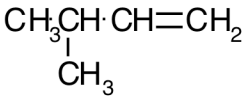




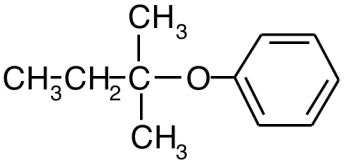
1



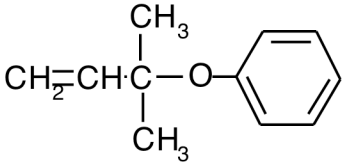
2



3



4



5

__ A. **1** is the major product of this reaction.

__ B. **5** is the major product of this reaction.

__ C. **4** is the major product of this reaction.

__ D. **3** is the major product of this reaction.

__ E. **2** is the major product of this reaction.

Rationale:
Chapter 10 Problem 33c

Answer Key

"Grade or Education" = 1

CHEM 2261/01
Summer 09
Exam 4
Chapters 10, 11, 14

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