

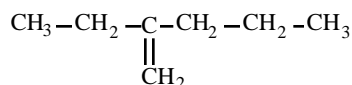
Test 2 Review
McMurry, Chapters 5, 6, and 7

Part I. Multiple choice.

1. What is the degree of unsaturation in $C_{12}H_{16}N_2O_2$?

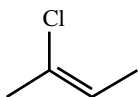
- a) 3
- b) 4
- c) 5
- d) 6
- e) 7

2. What is the correct IUPAC name of the following compound?



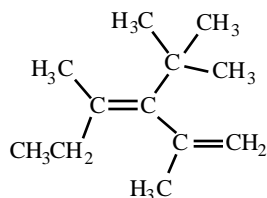
- a) 3-methylene hexane
- b) 2-ethyl-2-propylethene
- c) 2-ethyl-1-pentene
- d) 2-ethyl-2-propylethylene
- e) 3-ethenehexane

3. What is the correct IUPAC name of the compound below?



- a) *trans*-2-chloro-2-butene
- b) (*Z*)-2-chloro-2-butene
- c) (*E*)-2-chloro-2-butene
- d) (*Z*)-1-chloro-2-methyl-2-butene
- e) (*E*)-1-chloro-2-methyl-2-butene

4. What is the correct IUPAC name of the compound below?

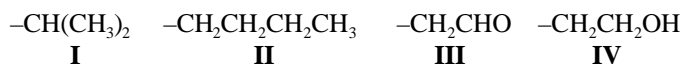


- a) (*Z*)-3-(1,1-dimethylethyl)-2,4-dimethyl-1,3-hexadiene
- b) (*E*)-3-(1,1-dimethylethyl)-2,4-dimethyl-1,3-hexadiene
- c) (*E*)-2,3,3,3,4-pentamethyl-1,3-hexadiene
- d) (*Z*)-2,4-dimethyl-3-(1,1-dimethylethyl)-1,3-hexadiene
- e) (*E*)-2,4-dimethyl-3-(1,1-dimethylethyl)-1,3-hexadiene

5. Which alkyl group below is commonly called an allyl group?

- a) $H_2C=CH-CH_2-$
- b) $H_2C=$
- c) $H_2C=CH-$
- d) $CH_3-CH=CH-CH_2-$
- e) $H_2C=CH-CH_2-CH_2-$

6. Rank the following sets of substituents in order of priority according to the Cahn-Ingold-Prelog sequence rules. Place the *highest* priority substituent *first* and place the *lowest* priority substituent *last*.

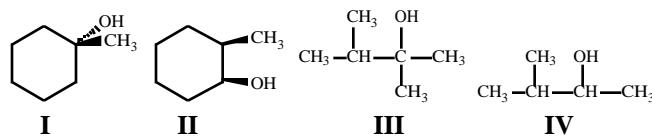


- a) IV > III > I > II
- b) III > IV > II > I
- c) I > II > IV > III
- d) I > III > IV > II
- e) IV > III > II > I

7. Compound A has the formula $C_{10}H_{14}$. On catalytic hydrogenation over palladium, it reacts with 2 molar equivalents of H_2 . How many rings does compound A have?

- a) 0
- b) 1
- c) 2
- d) 3
- e) not enough information to determine

8. Which of the following alcohols could be selectively prepared by hydroboration/oxidation of an alkene?

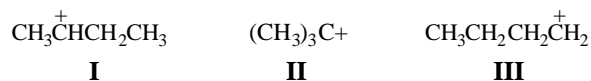


- a) II only
- b) III and IV
- c) II and IV
- d) II, III, and IV
- e) I and II

9. Starting with 1-bromo-2-methylbutane, which of the reaction sequences below would yield 2-chloro-2-methylbutane?

- BH_3 in THF; then H_2O_2 , OH^- ; then Cl_2 in CH_2Cl_2
- Cl_2 in CH_2Cl_2
- CHCl_3 in KOH ; then KMnO_4
- $\text{Hg}(\text{OAc})_2$ in $\text{H}_2\text{O}/\text{THF}$; then NaBH_4 ; then HCl in ether
- KOH in ethanol; then HCl in ether

10. Rank the carbocations below in order of decreasing stability. (That is, list the most stable carbocation first, and the least stable carbocation last.)



- $\text{II} > \text{I} > \text{III}$
- $\text{II} > \text{III} > \text{I}$
- $\text{III} > \text{I} > \text{II}$
- $\text{III} > \text{II} > \text{I}$
- $\text{I} > \text{III} > \text{II}$

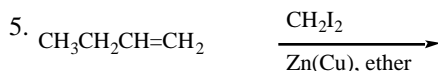
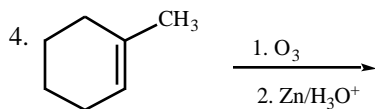
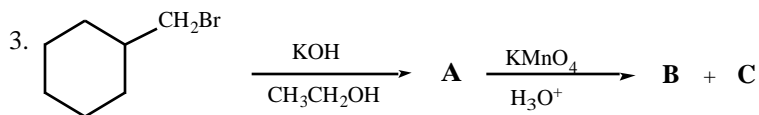
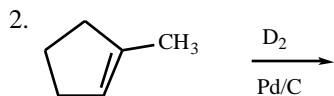
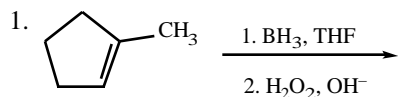
11. Which compound below is expected to have the largest (i.e., most negative) heat of hydrogenation?

- 4-methyl-1-pentene
- 2-methyl-1-pentene
- 2-methyl-2-pentene
- (E)-4-methyl-2-pentene
- (Z)-4-methyl-2-pentene

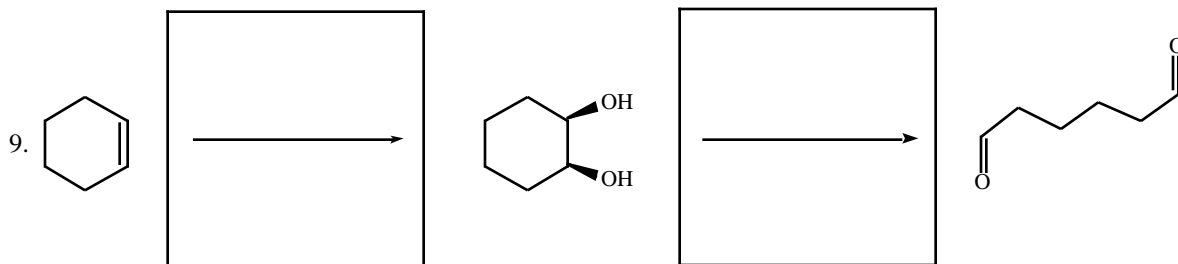
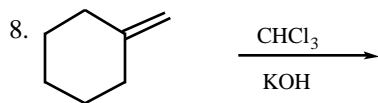
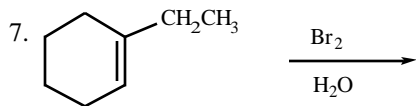
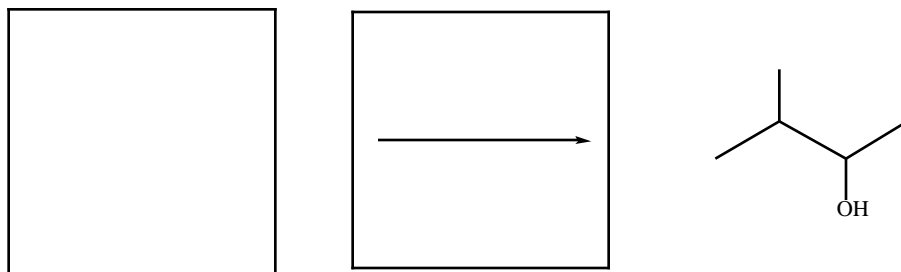
Answers to Multiple Choice Questions

- | | | |
|------|-------|-------|
| 1. D | 6. D | 11. A |
| 2. C | 7. C | |
| 3. B | 8. B | |
| 4. A | 9. E | |
| 5. A | 10. A | |

Part II. Reactions. Complete the reactions below by drawing any missing reactants, products, and/or reagents. Clearly indicate the regiochemistry and stereochemistry when appropriate.



6. What starting alkene would you use (A) and what reagents would be used (B) to synthesize the alcohol below, using oxymercuration?



Part III. Mechanisms.

1. Draw the structure of the transition state that is formed when 1-methylcyclopentene reacts with BH_3 in THF solution. (Only draw the transition state; do not draw the complete mechanism.)
2. Draw the structure of intermediate that is formed when cyclopentene reacts with OsO_4 in pyridine. (Draw only the intermediate; do not draw the complete mechanism.)
3. Draw the complete mechanism for the reaction of cyclopentene with Br_2 in CH_2Cl_2 . Use the curved arrow formalism to indicate every bond broken and every bond formed.
4. When 3,3-dimethylcyclohexene reacts with HCl in ether, one product is 1-chloro-1,2-dimethylcyclohexane. Show the complete mechanism for the formation of this product using the curved arrow formalism.
5. Write the complete mechanism for the monobromination of propane.