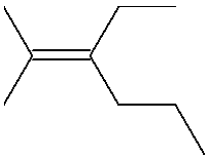
Chemistry 210 - Chapter 5 - Quiz 1

Student: _____

1. Carbon-carbon double bonds do not freely rotate like carbon-carbon single bonds. Why?

   A. The double bond is much stronger and thus more difficult to rotate.
   B. Overlap of the two 2p orbitals of the π bond would be lost.
   C. The shorter bond length of the double bond makes it more difficult for the attached groups to pass each other.
   D. Overlap of the sp^2 orbitals of the carbon-carbon σ bond would be lost.

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

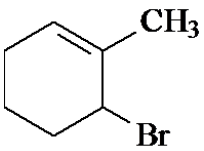


   A. 2-methyl-3-propyl-2-pentene
   B. 3-ethyl-2-methyl-2-hexene
   C. 4-ethyl-methyl-4-hexene
   D. 4-methyl-3-propyl-3-pentene

3. How many isomeric alkenes of formula C_4H_8, including stereoisomers, are possible?

   A. two
   B. three
   C. four
   D. five

4. What is the IUPAC name of the following compound?



   A. 3-bromo-2-methylcyclohexene
   B. 1-bromo-2-methyl-2-cyclohexene
   C. 6-bromo-1-methylcyclohexene
   D. 2-bromo-1-methylcyclohexene

5. Which of the following alkenes exhibit E-Z isomerism?

I. $CH_3CH_2CH{=}CHCH_2CH_3$

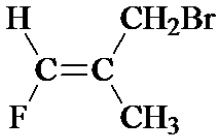
II. $(CH_3)_2C{=}CHCH_3$

III. $CH_3CH_2CH{=}CHBr$

IV. $H_2C{=}CHCH_2CH(CH_3)_2$

A. I and II
B. I and III
C. II and IV
D. I, II, and III

6. What is the IUPAC name of the following compound?



A. (E)-3-bromo-1-fluoro-2-methylpropene
B. (Z)-3-bromo-1-fluoro-2-methylpropene
C. (E)-1-bromo-3-fluoro-2-methylpropene
D. (Z)-1-bromo-3-fluoro-2-methylpropene

7. Identify the major organic product expected from the acid-catalyzed dehydration of 2-methyl-2-pentanol.

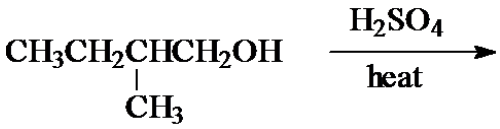
A. 2-methyl-1-pentene
B. 2-methyl-2-pentene
C. 3-methyl-1-pentene
D. *cis*-3-methyl-2-pentene

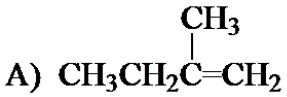
8. What is the slow, rate-determining step, in the acid-catalyzed dehydration of 2-methyl-2-propanol?

$$(CH_3)_3COH \xrightarrow{H_2SO_4}$$

A. Protonation of the alcohol to form an oxonium ion.
B. Loss of water from the oxonium ion to form a carbocation.
C. Loss of a b-hydrogen from the carbocation to form an alkene.
D. The simultaneous loss of a b-hydrogen and water from the oxonium ion.

9. Predict the major product of the following reaction:



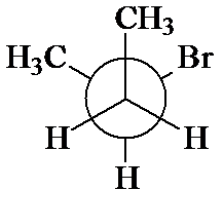


A. A
B. B
C. C
D. D

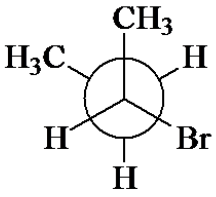
10. Which of the following most readily undergoes an E2 reaction with sodium ethoxide ($NaOCH_2CH_3$)?

A. $(CH_3)_3CF$
B. $(CH_3)_3CCl$
C. $(CH_3)_3CBr$
D. $(CH_3)_3CI$

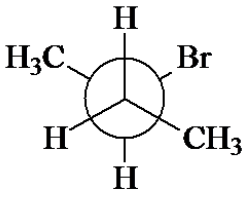
11. In the dehydrohalogenation of 2-bromobutane, which conformation below leads directly to the formation of *cis*-2-butene?



I



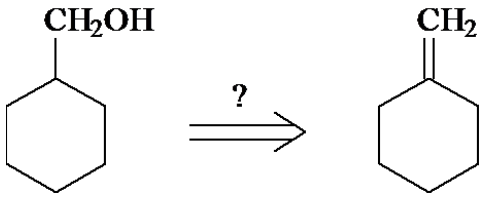
II



III

A. only I
B. only II
C. only III
D. I and II

12. Which of the following would you predict to be the best method for doing the following conversion with the highest yield?



A. H_2SO_4, heat
B. $NaOCH_2CH_3$
C. (1) PBr_3 (2) NaOH
D. (1) PBr_3 (2) $KOC(CH_3)_3$

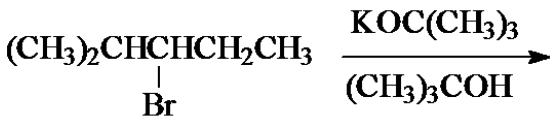
13. Which of the following sets of conditions most favors the E1 mechanism?

A. When the alkyl halide is tertiary and the base is a weak base.
B. When the alkyl halide is tertiary and the base is a strong base.
C. When the alkyl halide is primary or secondary and the base is a weak base.
D. When the alkyl halide is primary or secondary and the base is a strong base.

14. What is the first step in the mechanism of the dehydration reaction of a tertiary alcohol with sulfuric acid to form an alkene?

A. The loss of OH^- to form a carbocation.
B. The protonation of the hydroxyl group.
C. The loss of the proton from the hydroxyl group to give an alkoxide ion.
D. The removal of a β-hydrogen from the alcohol.

15. Including E-Z isomers, how many E2 products are possible in the following reaction?

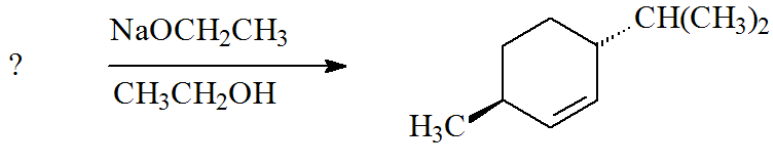


A. one
B. two
C. three
D. four

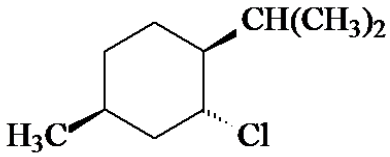
16. Which of the following will give 2-methyl-1-butene as the only alkene product on treatment with $KOC(CH_3)_3$ in dimethyl sulfoxide?

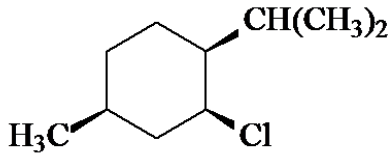
A. 2-bromo-3-methylbutane
B. 1-bromo-3-methylbutane
C. 2-bromo-2-methylbutane
D. 1-bromo-2-methylbutane

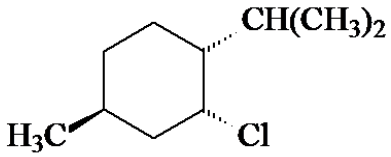
17. Which of the following stereoisomers gives the exclusive E2 product shown?

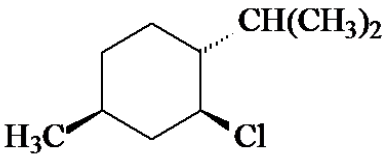


(only E2 product)

A)


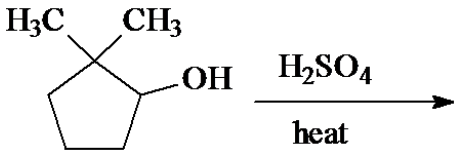
B)


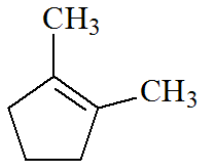
C)


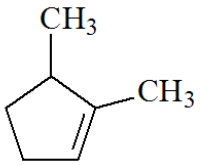
D)


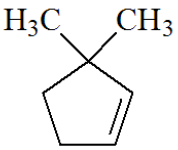
A. A
B. B
C. C
D. D

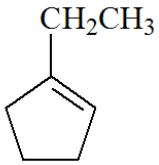
18. The acid-catalyzed dehydration of the alcohol shown below gives a major product which results from a carbocation rearrangement. Identify this major product.



A) 

B) 

C) 

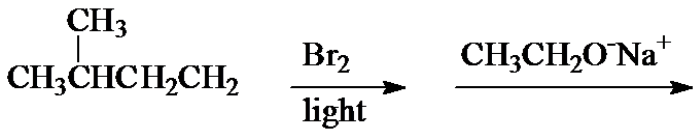
D) 

A. A
B. B
C. C
D. D

19. How many different E2 products are expected in the reaction of 3-bromo-1,1-dimethylcyclohexane with $NaOCH_2CH_3$?

A. only 1
B. 2
C. 3
D. 4

20. What is the major product of the reaction sequence shown below?



A. 2-methyl-1-butene
B. 2-methyl-2-butene
C. 3-methyl-1-butene
D. 2-methylbutane

Chemistry 210 - Chapter 5 - Quiz 1 Key

1. B
2. B
3. C
4. C
5. B
6. A
7. B
8. B
9. C
10. D
11. A
12. D
13. A
14. B
15. C
16. D
17. D
18. A
19. B
20. B

Chemistry 210 - Chapter 5 - Quiz 1 Summary

Category	*# of Questions*
Carey - 005 Structure...	20