

CHEM 2410 – Principles of Organic Chemistry I – Summer 2016

Instructor: Paul Bracher

Quiz #3Due: Friday, June 10th, 2016

5:00 p.m. (to the mailbox outside Monsanto Hall 103)

Student Name (Printed)	Solutions
Student Signature	N/A

Instructions & Scoring

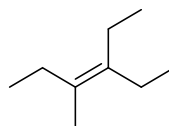
- Please write your answers on the official answer sheet. No answers marked in this booklet will be graded. Submissions submitted electronically will not be graded.
- You may use any resources you wish and collaborate with others.
- Any questions should be posted to the Blackboard discussion board so all students have equal access to the information.
- Your quiz answer sheet may be photocopied.

Problem	Points Earned	Points Available
I		60
II		7
III		17
IV		16
TOTAL		100

Questions, Required Information, Supplementary Information

Multiple choice (60 points total; +5 points for a correct answer, +2 points for answering with the letter “E”, and 0 points for an incorrect answer). For each question, select the best answer of the choices given.

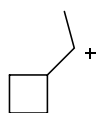
- (1) D Which of the following statements is true regarding compound **A**?



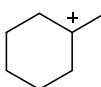
A

- (A) compound **A** has two stereoisomers
- (B) compound **A** will have a more exothermic heat of combustion than 4-ethyl-3-methyl-1-hexene
- (C) compound **A** is an isomer of cyclononene
- (D) none of the above statements is true

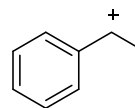
- (2) A Which of the following carbocations is the most prone to rearrangement?



(A)



(B)



(C)

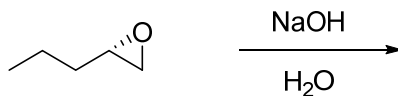


(D)

- (3) B Compound **B** is a dialkyne. Which of the following could be its molecular formula?

- (A) $C_{17}H_{32}$
- (B) $C_{18}H_{28}$
- (C) $C_{28}H_{56}$
- (D) $C_{52}H_{100}$

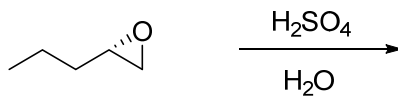
- (4) ^C What is the major product when compound **C** is treated with sodium hydroxide in water?



C

- (A) 1-pentanol, exclusively
(B) (*R*)-1,2-pentanediol, exclusively
(C) (*S*)-1,2-pentanediol, exclusively
(D) both (*R*)-1,2-pentanediol and (*S*)-1,2-pentanediol

- (5) ^B What is the major product when compound **D** is treated with dilute sulfuric acid in water?



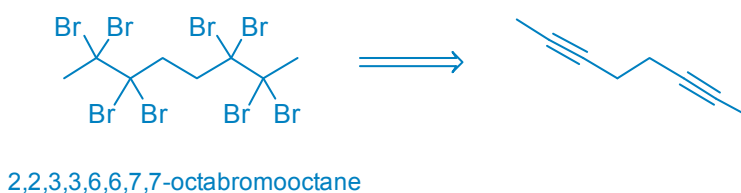
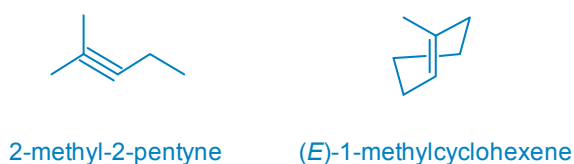
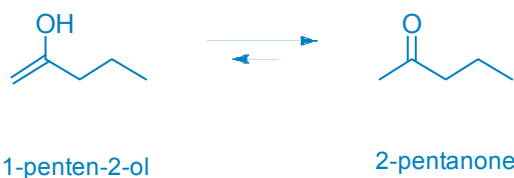
D

- (A) 1-pentanol, exclusively
(B) (*R*)-1,2-pentanediol, exclusively
(C) (*S*)-1,2-pentanediol, exclusively
(D) both (*R*)-1,2-pentanediol and (*S*)-1,2-pentanediol

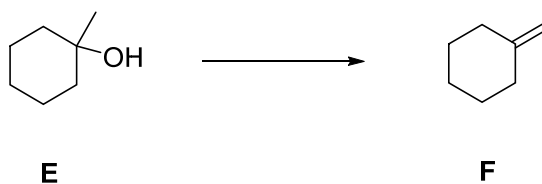
(6) C Which of the following compounds should a chemist have the easiest time synthesizing in high yield and maintaining in high purity?

- (A) (*E*)-1-methylcyclohexene
- (B) 2-methyl-2-pentyne
- (C) 2,2,3,3,6,6,7,7-octabromooctane
- (D) 1-penten-2-ol

Compound (A) is too strained to exist. You cannot have *trans* double bonds in rings smaller than eight carbons. Compound (B) is nonsensical, as C2 would be a pentavalent “Texas” carbon. If a pure sample of compound (D) were to exist, it would tautomerize to form its (more stable) keto tautomer, 2-pentanone. Compound (C) is stable and should be easily prepared from 2,6-octadiyne.



- (7) D Which set of conditions is most likely to effect the following transformation in the highest yield?



- (A) H_2SO_4 , heat
(B) H_2SO_4 , H_2O , heat
(C) 1. PBr_3 ; 2. tBuO^-/K^+
(D) 1. TsCl , pyridine; 2. tBuO^-/K^+

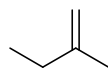
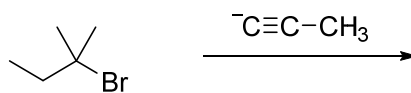
- (8) D The reaction of Br_2 with which of the following alkenes produces the product mixture with the fewest stereoisomers?

- (A) *cis*-2-hexene
(B) *trans*-2-hexene
(C) *cis*-3-hexene
(D) *trans*-3-hexene

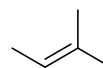
- (9) C How can sulfuric acid be a reagent for both the conversion of cyclohexanol to cyclohexene *and* for the conversion of cyclohexene to cyclohexanol?

- (A) A catalyst for the forward reaction is also a catalyst for the reverse reaction.
(B) The desired product can be obtained by manipulating the equilibrium, for instance, by removing components like water or the alkene during the course of the reaction.
(C) Both of the above statements are true.
(D) It can't. This is a conspiracy perpetrated by the scientific community on the general public, enabled by multinational conglomerates controlled by offshore shell corporations outside of the bounds of regulation, oversight, and media scrutiny.

(10) **B** What is the major product expected of the following reaction?



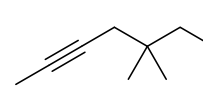
(A)



(B)

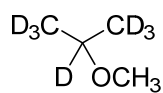
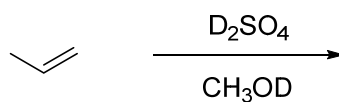


(C)

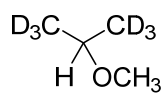


(D)

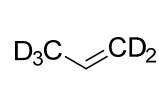
(11) **A** Which of the following products is least likely to be present in the product mixture?
(Hint: Be careful! Think forwards *and* backwards.)



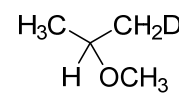
(A)



(B)

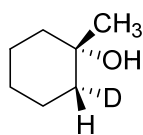
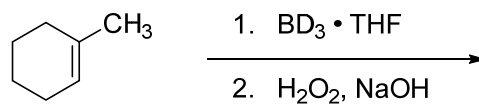


(C)

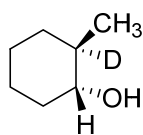


(D)

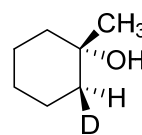
(12) **B** What is a major product expected of the following reaction?



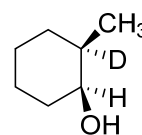
(A)



(B)

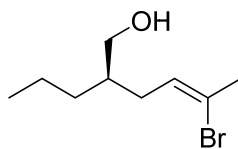


(C)



(D)

Problem II. Alkenes (7 points). Provide the systematic IUPAC name for compound **G**.



G

(2*R*,4*Z*)-5-bromo-2-propyl-4-hexen-1-ol

Problem III. Mechanism (17 points). Draw a sensible mechanism for the formation of **J** from **H** in aqueous, acidic solution. Remember to use proper “curved arrow notation” to account for the redistribution of electrons in the making and breaking of bonds. Show all intermediates in the reaction and any significant resonance forms that account for the stability of these intermediates.

