CHEM 347 – Organic Chemistry II (for Majors)

Instructor: Paul J. Bracher

Quiz #6

(OPTIONAL)

Due in Monsanto Hall 103 by

Thursday, May 8th, 2014, 12:30 p.m.

Student Name (Printed)	Solutions
Student Signature	N/A

Instructions & Scoring

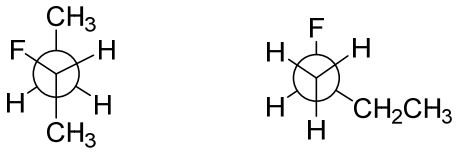
	Points Earned	Points Available
TOTAL		100

- Please write your answers on the official answer sheet.
- This quiz is optional. To count for a grade, your answer sheet must be turned in by the date and time listed above.
- You are allowed access to any materials you wish and may discuss the questions with other students.
- Your quiz may be photocopied.

Original Problems, Required Answers, Supplemental Information

Problem I. Multiple choice (100 points total; +5 points for a correct answer, +1 point for an answer intentionally left blank, and 0 points for an incorrect answer.) For each question, select the best answer of the choices given. Write the answer, legibly, in the space provided on the answer sheet.

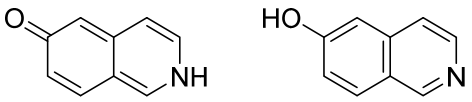
(1) B What term best describes the relationship between compounds **A** and **B**, represented by the Newman projections below?



A **B**

(a) identical compounds
(b) enantiomers
(c) diastereomers
(d) resonace forms
(e) isotopes

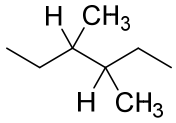
(2) D What term accurately describes the relationship between compounds **C** and **D**, whose Lewis structures are drawn below?



C **D**

(a) enantiomers
(b) diastereomers
(c) resonance forms
(d) tautomers
(e) conformations

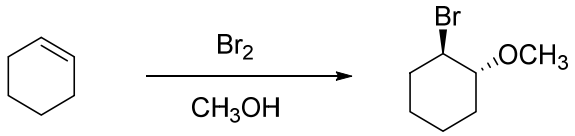
(3) C How many stereoisomers exist of the general structure **E**?

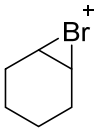


E

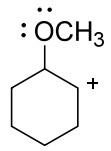
(a) one
(b) two
(c) three
(d) four
(e) five

(4) A What structure represents an intermediate in the reaction below?

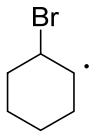




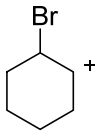
(a)



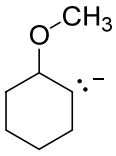
(b)



(c)

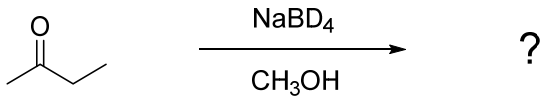


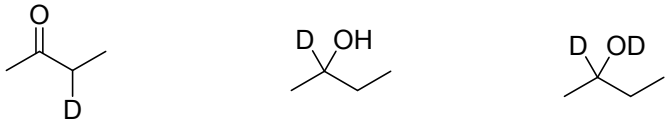
(d)



(e)

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

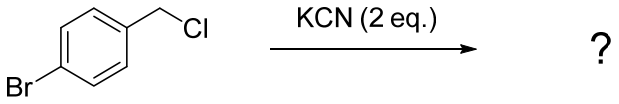


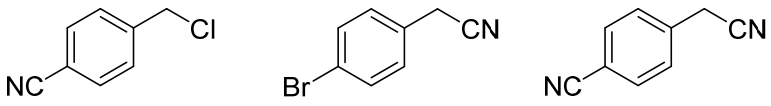


(a) (b) (c)

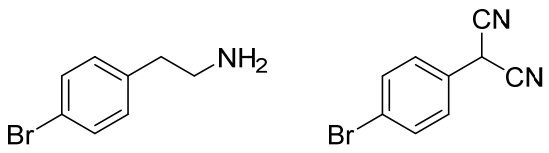
(d) (e)

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



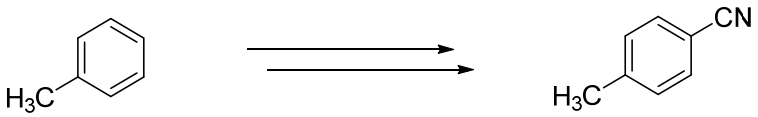


(a) (b) (c)



(d) (e)

(7) B What sequence of reactions is the best choice to carry out the following transformation?



(a) $\xrightarrow[FeBr_3]{Br_2}$ $\xrightarrow{NaCN}$

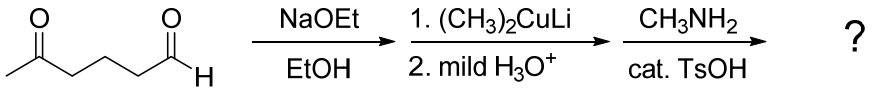
(b) $\xrightarrow[H_2SO_4]{HNO_3}$ $\xrightarrow[HCl]{Sn}$ $\xrightarrow[HCl]{NaNO_2}$ $\xrightarrow{CuCN}$

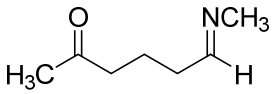
(c) $\xrightarrow[heat]{KMnO_4}$ $\xrightarrow[AlCl_3]{CH_3Cl}$ $\xrightarrow[DCC]{NH_3}$

(d) $\xrightarrow[H_2SO_4]{HNO_3}$ $\xrightarrow[Pd\text{-}C]{H_2}$ $\xrightarrow{CH_2O}$ $\xrightarrow{HCl}$

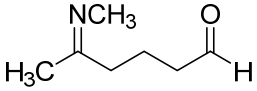
(e) $\xrightarrow[FeBr_3]{Br_2}$ $\xrightarrow[ether]{Mg}$ $\xrightarrow{NaCN}$ $\xrightarrow{H_3O^+}$

(8) E What is the major product expected of the series of reactions below?

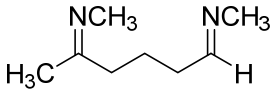




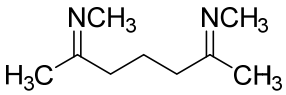
(a)



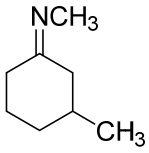
(b)



(c)

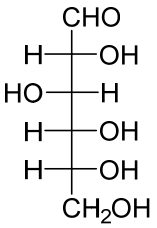


(d)

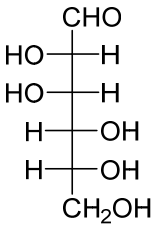


(e)

(9) C Which of the following carbohydrates yields an optically inactive product upon treatment with $NaBH_4$?



(a)



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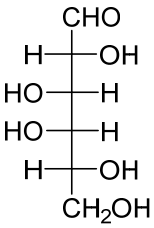

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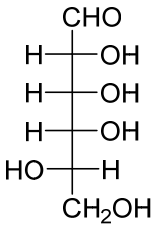
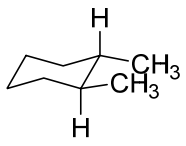


(d)

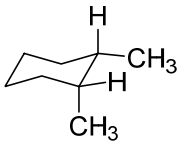
none of the above

(e)

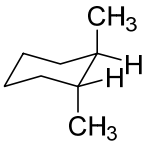
(10) D Which of the following structures represents the lowest-energy conformation of (*R*,*R*)-1,2-dimethylcyclohexane?



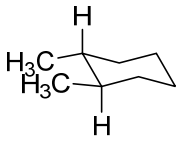
(a)



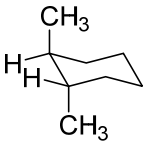
(b)



(c)

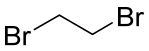


(d)



(e)

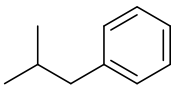
(11) E Which of the following compounds will give rise to an NMR spectrum in which one of the signals is a triplet?



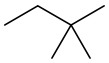
(a)

(b)

(c)

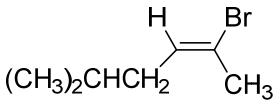


(d)



(e)

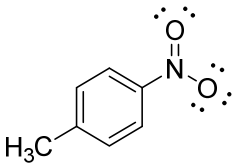
(12) E What is an acceptable IUPAC name for compound **F**?



F

(a) (*Z*)-5-bromo-2-methyl-4-hexene
(b) (*E*)-5-bromo-2-methyl-4-hexene
(c) (*Z*)-1-bromo-1,4-dimethyl-1-pentene
(d) (*E*)-1-bromo-1,4-dimethyl-1-pentene
(e) (*E*)-2-bromo-5-methyl-2-hexene

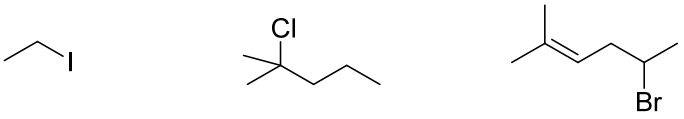
(13) D What is the formal charge on the nitrogen atom of *p*-nitrotoluene (**G**)?



G

(a) −2
(b) −1
(c) 0
(d) +1
(e) +2

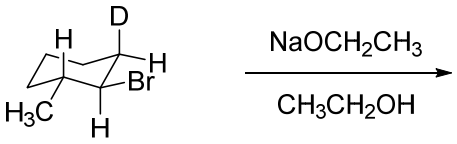
(14) C Heterolytic cleavage of the carbon–halogen bond in which of the following compounds would generate a carbocation likely to undergo rearrangement?

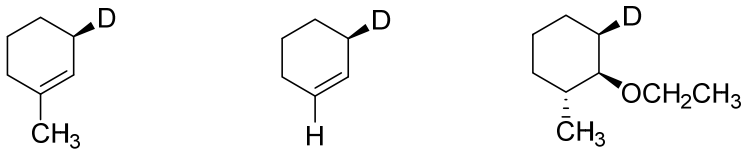


(a) (b) (c)

(d) (e)

(15) E What is the major product expected of the following reaction?

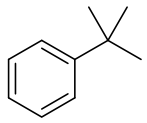




(a) (b) (c)

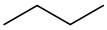
(d) (e)

(16) D Which of the compounds below reacts fastest with Br_2 in the presence of *t*-butyl peroxide?



(a)

(b)



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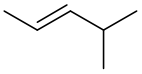
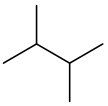
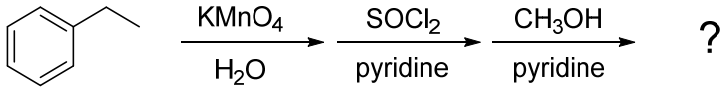


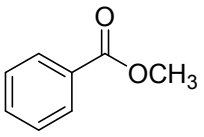
(d)



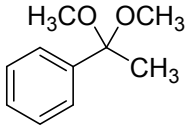
(e)

(17) A What is the major product expected of the series of reactions below?

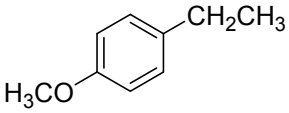




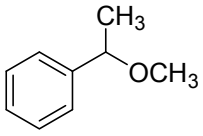
(a)



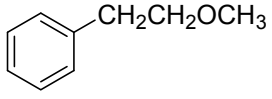
(b)



(c)



(d)



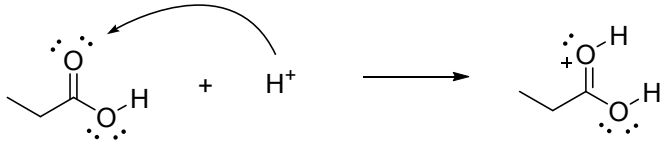
(e)

(18) A What rings and π bonds could be present in a stable compound with the molecular formula $C_{15}H_{25}O_3N$? (Assume each compound contains no other rings or π bonds other than those mentioned in each answer.)

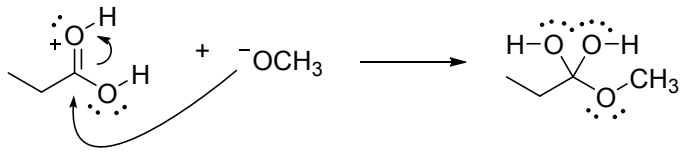
(a) a phenyl ring
(b) a triple bond and a cyclopropane ring
(c) two cyano (nitrile) groups
(d) a C=C bond and two cyclohexane rings
(e) a cyclohexene ring

(19) E What choice below is a valid representation of a step in the mechanism of Fischer esterification?

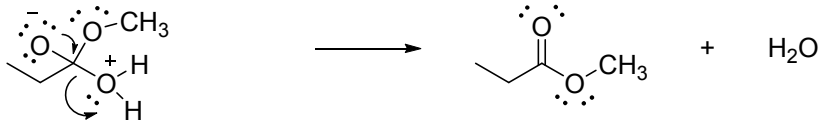
(a)



(b)



(c)



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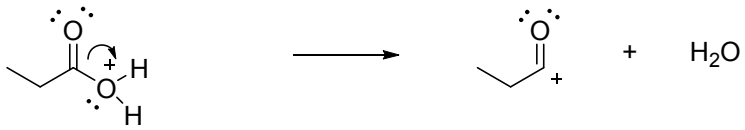

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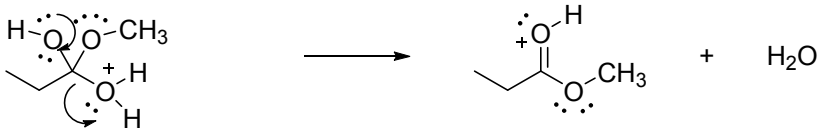
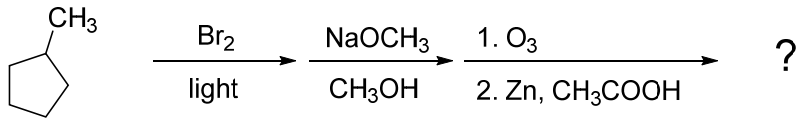
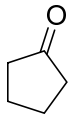
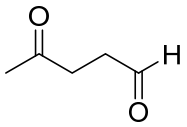


(20) C What is the major product expected of the sequence of reactions below?





(a)



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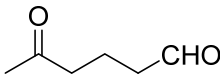

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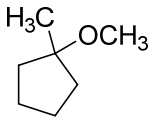

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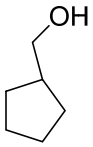

(e)