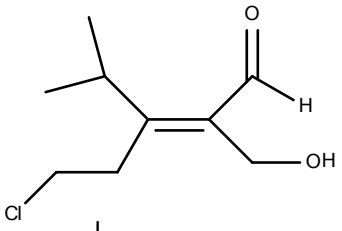
Organic Chemistry Practice Problems

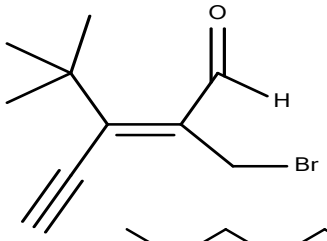
Organic Chemistry I Practice Set #7 (Chapters 4-5 – Carey)

1) Apply the Cahn-Ingold-Prelog priorty rules and assign the configuration ***(E or Z)*** of the CC double bond in each structure below.

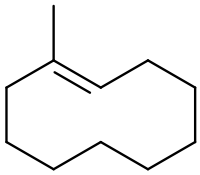
(a)



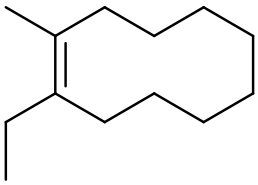
(b)



(c)

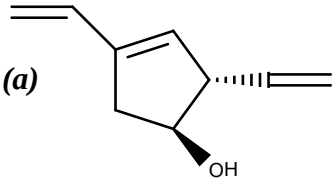


(d)

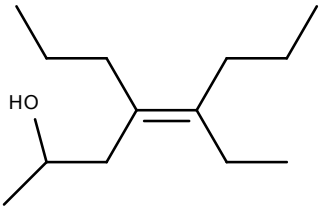


2) Name the following compounds

(a)

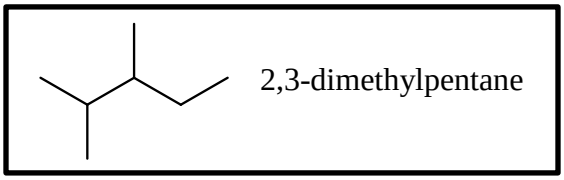


(b)

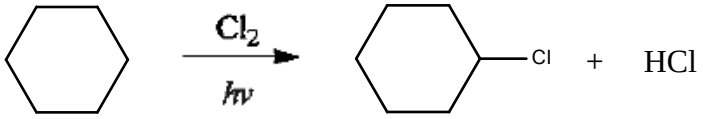


3) For each of the following, provide a structural formula.
(a) 1-ethyl-3-isopropyl-1-methyl-1-hexyl cation ***(b)*** *trans*-4-[(Z)]-1-butenyl]cyclohexanol

4) ***(a)*** Draw all the different possible constitutionally isomeric monochloroalkanes that may result from the light-initiated reaction of chlorine with 2,3-dimethylpentane.
(b) Consider ***ONLY*** the ***primary*** alkyl halide isomers (given in your answer above) and circle the ***one*** that is formed in the ***greatest*** amount.



5) Using arrows to show the flow of electrons, write a stepwise mechanism for the following reaction. If the mechanism is a free-radical chain reaction, label each stem as either ***initiation, propagation, or termination***; ***also give three termination steps.***



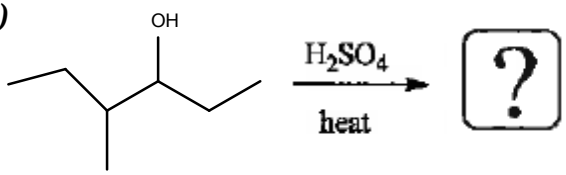
Adapted from practice handouts created by Dr. EF Hilinski of Florida State University

Organic Chemistry Practice Problems

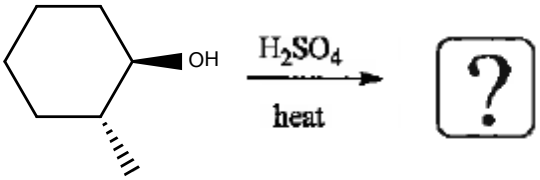
6) (i) Which one is thermodynamically more stable: ***(a)*** 1-pentene ***(b)*** (Z)-2-pentene
(ii) Which compound has the lower heat of combustion: ***(a)*** (E)-cyclodecene ***(b)*** (Z)-cyclodecene
(iii) Which compound has the higher heat of combustion:
(a) (E)-cyclopentadecene ***(b)*** (Z)-cyclopentadecene
(iv) Which one is the major monobromination product of the reaction of 2-methylbutane with Br_2, in the presence of heat and light: ***(a)*** 1-bromo-2-methylbutane ***(b)*** 1-bromo-3-methylbutane
(c) 2-bromo-3-methylbutane ***(d)*** 2-bromo-2-methylbutane
(v) Which is the top layer in a flask that contains both of the following: ***(a)*** water or ***(b)*** 1-bromohexane
(vi) Which one is thermodynamically more stable: ***(a)*** tert-butyl cation ***(b)*** isobutyl cation
(vii) When methylcyclohexane reacts with Br_2 in the presence of heat and light, does the major monobromination product involve the formation of which of the following:
(a) a primary radical ***(b)*** a secondary radical ***(c)*** a tertiary radical
(viii) What is the hybridization of C in the methyl radical: ***(a)*** sp^3 ***(b)*** sp^2 ***(c)*** sp

7) Fill in what is missing. Either give all of the missing reagents to complete the reaction or give a structural formula for the ***major organic product(s)***. Show stereoisomers properly if necessary. If no reaction occurs, write ***N.R.***

(a)

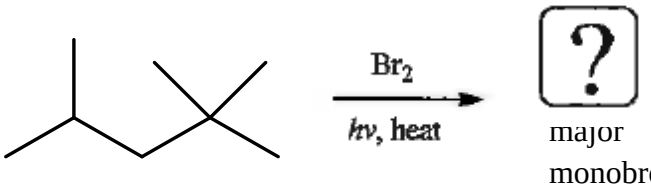


(b)



(c)

(d)



major monobromination product

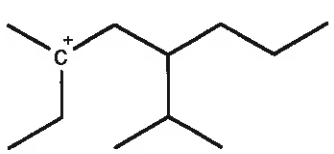
LEARNING COMMONS

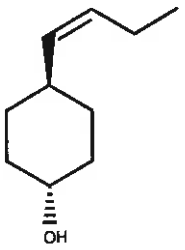
Organic Chemistry Practice Problems

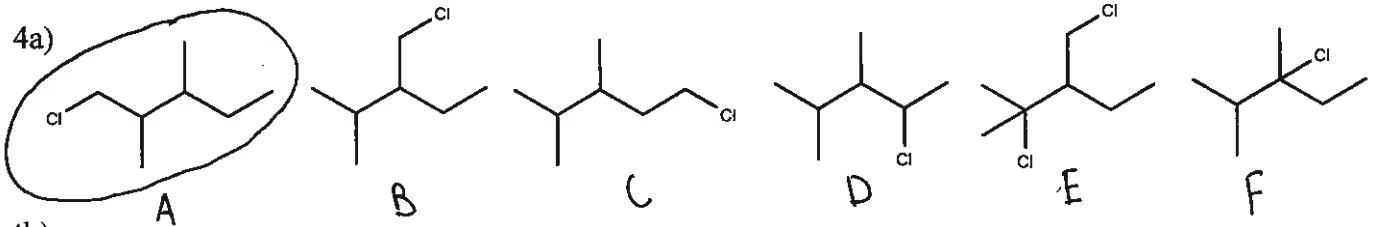
Organic Chemistry I Answers to Practice Set #7 (Chapters 2-4 – Carey)

1a) Z 1b) Z 1c) E 1d) Z

2a) trans-2,4-divinylcyclopent-3-enol 2b) (E)-5-ethyl-4-propyl-oct-4-en-2-ol

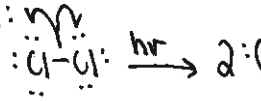
3a) 

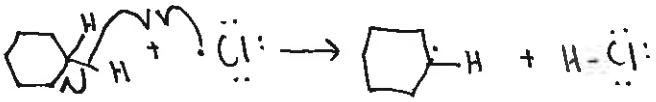
3b) 

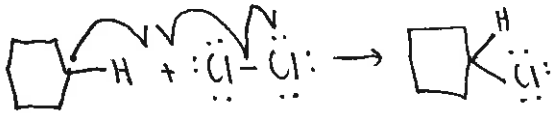
4a) 

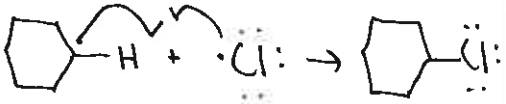
4b)

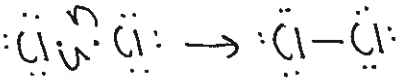
$$\%A = \frac{(6\times1.0)\times100\%}{(6\times1.0)+(3\times1.0)+(3\times1.0)+(2\times3.9)+(1\times5.2)+(1\times5.2)} = \frac{(6\times1.0)\times100\%}{(12\times1.0)+(2\times3.9)(2\times5.2)}$$

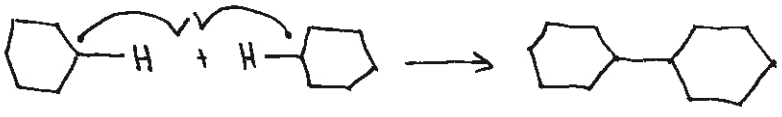
5) Initiation: 

Propagation: 

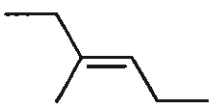
Propagation: 

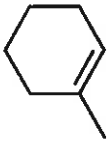
Termination: 

Termination: 

Termination: 

6i) b 6ii) b 6iii) b 6iv) d 6v) a 6vi) a 6vii) c 6viii) b

7a) 

7b) 

7c) PBr_3 7d)