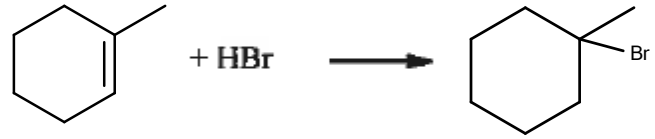
Organic Chemistry Practice Problems

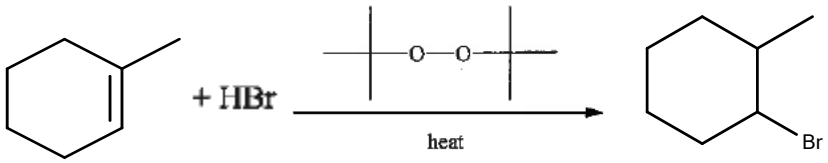
Organic Chemistry I Practice Set #8 (Chapters 5-7 – Carey)

1) Using arrows to show the flow of electrons, write a stepwise mechanism for each of the following reactions. If the reaction proceeds via a free-radical mechanism, label the steps appropriately.

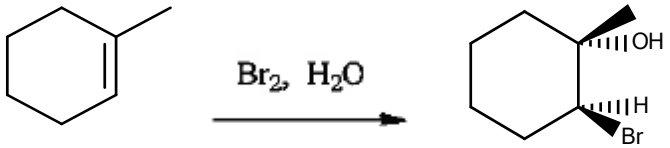
(a)



(b)



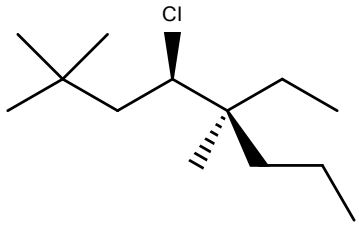
(c)



2) Provide a structural formula for ***(a)*** poly(vinyl chloride) and ***(b)*** (2R,3R)-3-bromopentan-2-ol.

3) Name the following compounds. Be sure to designate the configurations in stereoisomers correctly.

(a)



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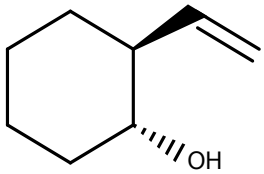
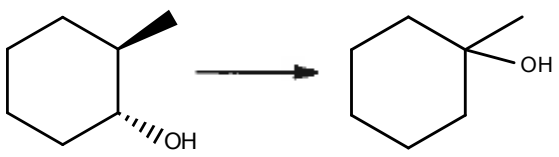


4) Provide an efficient multistep synthesis for each of the following conversions of the given starting material into product. For each transformation, give all necessary reagents and catalysts and give a structural formula of the organic product. Show stereochemistry appropriately when necessary.

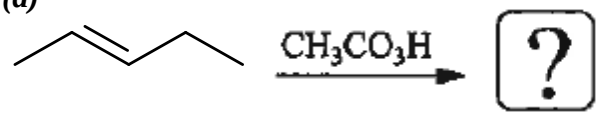
(a)

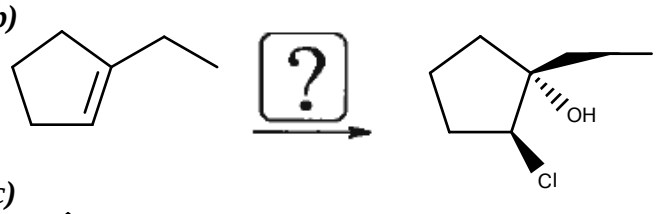


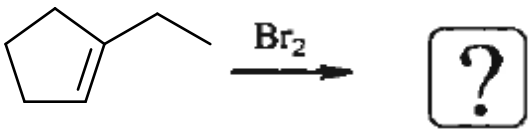
(b)

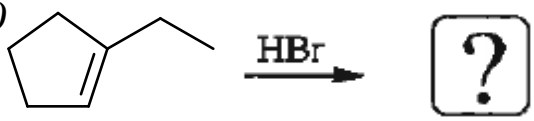
Organic Chemistry Practice Problems

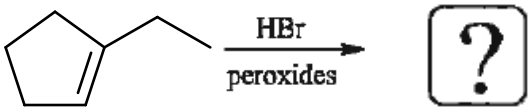
5) Fill in what is missing. Either give all of the missing reagents to complete the reaction or give a structural formula for the ***major organic product(s)***. Show stereoisomers properly if necessary. If no reaction occurs, write ***N.R.***

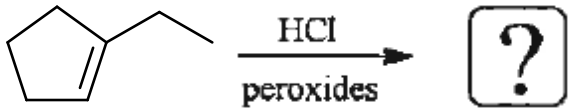
(a) 

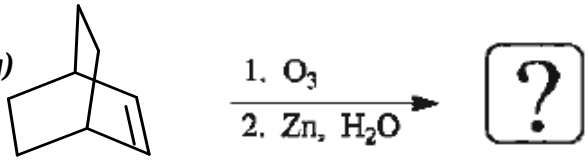
(b) 

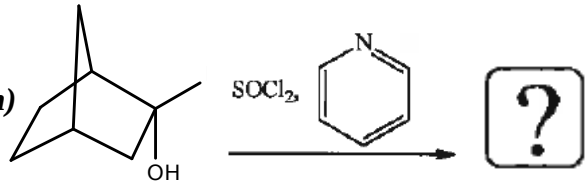
(c) 

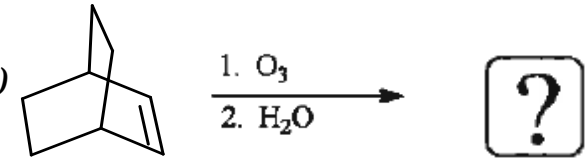
(d) 

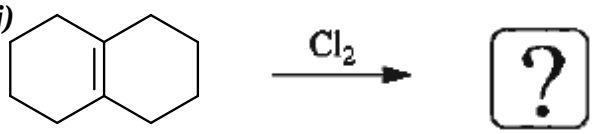
(e) 

(f) 

(g) 

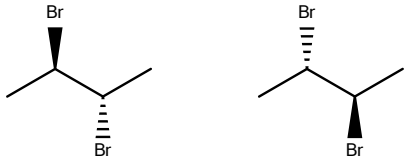
(h) 

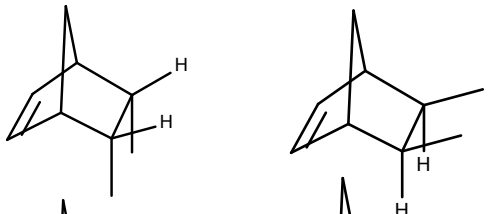
(i) 

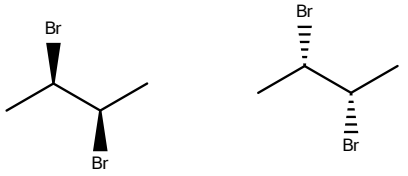
(j) 

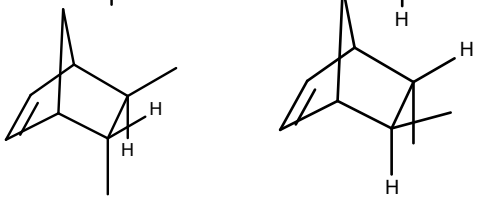
6) (i) Which has the larger heat of hydrogenation: ***(a)*** (E)-2-pentene ***(b)*** (Z)-2-pentene
(ii) Which has the smaller heat of combustion: ***(a)*** (E)-cyclodecene ***(b)*** (Z)-cyclodecene
(iii) Which is thermodynamically less stable: ***(a)*** isobutyl radical ***(b)*** *tert*-butyl radical
(iv) Which is the rate law for an E2 reaction: ***(a)*** rate = *k*[RX] ***(b)*** rate = *k*[RX][base]
(v) Which reacts fastest with propene: ***(a)*** HF; ***(b)*** HCl; ***(c)*** HBr; ***(d)*** HI
(vi) Which is thermodynamically more stable: ***(a)*** 1-methylhexyl cation ***(b)*** 3-methylhexyl cation
(vii) Which one will proceed via an E1 reaction to produce an alkene:
(a) heating *tert*-butyl chloride in ethanol w/sodium ethoxide ***(b)*** heating *tert*-butyl chloride in ethanol

7) The relationship of each pair of molecules: ***(a)*** same molecule ***(b)*** constitutional isomers ***(c)*** diastereomers ***(d)*** enantiomers

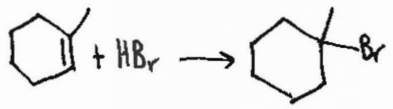
(i) 

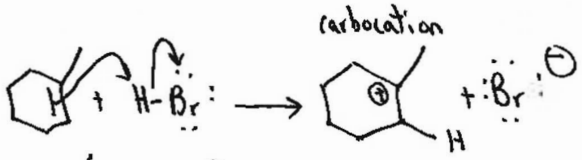
(ii) 

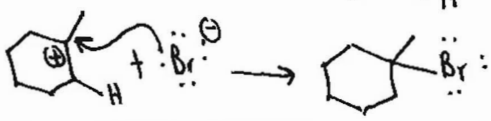
(iii) 

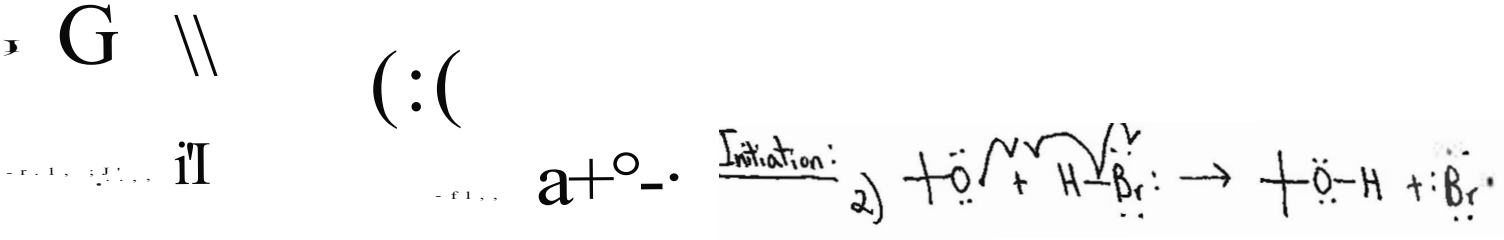
(iv) 

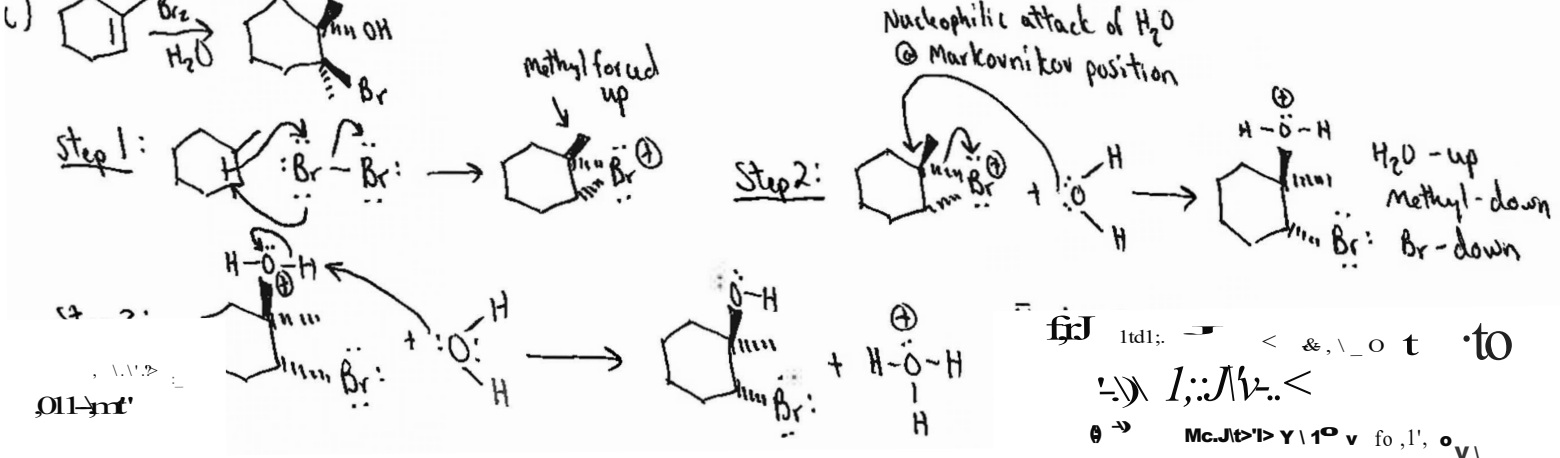
Organic Chemistry I Answers to Practice Set #8 (Chapters 5-7 – Carey)

1a) 

Step 1 Proton Transfer Reaction 

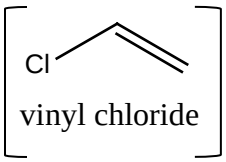
Step 2 Nucleophilic Attack 

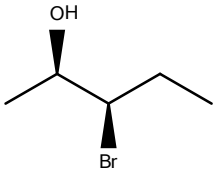


c) 

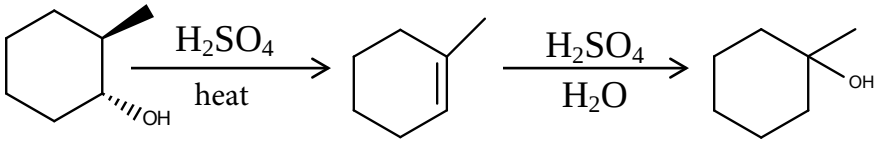
Organic Chemistry Practice Problems

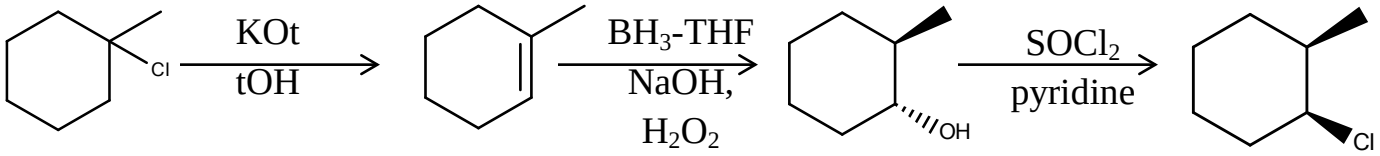
Organic Chemistry I Answers to Practice Set #8 (Chapters 5-7 – Carey)

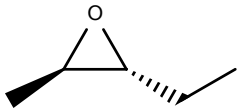
2a) 

2b) 

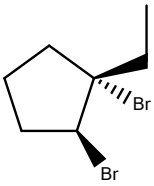
3a) (4R,5R)-4,5-dichloro-5-ethyl-2,2-dimethyloctane
3b) (1R,2S)-2-vinylcyclohexanol

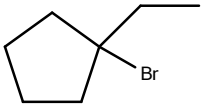
4a) 

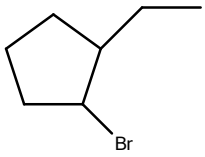
4b) 

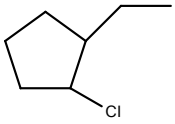
5a) 

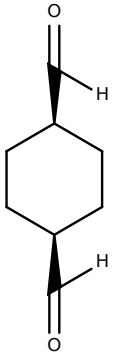
5b) Cl_2, H_2O

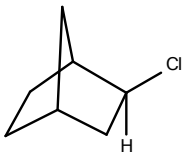
5c) 

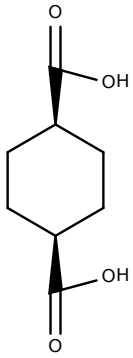
5d) 

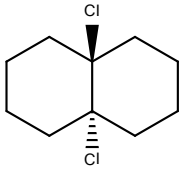
5e) 

5f) 

5g) 

5h) 

5i) 

5j) 

6i) b 6ii) b 6iii) a 6iv) b 6v) d 6vi) a 6vii) b
7i) a 7ii) c 7iii) d 7iv) d