



A chemist walks into a pharmacy and asks the pharmacist, "Do you have any acetylsalicylic acid?"

"You mean aspirin?" asked the pharmacist.

"That's it, I can never remember that word."

1. Rank the boiling points of the following molecules from lowest to highest. State which of the intermolecular attraction forces is dominant (Van der Waal's, polar forces, hydrogen bonding, electrostatic).

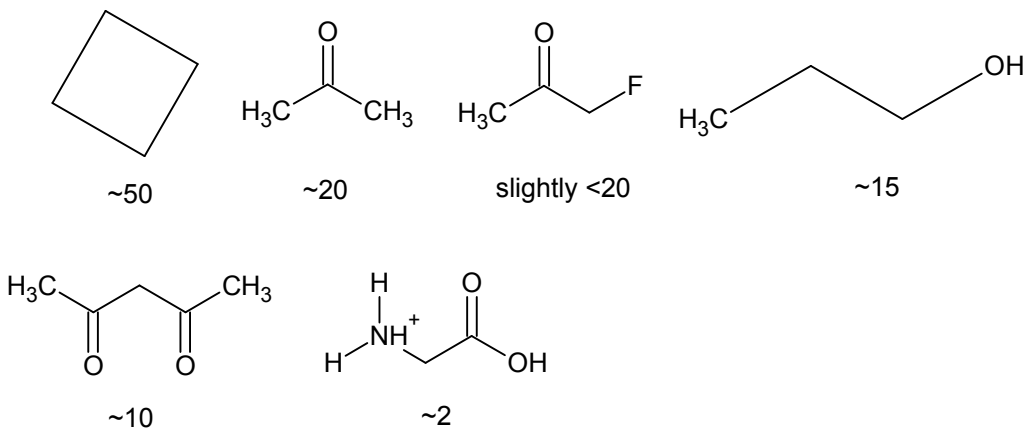
Solution

- methane (lowest) -VOW
- isobutane - VOW
- Butane - VOW
- Dimethyl ether - polar
- Ethanol - H-bonding
- Acetic acid - H-bonding
- Sodium methoxide (highest) - ionic bonding

2. Rank the acidities of the following compounds from lowest to highest.

a)

Solution

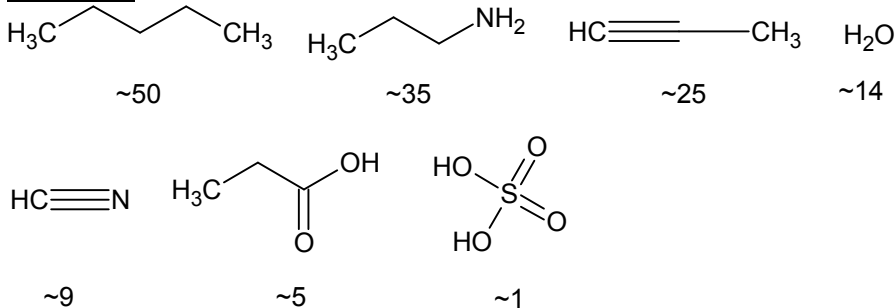


The pKa's of the most acidic protons in the above molecules are represented by the number written under each. Same for b)



b)

Solution



3. Determine whether the products or reagents are favoured in the following chemical reactions.

Solution

- a) Products
- b) Reagents
- c) Products
- d) Products

4.

Solutions

- a) pH 1 \rightarrow +1 , pH 7 \rightarrow 0 , pH 12 \rightarrow -1
- b) pH 7 \rightarrow 0 , pH 12 \rightarrow -1
- c) pH 1 \rightarrow 0 , pH 7 \rightarrow -1 , pH 12 \rightarrow -2

5.

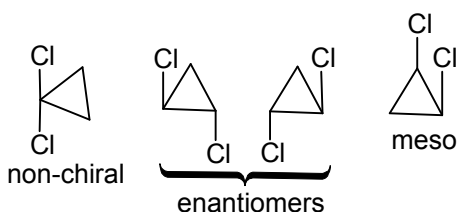
Solutions

- | | | | |
|------------------|------------------|-------------------|------------------|
| a) identical | b) diastereomers | c) diastereomers | d) enantiomers |
| e) identical | f) conformers | g) enantiomers | h) conformers |
| i) diastereomers | j) enantiomers | k) conformers | l) identical |
| m) enantiomers | n) identical | o) constitutional | p) diastereomers |

6.

Solutions

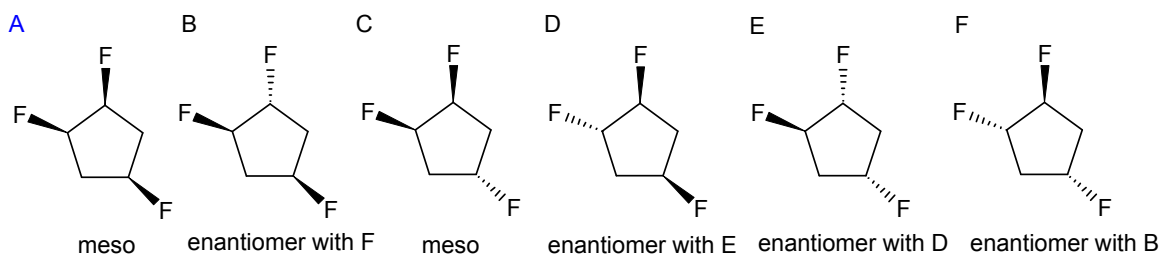
a)





b)

Theoretically $2^3 = 8$, but actually 6.

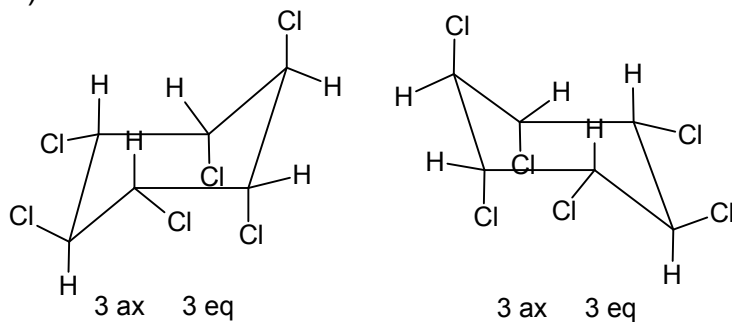


7.

Solutions

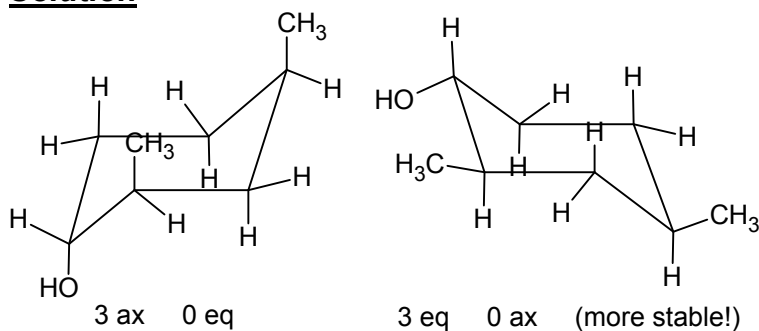
a) Nope → meso

b)



8.

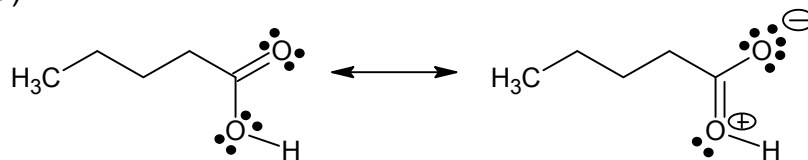
Solution



9.

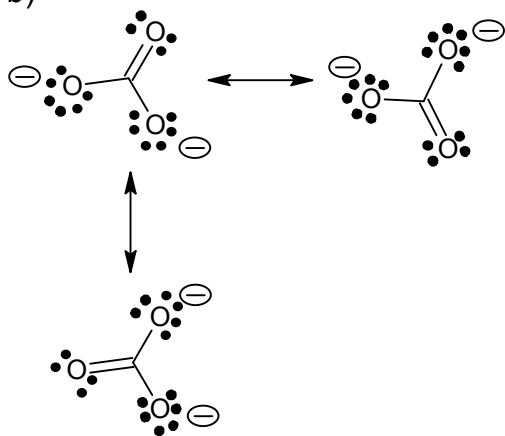
Solutions

a)

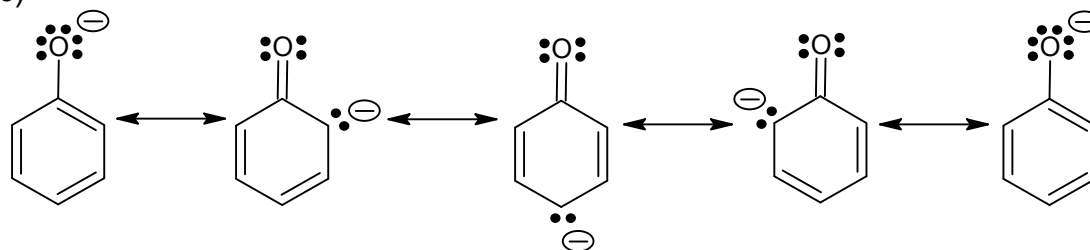




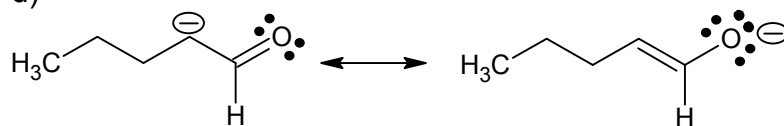
b)



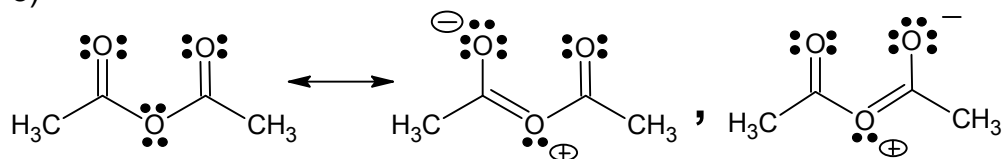
c)



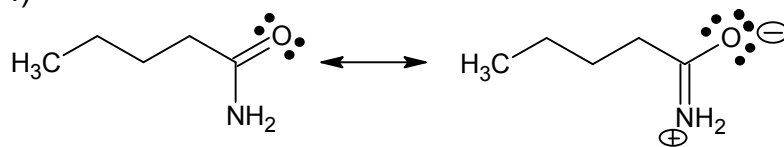
d)



e)



f)

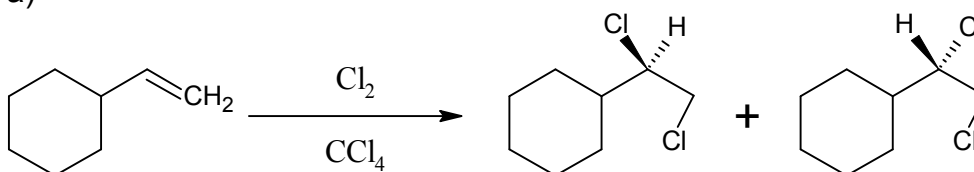




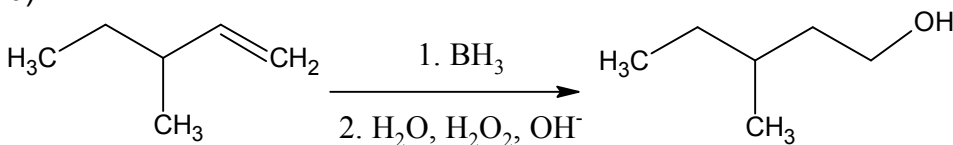
10.

Solutions

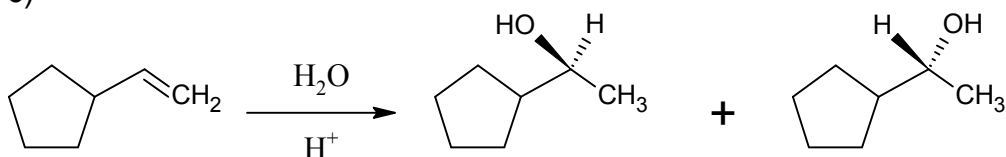
a)



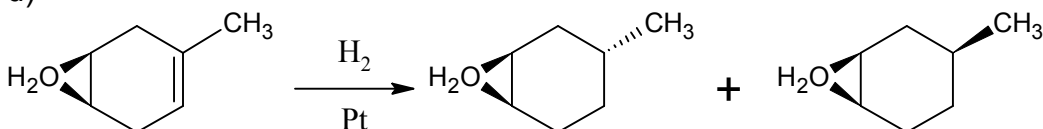
b)



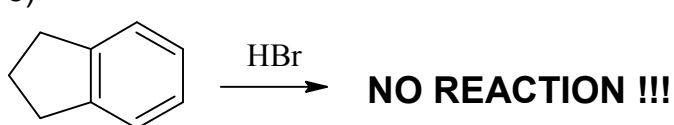
c)



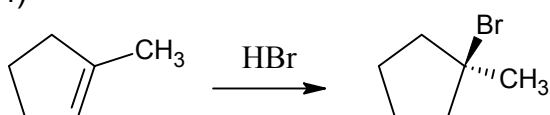
d)



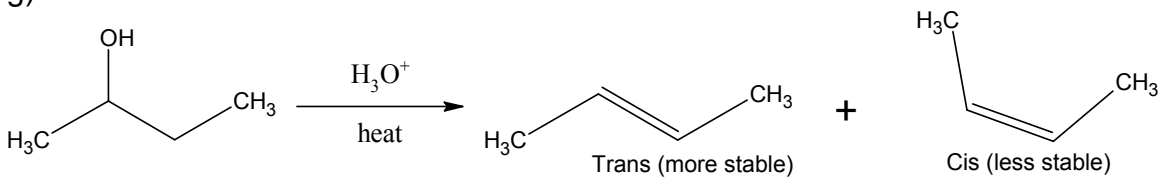
e)



f)

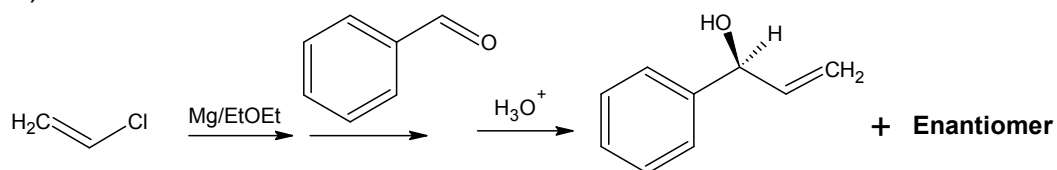


g)

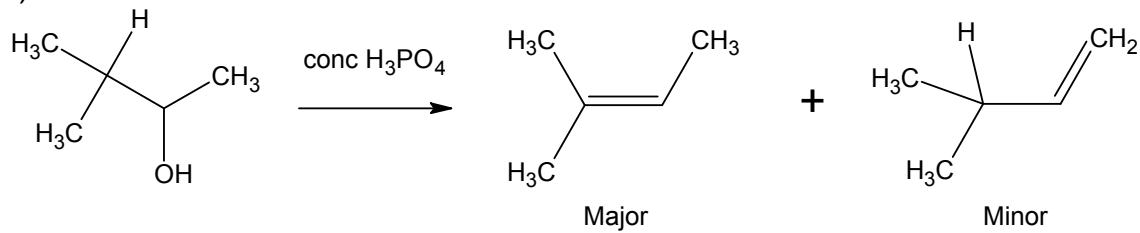




h)



i)

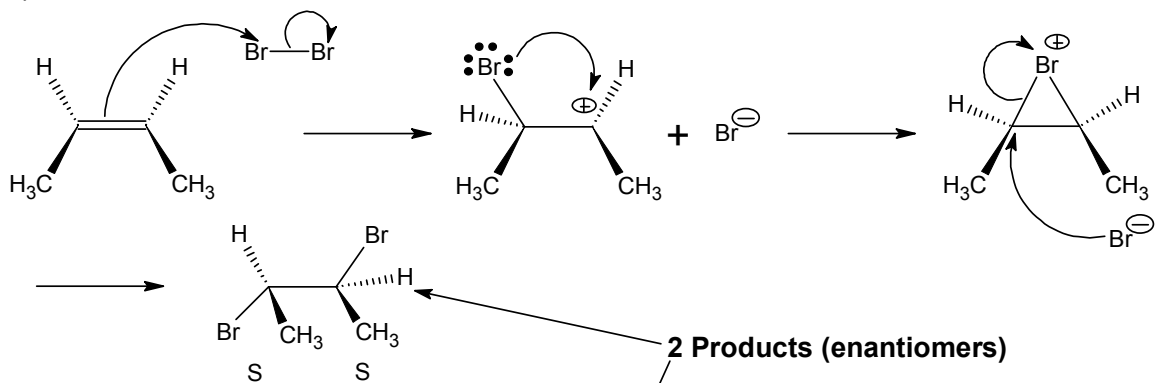




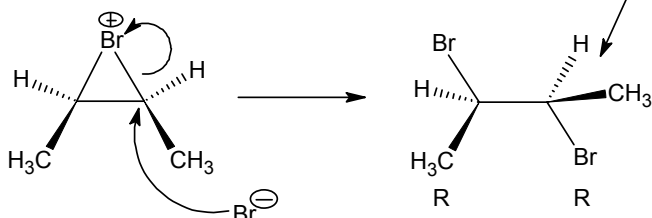
11.

Solutions

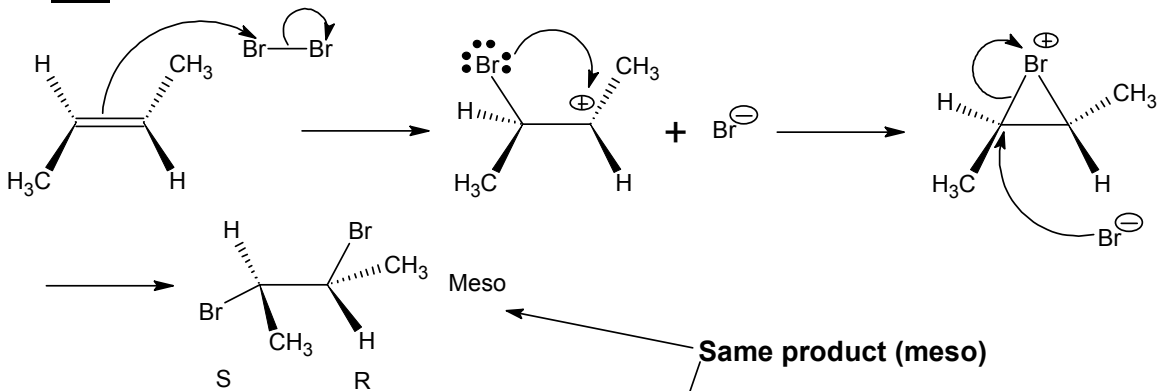
a)



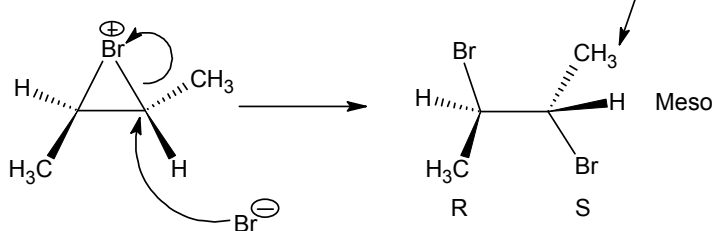
OR



BUT

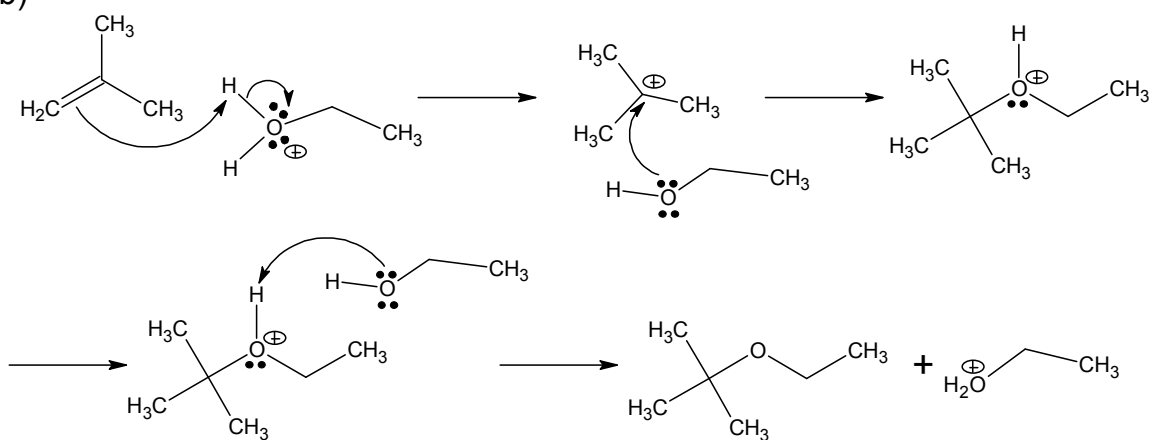


OR





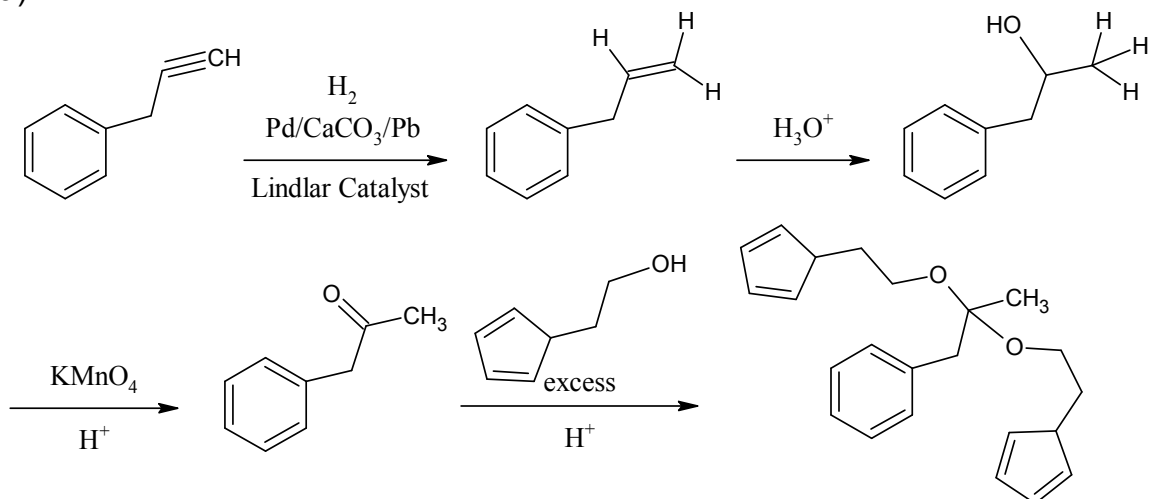
b)



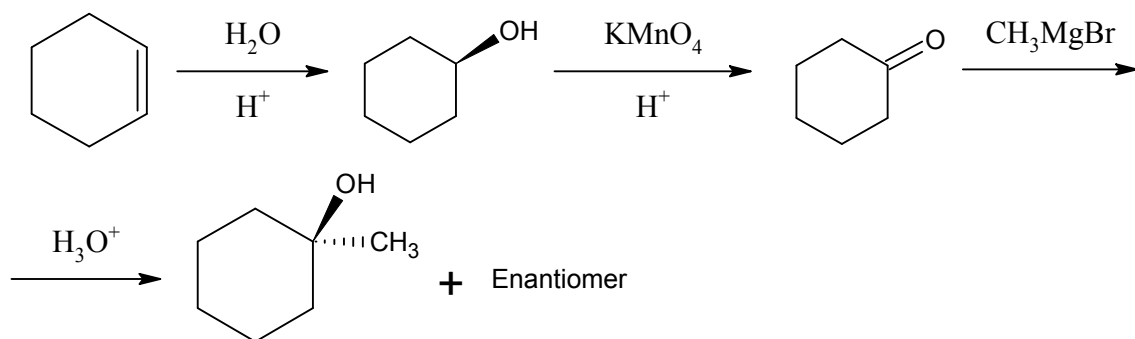
12.

Solutions

a)



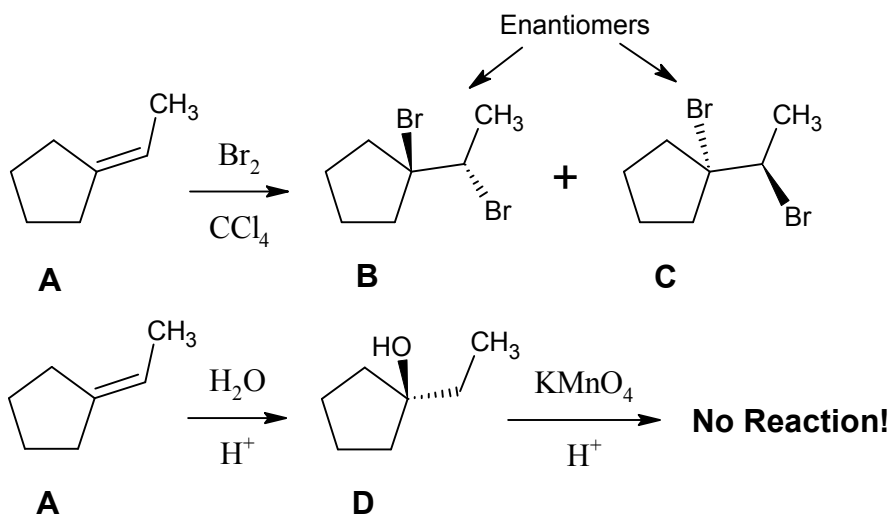
b)





13.

Solution



Alternatively.....

