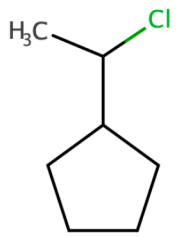
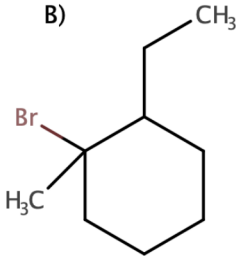
7.1 **Elimination by the E1 mechanism**

A) Draw the structures of all possible E1 products starting with the compounds below, and rank them in order of highest to lowest abundance.

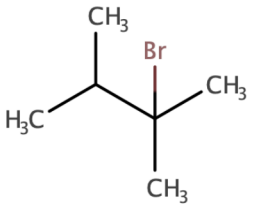
A)



B)



C)

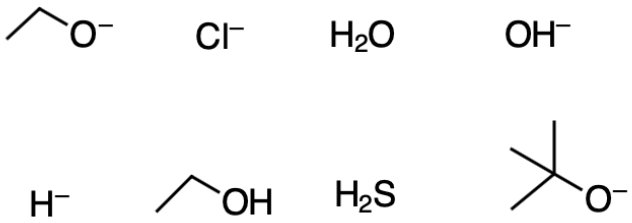


Answer:

7.2 Substitution vs. elimination

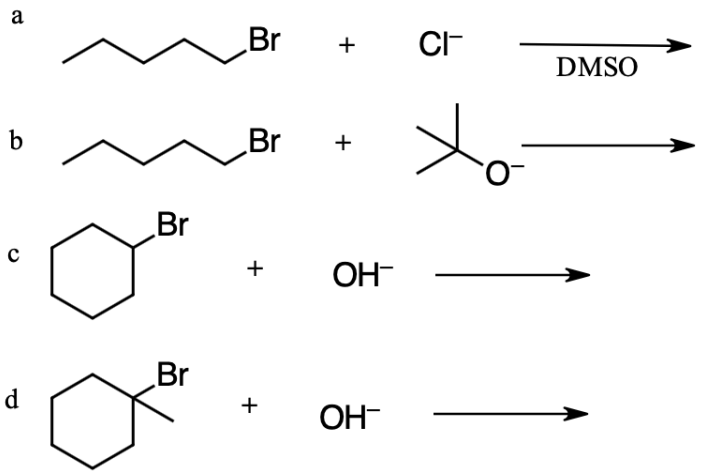
A) When both elimination and substitution products are possible, however, we can often predict which reaction will predominate. In general, strong bases and hindered carbons favor elimination, while powerful nucleophiles and unhindered carbons favor substitution. Let's start with rating the following compounds into four groups:

- nucleophile only
- base only
- strong nucleophile & strong base
- and weak nucleophile & weak base



Answer:

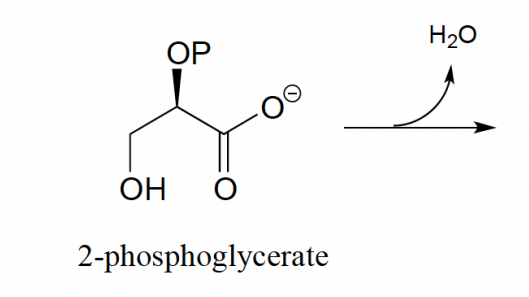
B) Now, draw products of the following reactions. Explain your reasoning:



Answer:

7.3 E1cb Elimination

(A) In the glycolysis pathway, the enzyme 'enolase' (EC 4.2.1.11) catalyzes the E1cb dehydration of 2-phosphoglycerate. Predict the product of this enzymatic step and draw the mechanism.



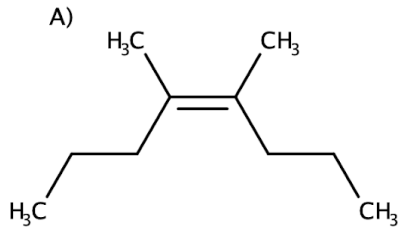
2-phosphoglycerate

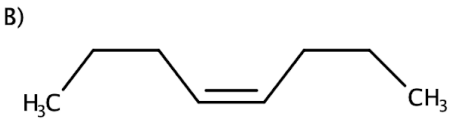
Answer:

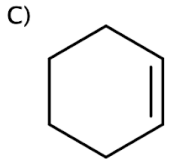
7.4 Mechanism of electrophilic addition of HBr to symmetric alkenes and its stereochemistry

Draw the mechanism and predict the product(s) of of electrophilic addition of HBr to the following alkenes. Draw all possible stereoisomers that could form, and take care not to draw identical structures twice.

A) *cis*-4,5-dimethyl-4-octene B) *cis*-4-octene C) cyclohexene





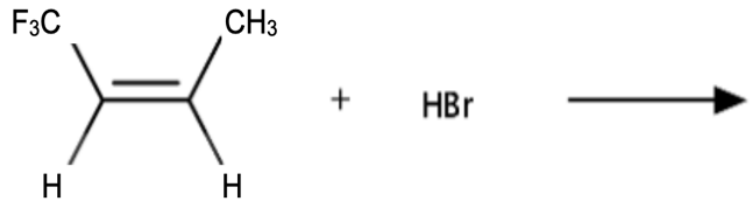


Answer:

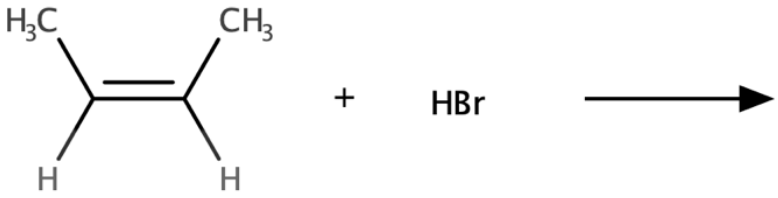
7.5 Electrophilic addition of HBr, water, to non-symmetric alkenes: Markovnikov rule

Predict the major product(s) of the following reactions. Draw all possible stereoisomers, and take care not to draw the same structure twice.

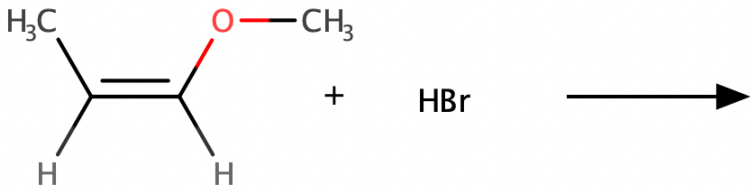
A)



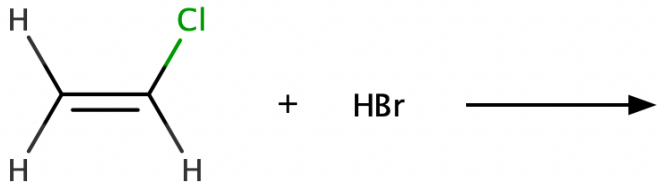
B)

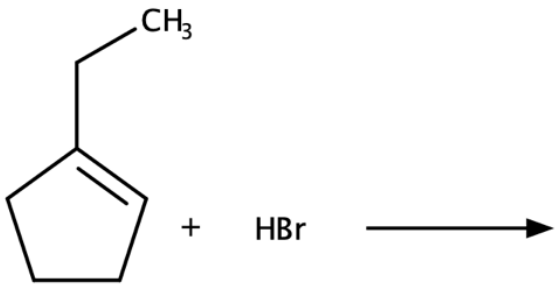


C)

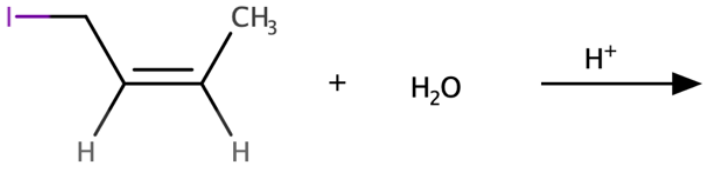


D)

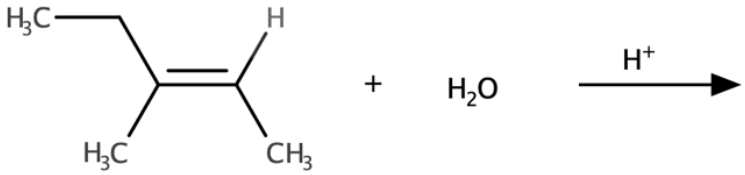




E)



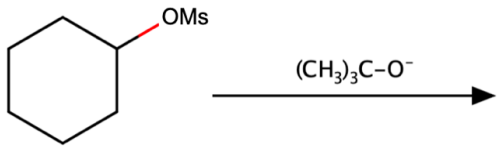
F)



G)

7.6 Competition between elimination and substitution E2/SN1/E1/SN2

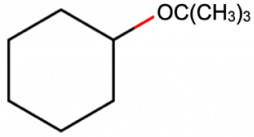
A. Consider the following:



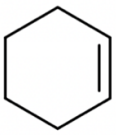
Where OMs is a good leaving group.

Which among the following reactions: SN1, SN2, E1, E2 is MOST likely to dominate? What is the major product formed in the given reaction? What is the mechanism?

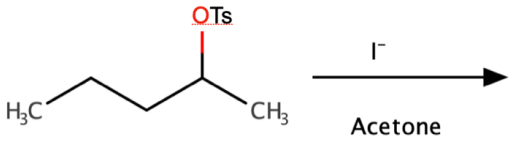
A)



B)

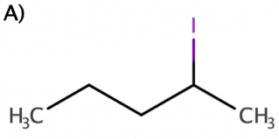


B. Consider the following:



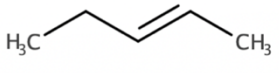
Which among the following reactions: SN1, SN2, E1, E2 is MOST likely to dominate? What is the major product formed in the given reaction? What is the mechanism?

A)

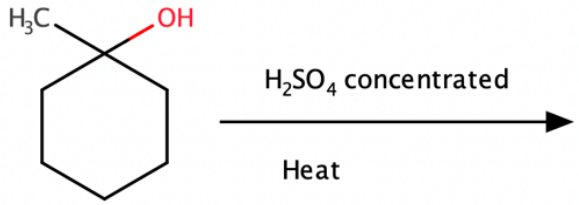


B)

C)

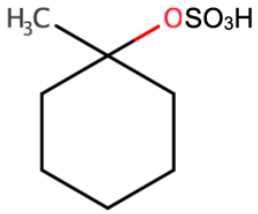


C. Consider the following:



Which among the following reactions: SN1, SN2, E1, E2 is MOST likely to dominate? What is the major product formed in the given reaction? What is the mechanism?

A)



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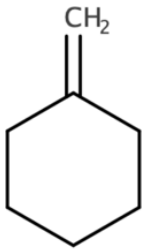
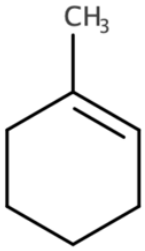
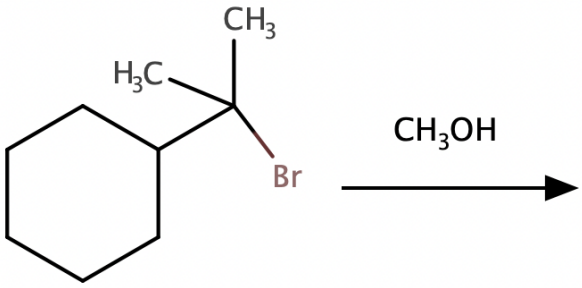


C)



D. Consider the following:



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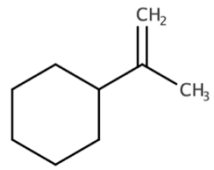
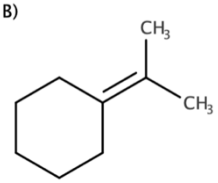
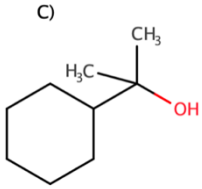
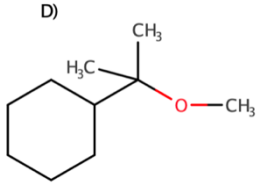
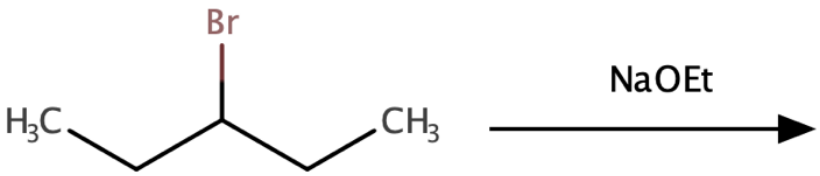
A) 

B) 

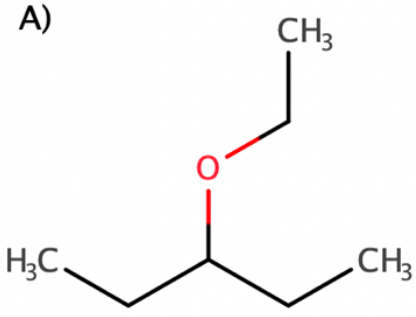
C) 

D) 

E. Consider the following:



Which among the following reactions: SN1, SN2, E1, E2 is MOST likely to dominate? What is the major product formed in the given reaction?

A) 

B)