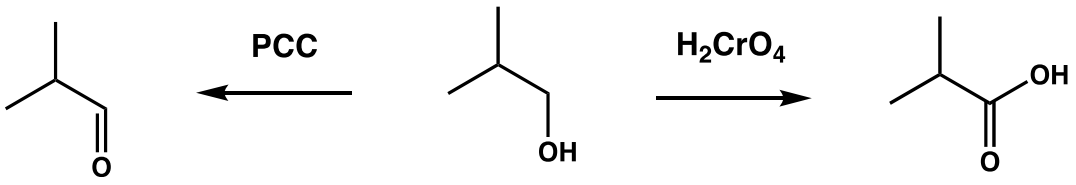
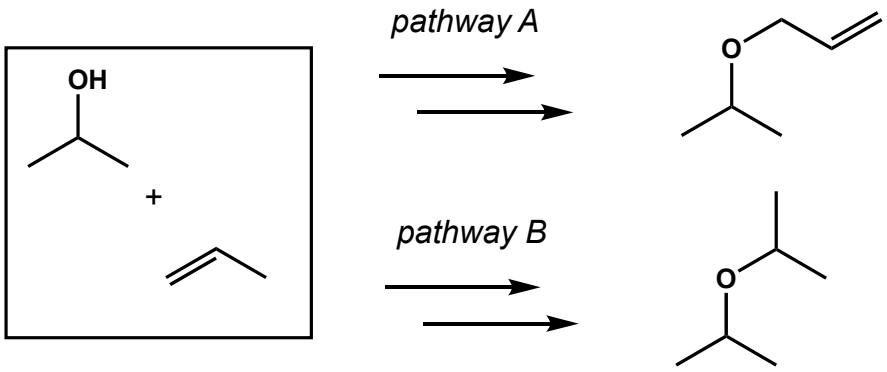
Different oxidizing agents can transform primary alcohols into either aldehydes or carboxylic acids selectively.

Fill in the reagents necessary to accomplish the following reactions.

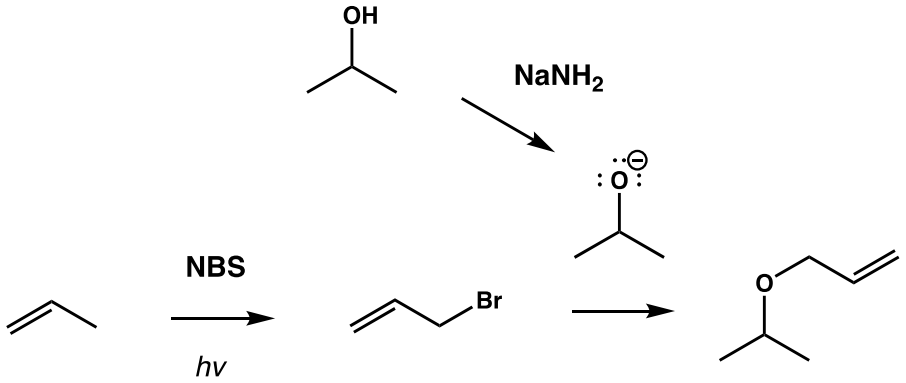


Devise synthetic pathways to create the following ethers from the given starting materials.

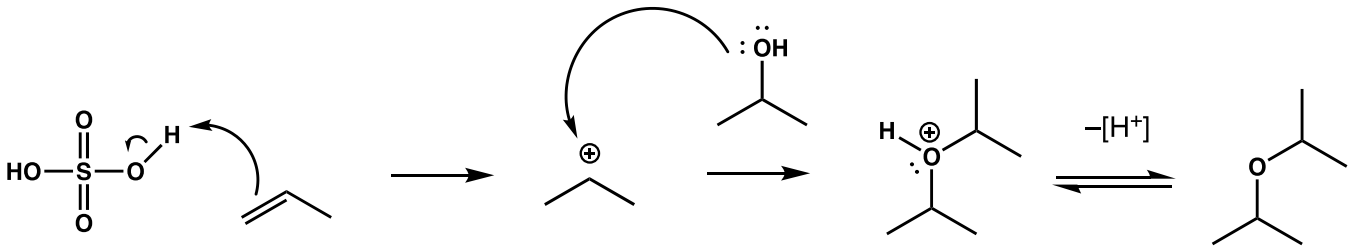
All carbons in the products must come from these starting materials.



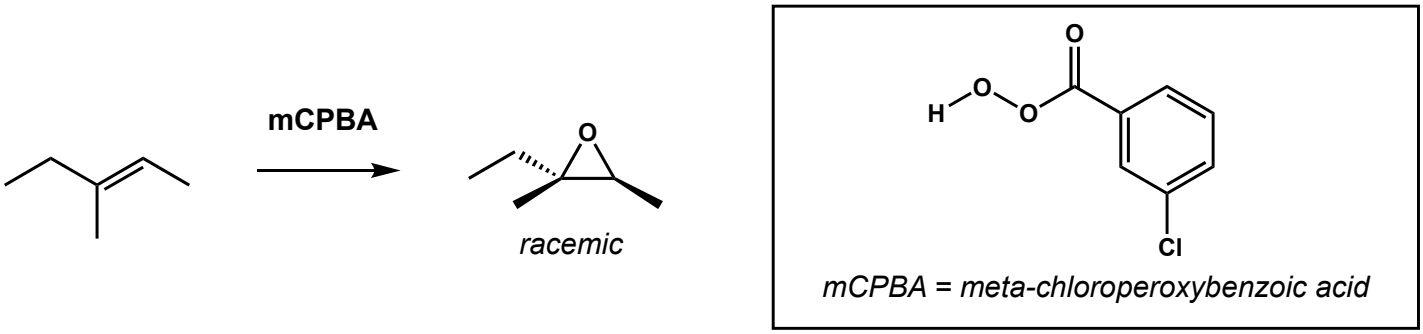
Pathway A

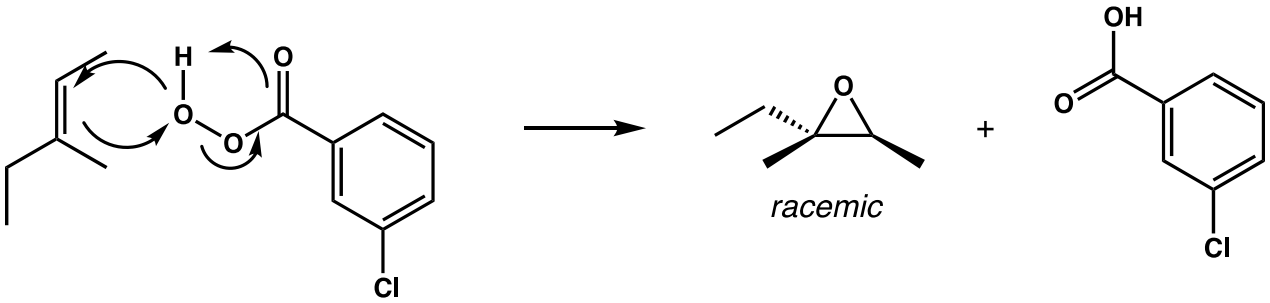


Pathway B

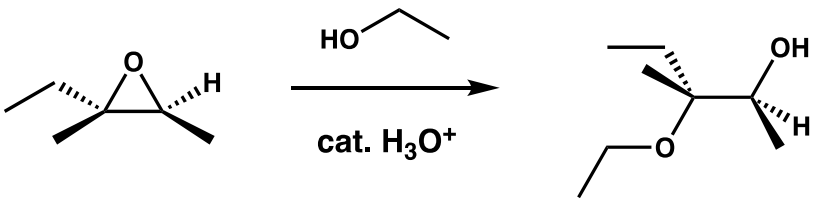


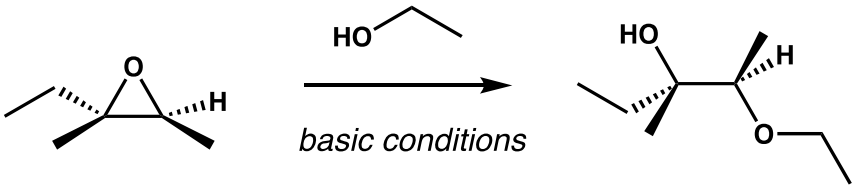
Provide the products and arrow-pushing mechanism for the following epoxidation.





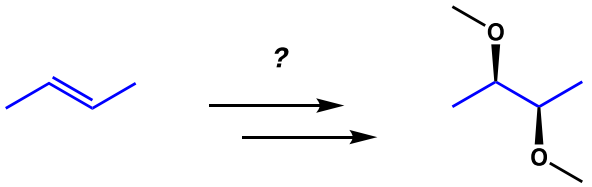
Depending on the conditions, epoxides may be opened away from either the most substituted carbon or the least.

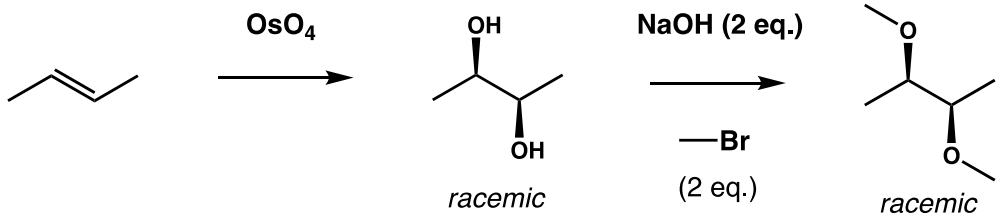


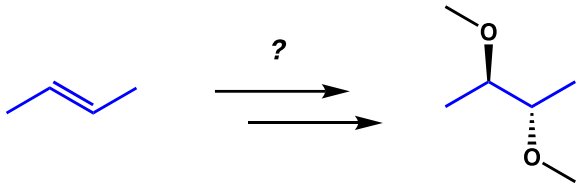


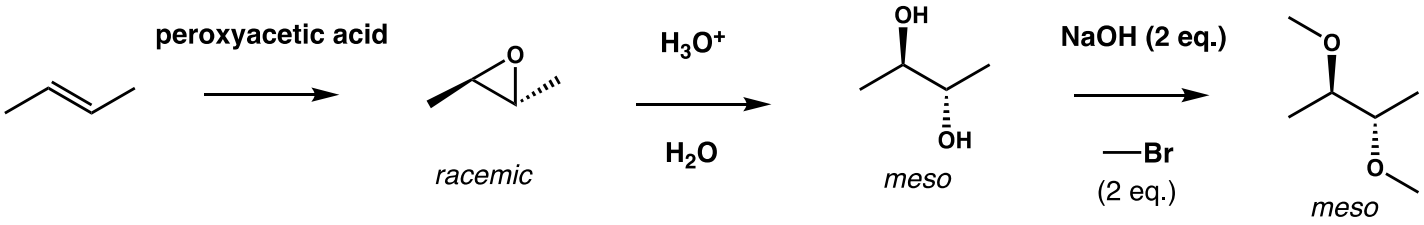
Using your knowledge of epoxide openings, propose synthetic routes for the following transformations. Match the blue carbons in starting materials to those in the products.

Then, give the arrow-pushing mechanisms.









Describe the NMR spectra which are expected for the following compounds.