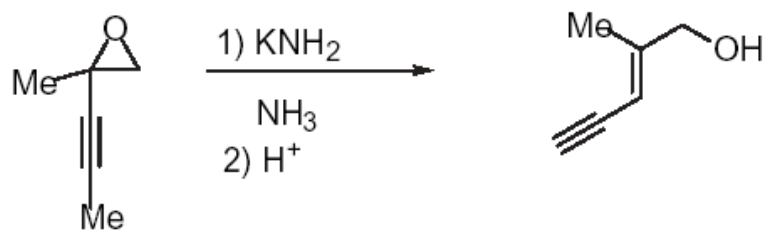
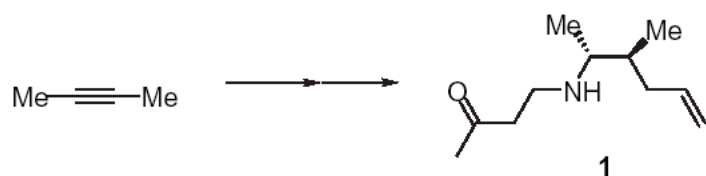


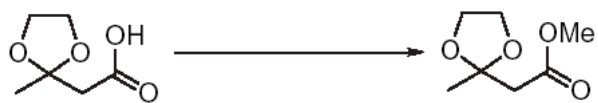
Provide a detailed arrow pushing mechanism



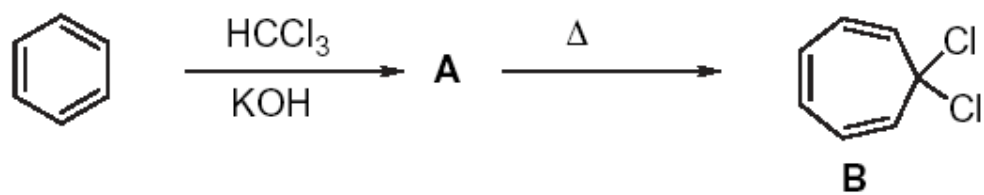
Provide a detailed multistep synthesis of **1** starting from 2-butyne and any materials that contain 3 carbons or less. Reagents that do not get incorporated into your product (such as BuLi, Ph₃P) may be used as well.



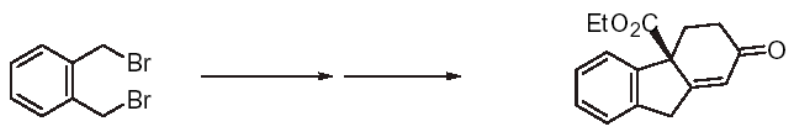
Fill in the reaction conditions



Provide a structure for **A** and a mechanism for the conversion to **B**

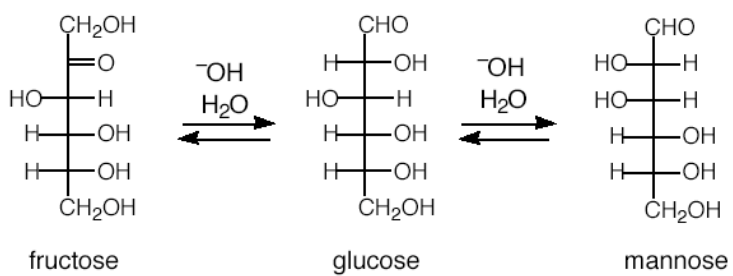


Provide a multistep synthesis using **E** and any other starting materials

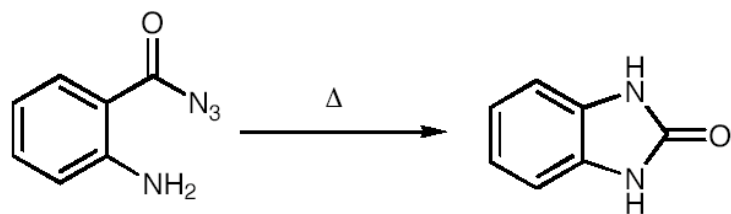


(60 pts)

Provide a mechanism for interconversion of glucose with fructose and mannose.



4. Provide a detailed mechanism for the following transformation:



4. Draw detailed stepwise mechanisms to explain the two results shown below; rationalize the difference.

