Haloalkanes, Alcohols and Amines. Problem Sheet 3

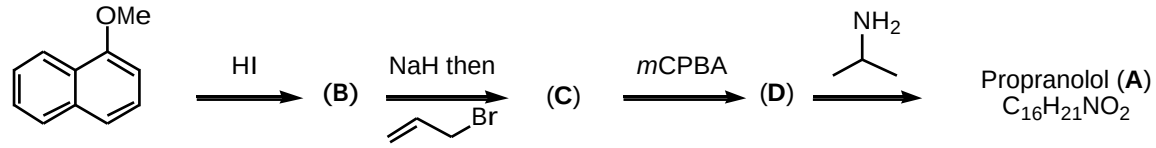
(Alcohols)

1. (a) By using models and then drawing clear diagrams, show the possible chair conformations for *cis*-1,3-cyclohexanediol.

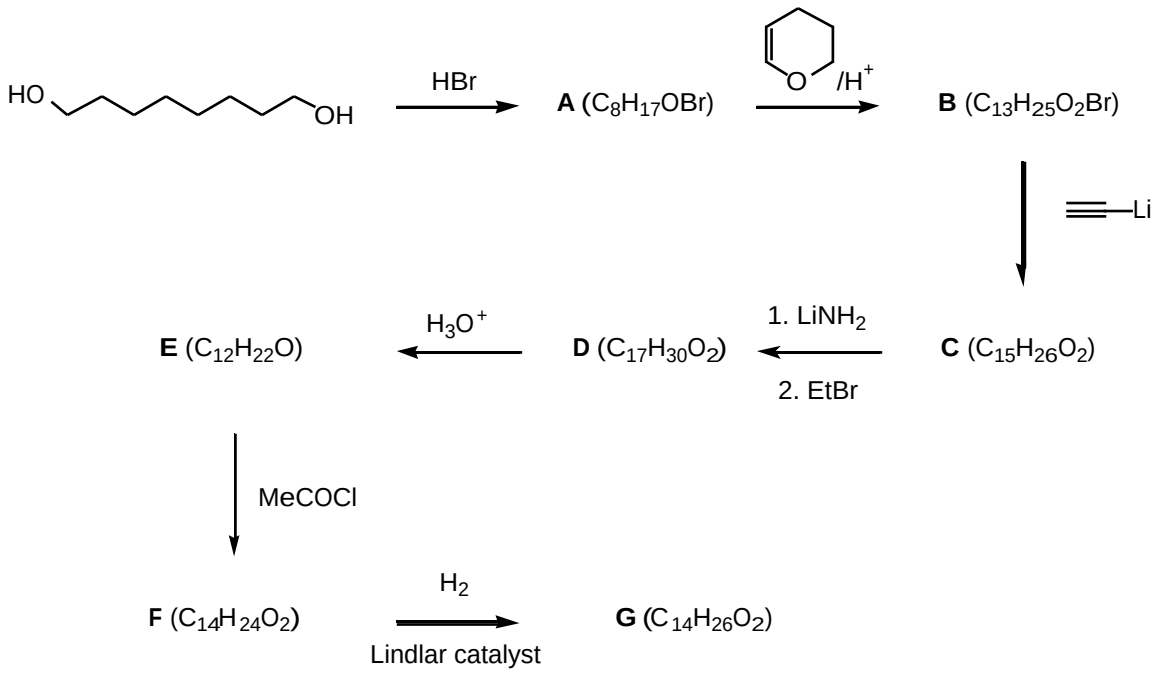
(b) On the basis solely of 1,3-interactions, which would you expect to be the more stable conformation and why?

(c) Infrared evidence indicates intramolecular hydrogen bonding in this diol. How would the infrared data show this? Which conformation in (a) in indicated by this evidence and where is the intramolecular H-bond?

2. Synthesis of the important β-blocker drug propranolol (**A**), used for the treatment of high blood pressure, was achieved according to the scheme below. Propose structures for the compounds **A**-**D** and mechanisms for the reactions.



3. An insect pheromone has been made the following way:



(a) Give the structure of the pheromone and all intermediates including mechanisms

(b) For maximum biological activity of the pheromone there should be 4% of it geometrical isomer present. How could you modify the above synthesis to obtain this isomer?

4. Propene oxide can be converted into 1,2-propanediol by the action of either dilute aqueous acid or dilute aqueous base. When optically active propene oxide is used, the 1,2-diol obtained from acidic hydrolysis has a rotation opposite to that obtained from alkaline hydrolysis. What is the most likely interpretation of these facts?

5. Show clearly all the mechanistic steps in the following acid catalysed transformations.