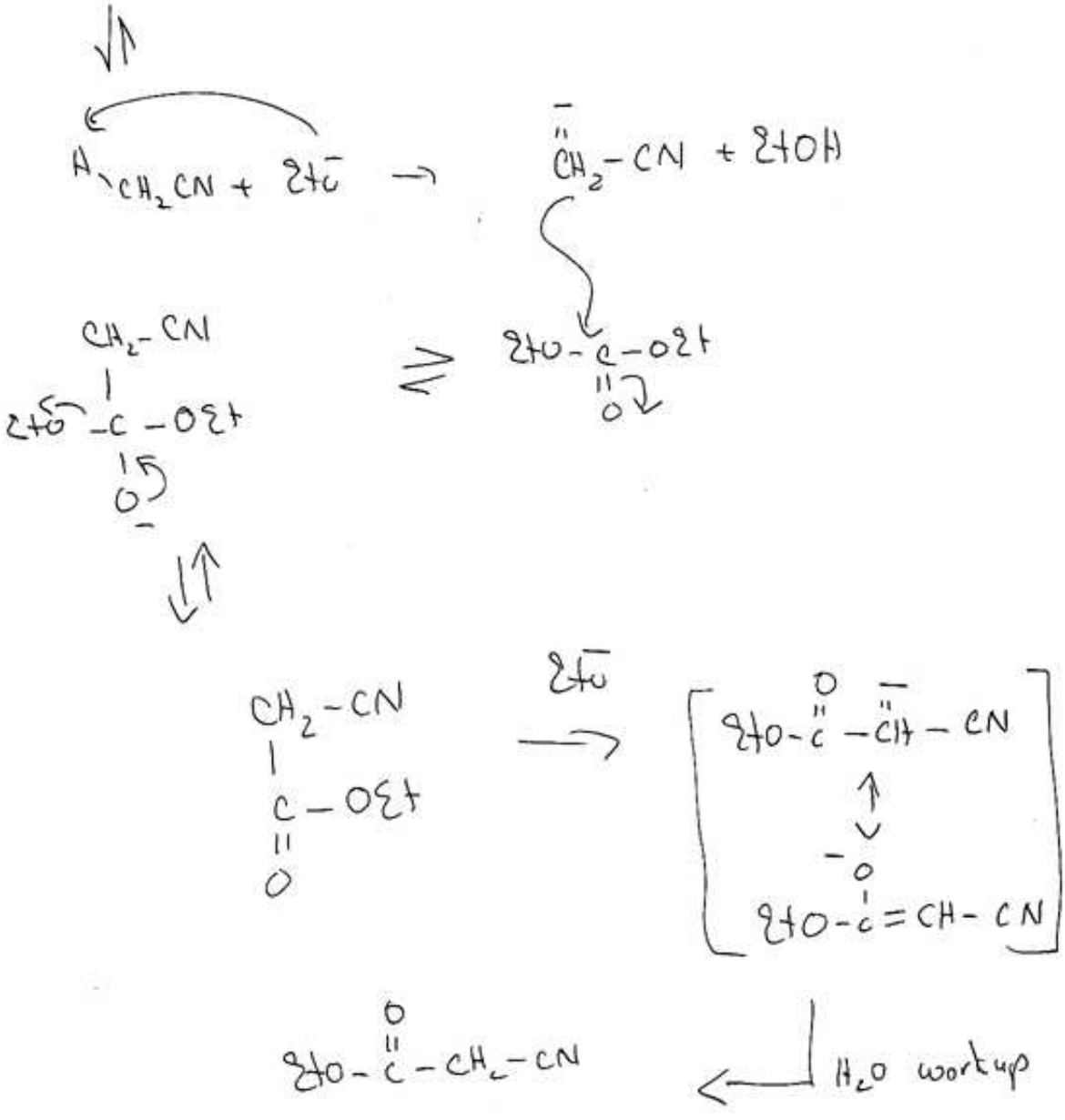
name:

Chemistry 3331-100
Organic Chemistry / Dr. Barney Ellison
Thursday: Oct. 20th **@ 7:00pm → 9:00** / 2nd Exam / Chem 142

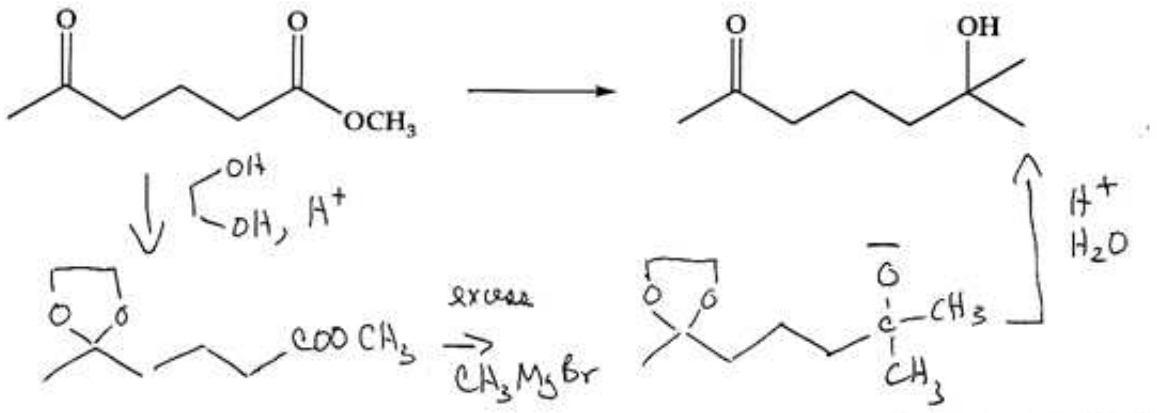
Name: key (please print)

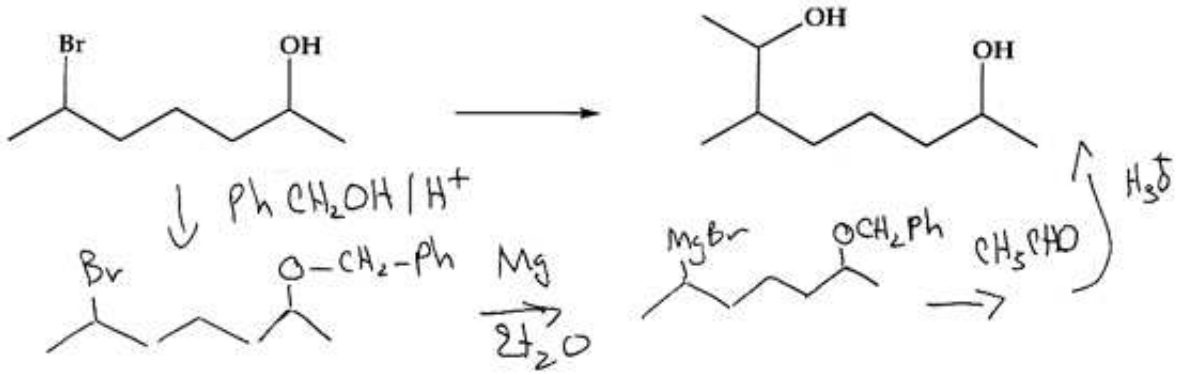
1. (10 pts) Write a mechanism for the reaction of acetonitrile with diethyl carbonate in base:

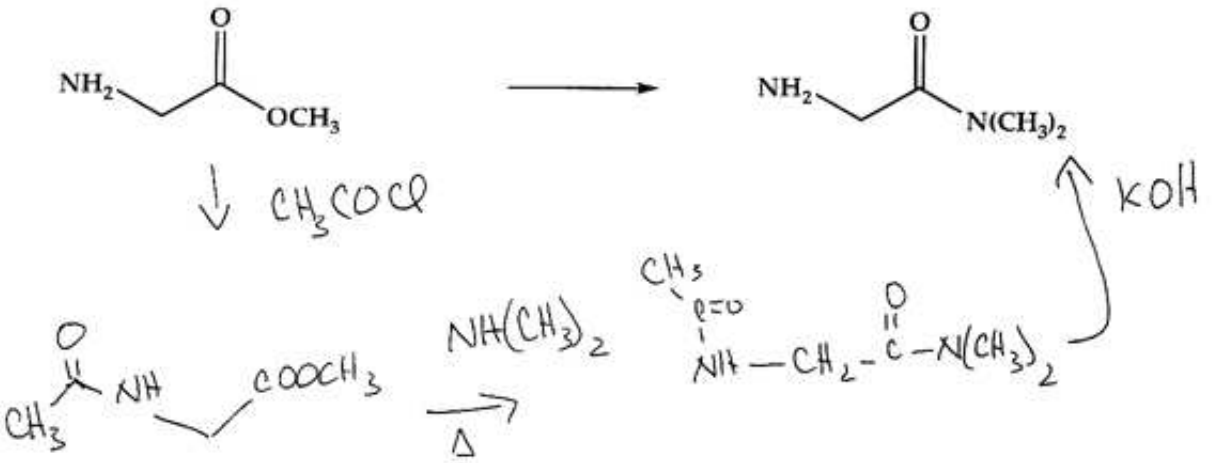
$CH_3CN + EtO(CO)OEt + Na^+EtO^- \longrightarrow NC\text{-}CH_2COOEt$



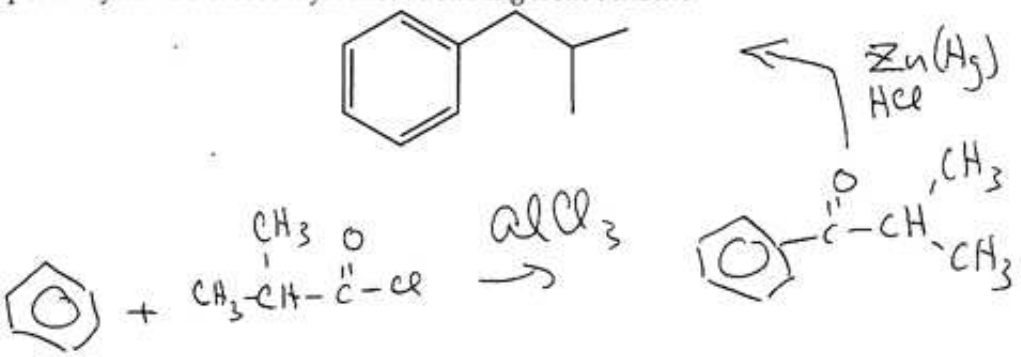
2. (10 pts) Suggest reactions to carry out the following transformation



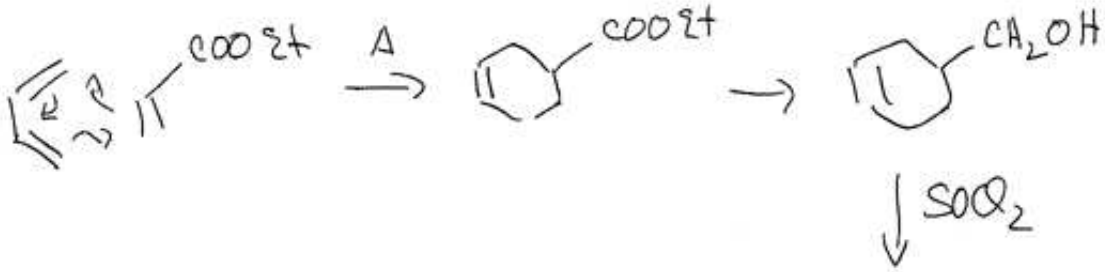


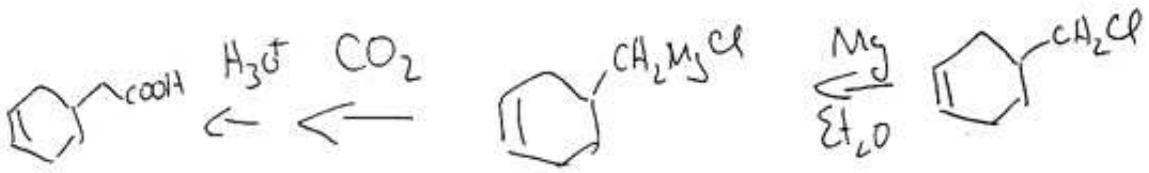


3. (10 pts) The starting material for the synthesis of ibuprofen is isobutylbenzene. Propose a synthesis of isobutylbenzene starting from benzene.

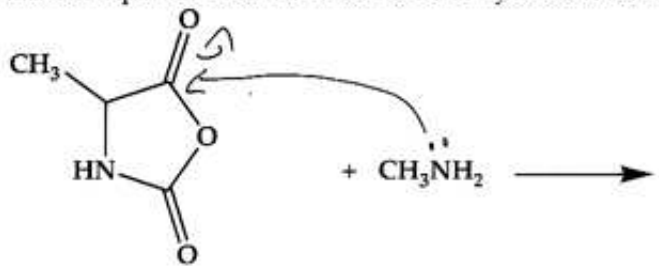


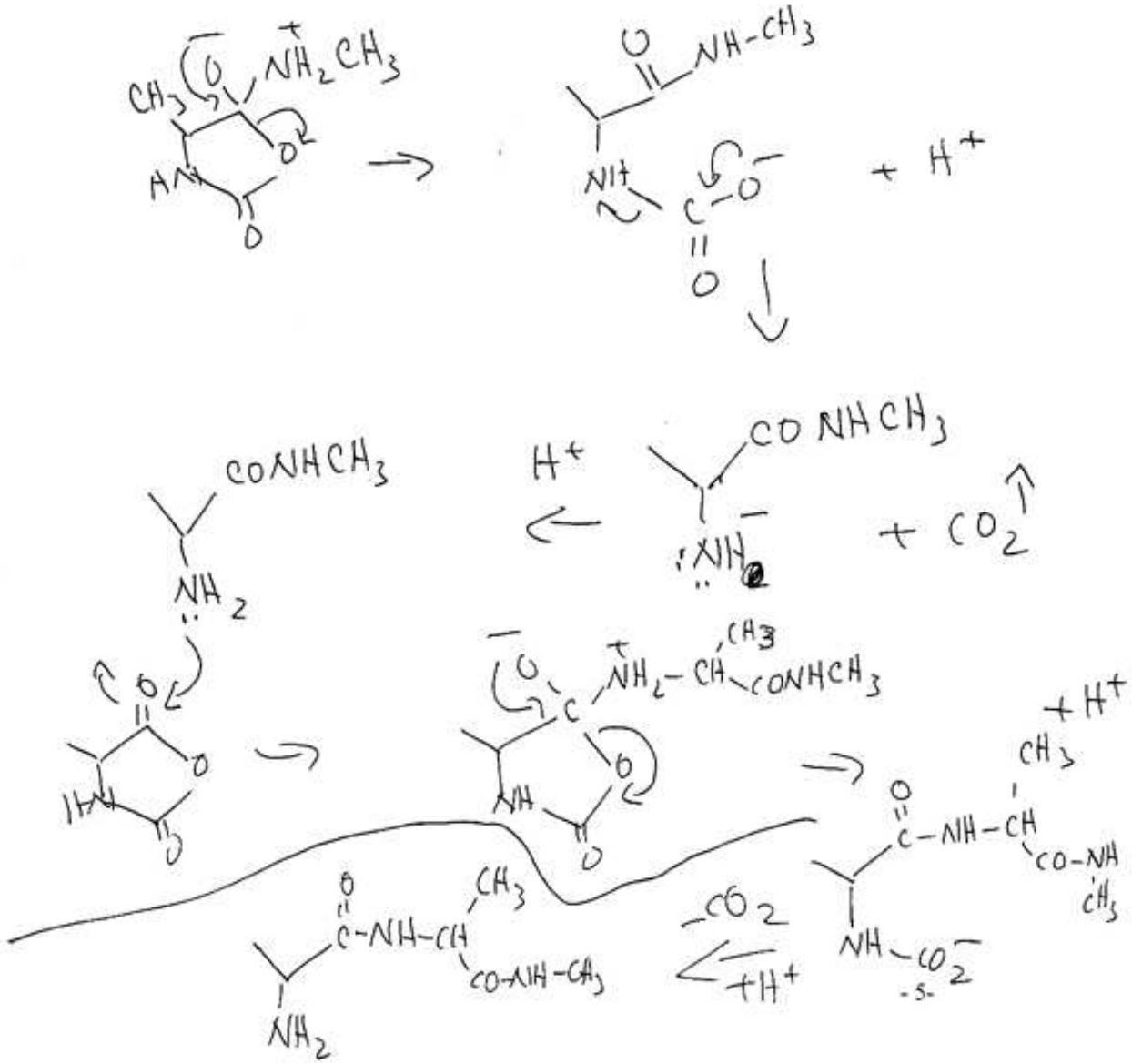
4. (10 pts) Develop a short synthesis for the following carboxylic acid starting from butadiene.



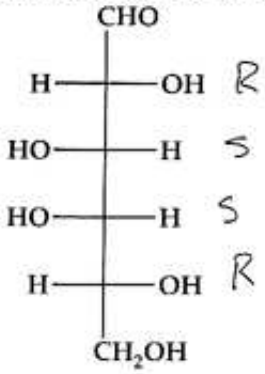


5. (10 pts) Write a mechanism for the reaction of methylamine with the N-carbonic anhydride of alanine. Continue your mechanism for a reaction of the product with another equivalent of the N-carbonic anhydride to form a peptide.

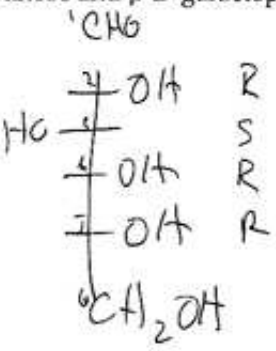




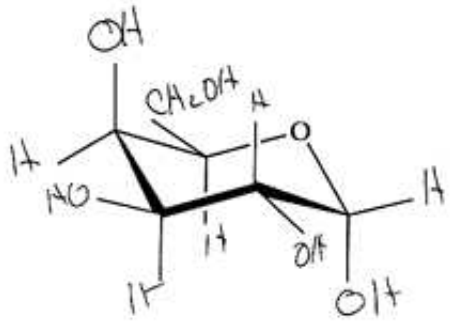
6. (20 pts) Assign (R,S) designations to all stereocenters of galactose. Draw the correct structures for α-D-galactopyranose and β-D-galactopyranose.



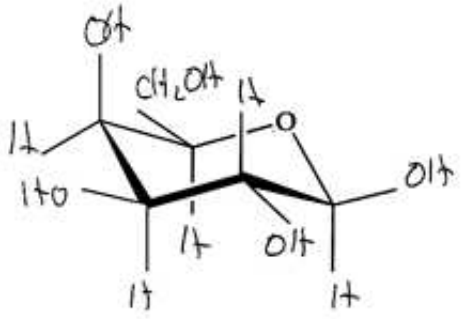
D-galactose



← differ at C_4

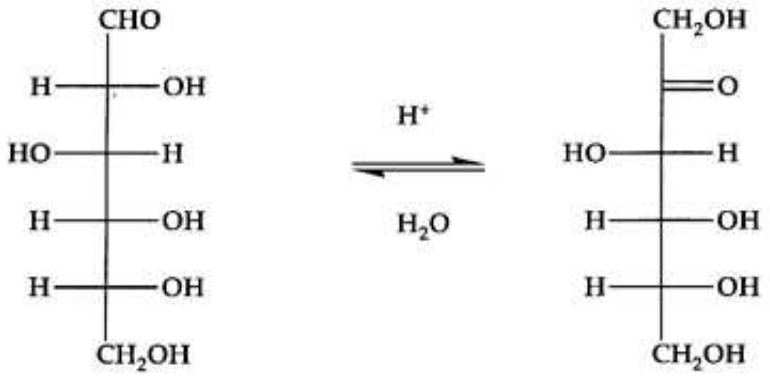


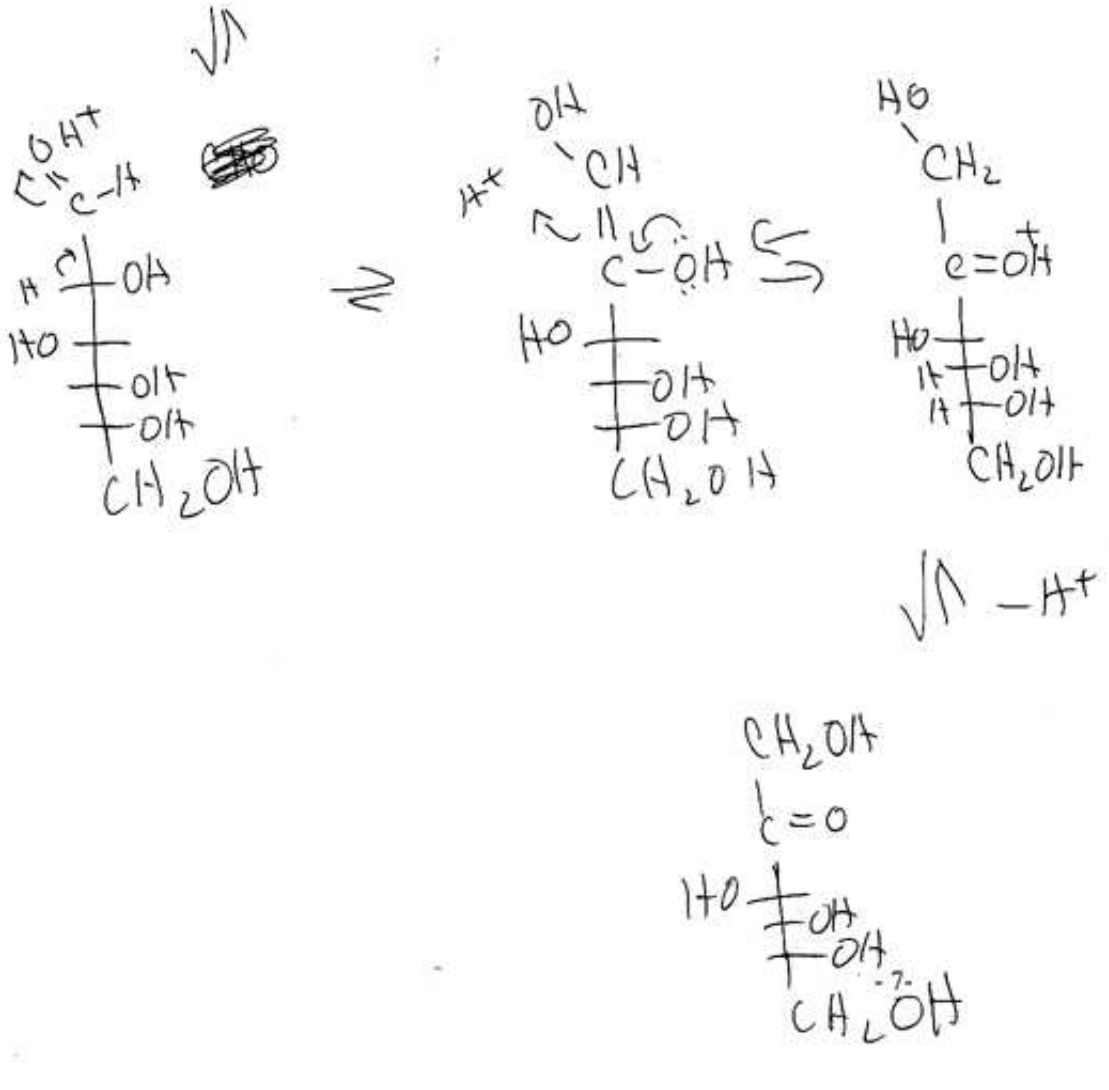
α-D-galactosepyranose



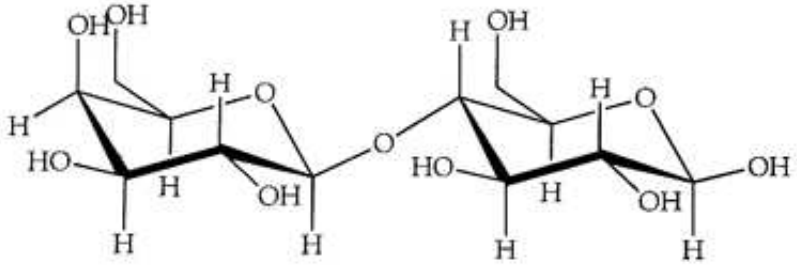
β isomer

7. (10 pts) Write a mechanism for the acid-catalyzed isomerization of glucose to fructose.

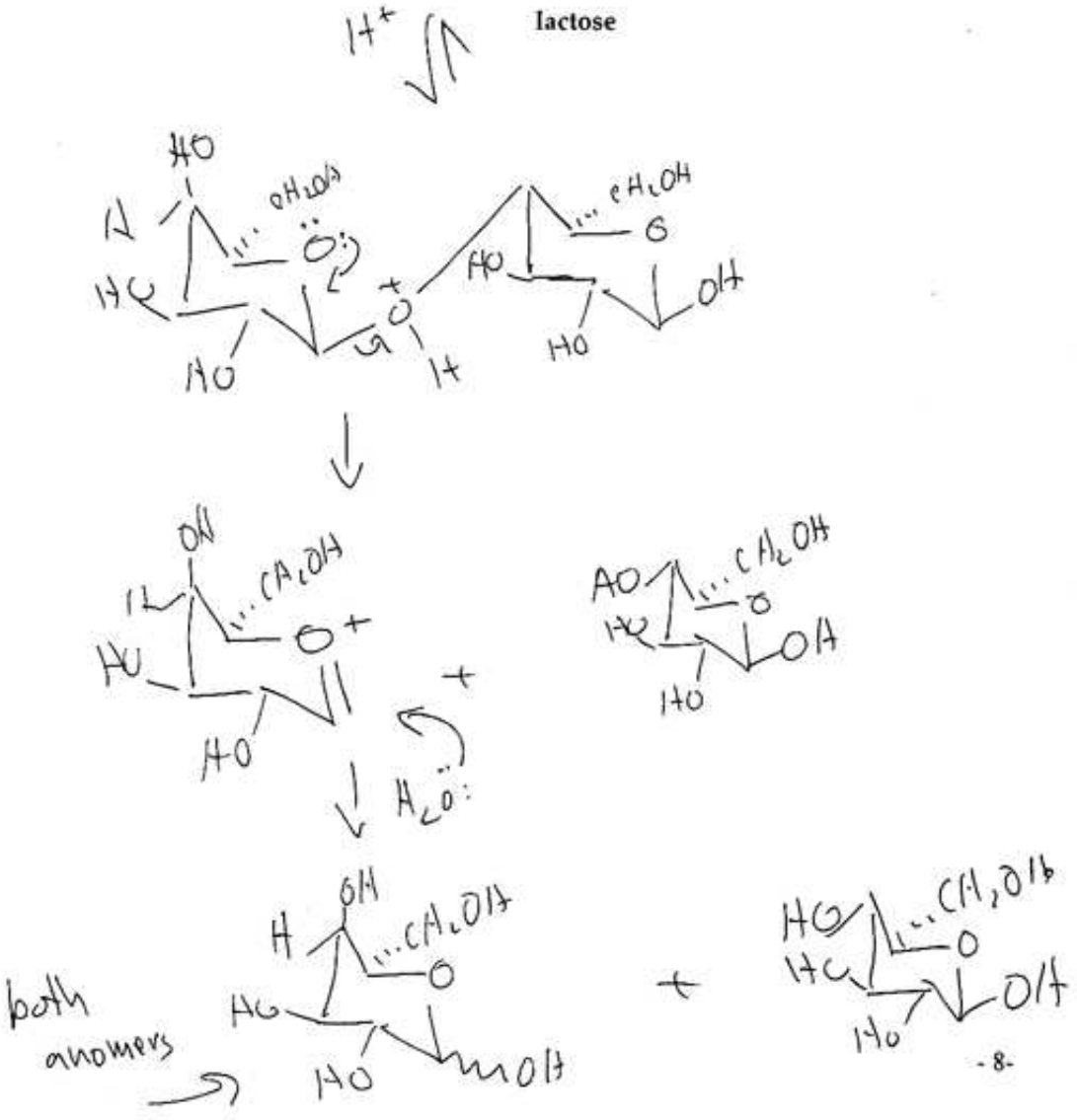




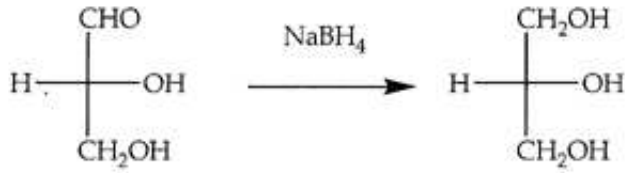
8. (10 pts) Write a mechanism for the acid-catalyzed cleavage of lactose to galactose and glucose.



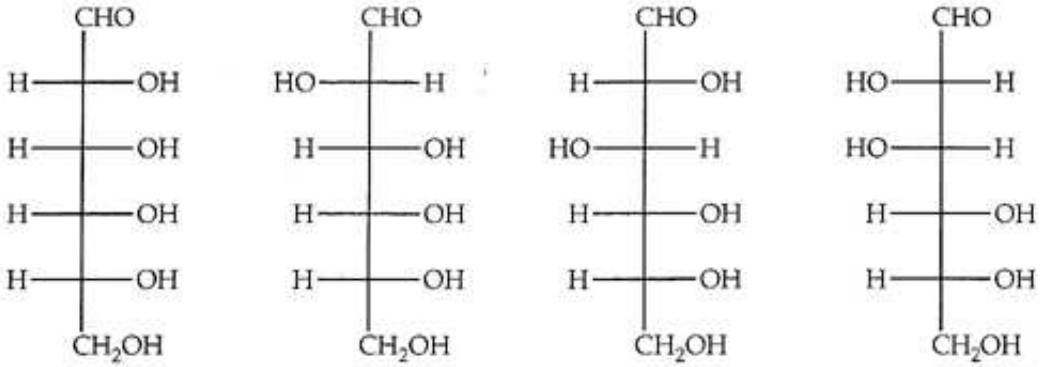
lactose

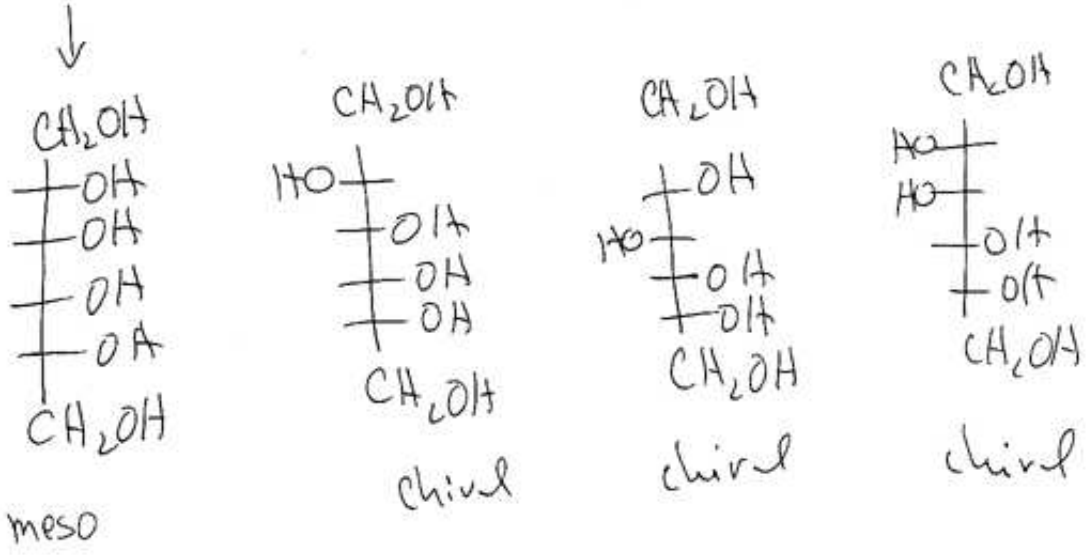


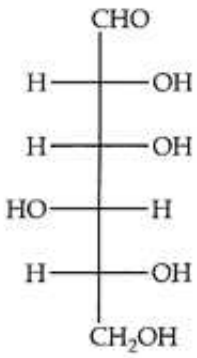
9. (10 pts) $NaBH_4$ can be used to reduce aldoses to the corresponding alcohol. For example, consider the reduction of glyceraldehyde:

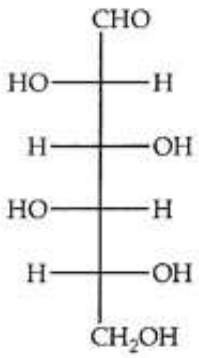


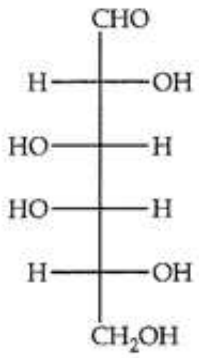
The reduction of the aldehyde functional group on an aldohexose yields a polyol of six carbons, each carbon bearing one hydoxyl group. Draw Fischer diagrams of the alcohols that would result from reduction of each of the eight possible D-aldohexoses. Which of these are chiral molecules and which are not?

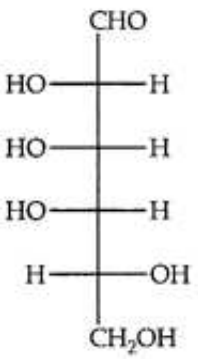


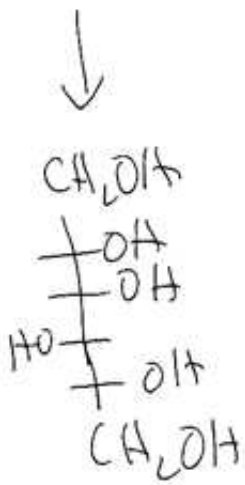


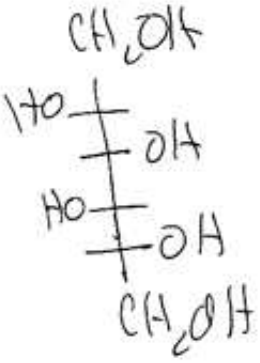


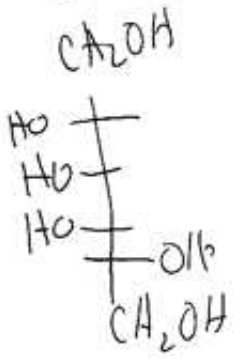












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