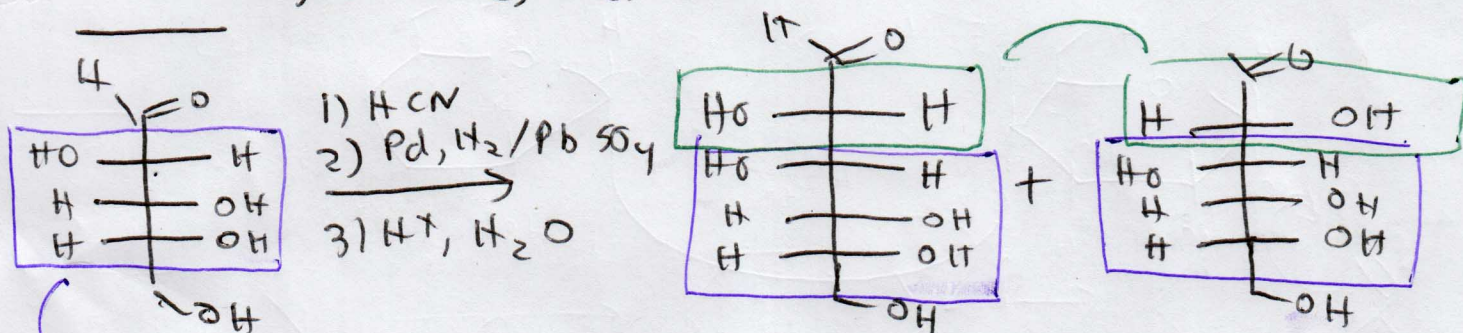


Fischer Stereochemistry Proof

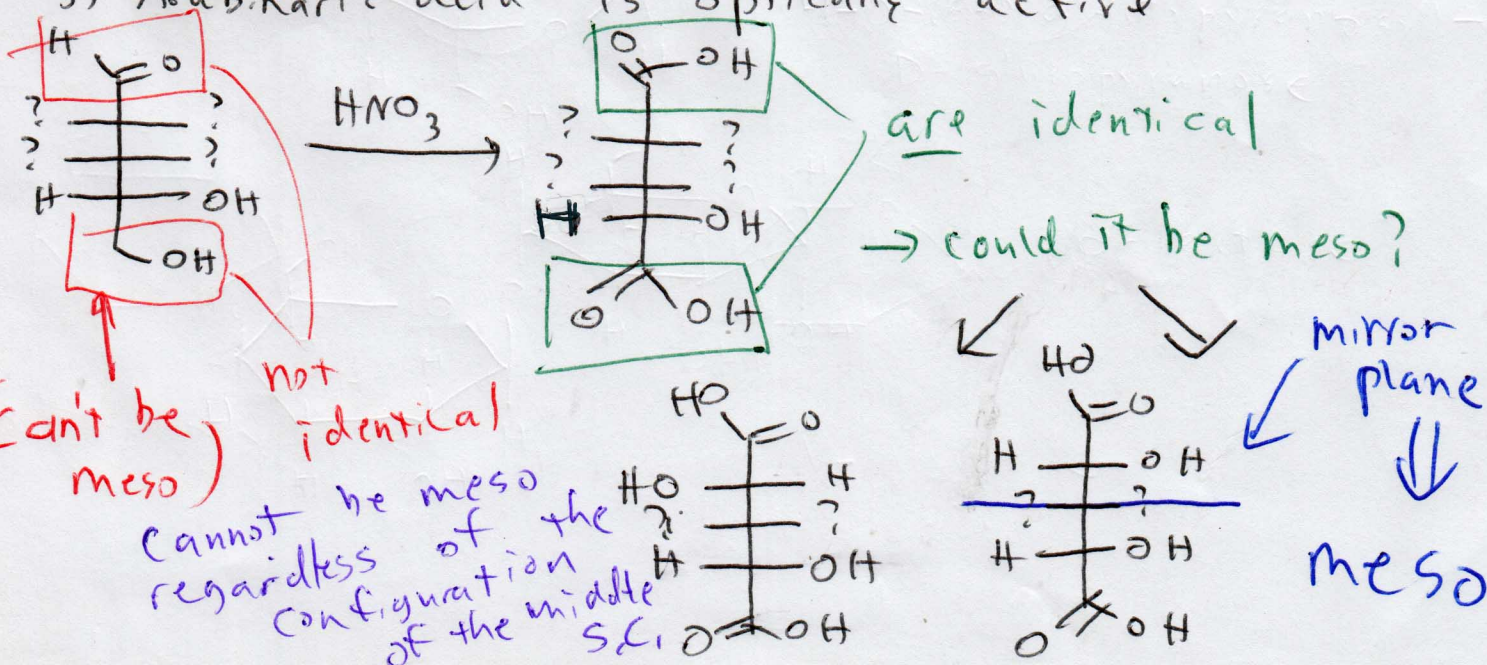
- 0) Glucose is an aldohexose
- 1) The configuration of the last stereocenter was a guess.
- 2) Glucose + mannose are epimers, and they both can be synthesized from arabinose.
- 3) Arabinaric acid is optically active
- 4) Glucaric + mannaric acids are optically active
- 5) Glucose forms an aldaric acid that another sugar does as well



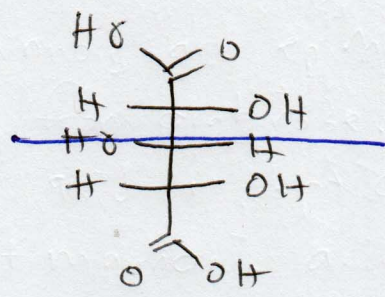
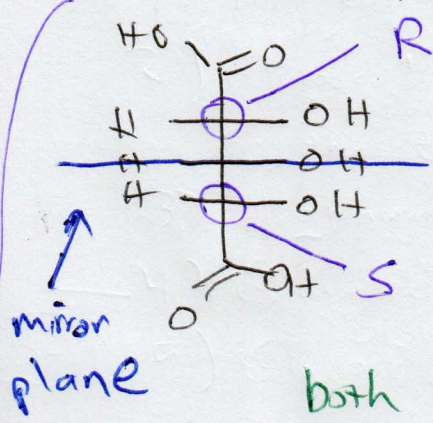
Glucose + mannose contain 3 stereocenters that are identical to those in arabinose

Glucose + mannose are epimers (differing by only one stereocenter),

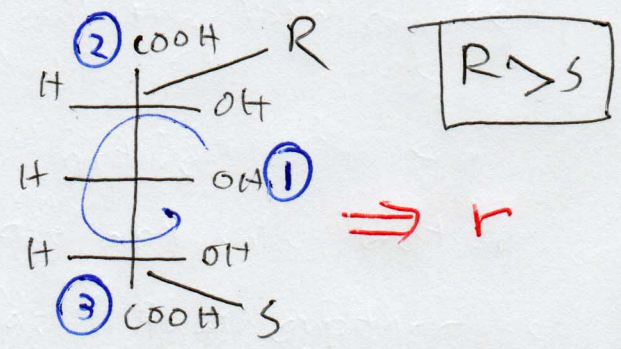
3) Arabinaric acid is optically active



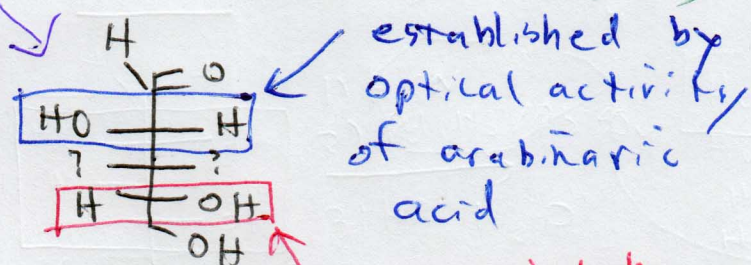
The only way arabinaric acid can be optically active is if the top stereocenter is configured so that it does not form a mirror plane w/ the bottom stereocenter,



pseudostereocenter



both meso (cannot be arabinaric acid)

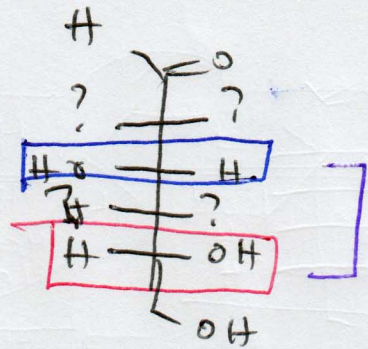


established by optical activity of arabinaric acid

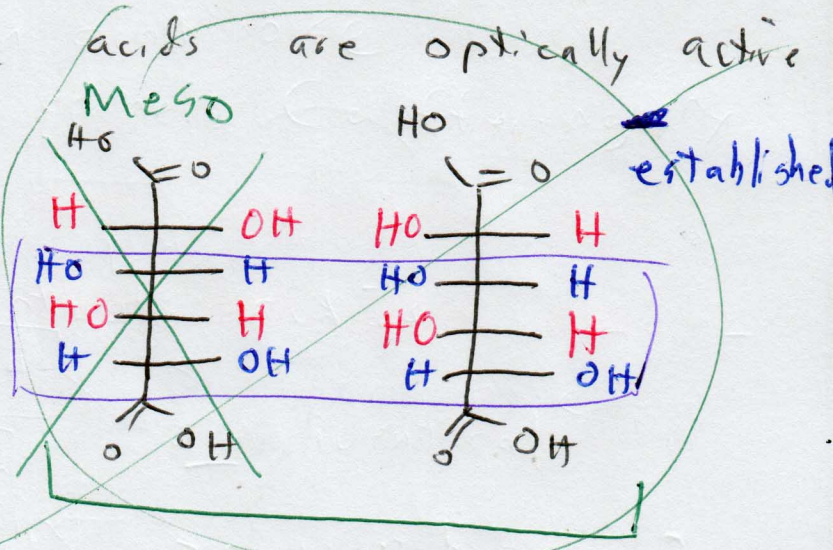
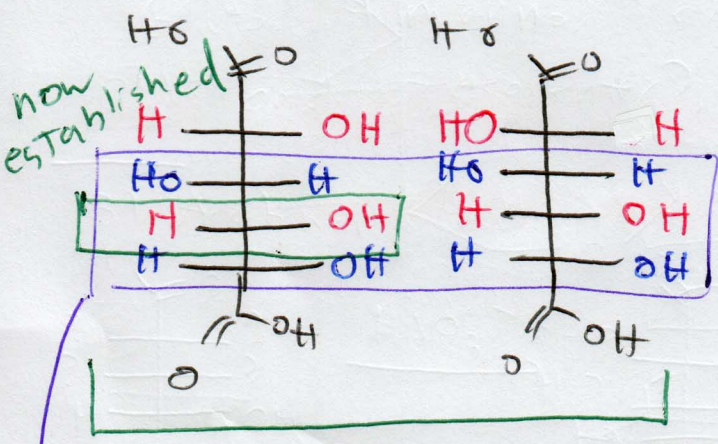
established by a guess

KFCE

⇒

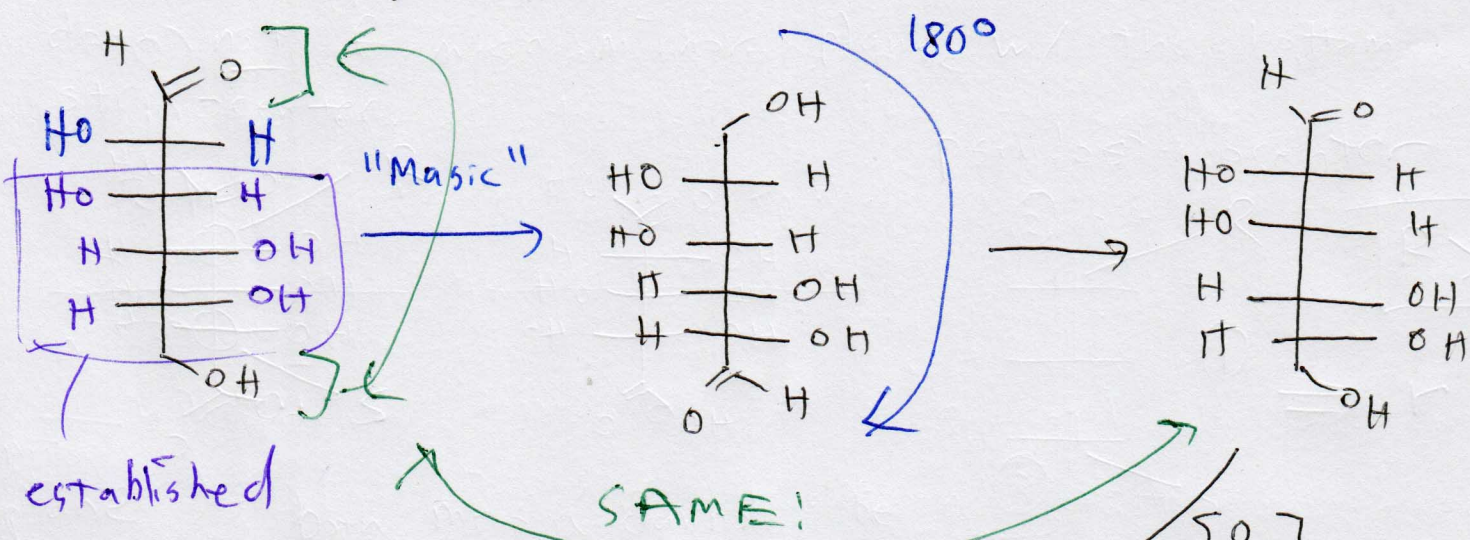


4) Glucaric + mannaric acids are optically active



The bottom 3 stereocenters in glucose + mannose are the same. The structures above represent two possibilities; each possibility, in turn, is a specific configuration of the bottom three stereocenters. If either structure in a pair is shown to be invalid, both structures in the pair are invalid.

5) Glucose makes the same aldaric acid as another sugar,

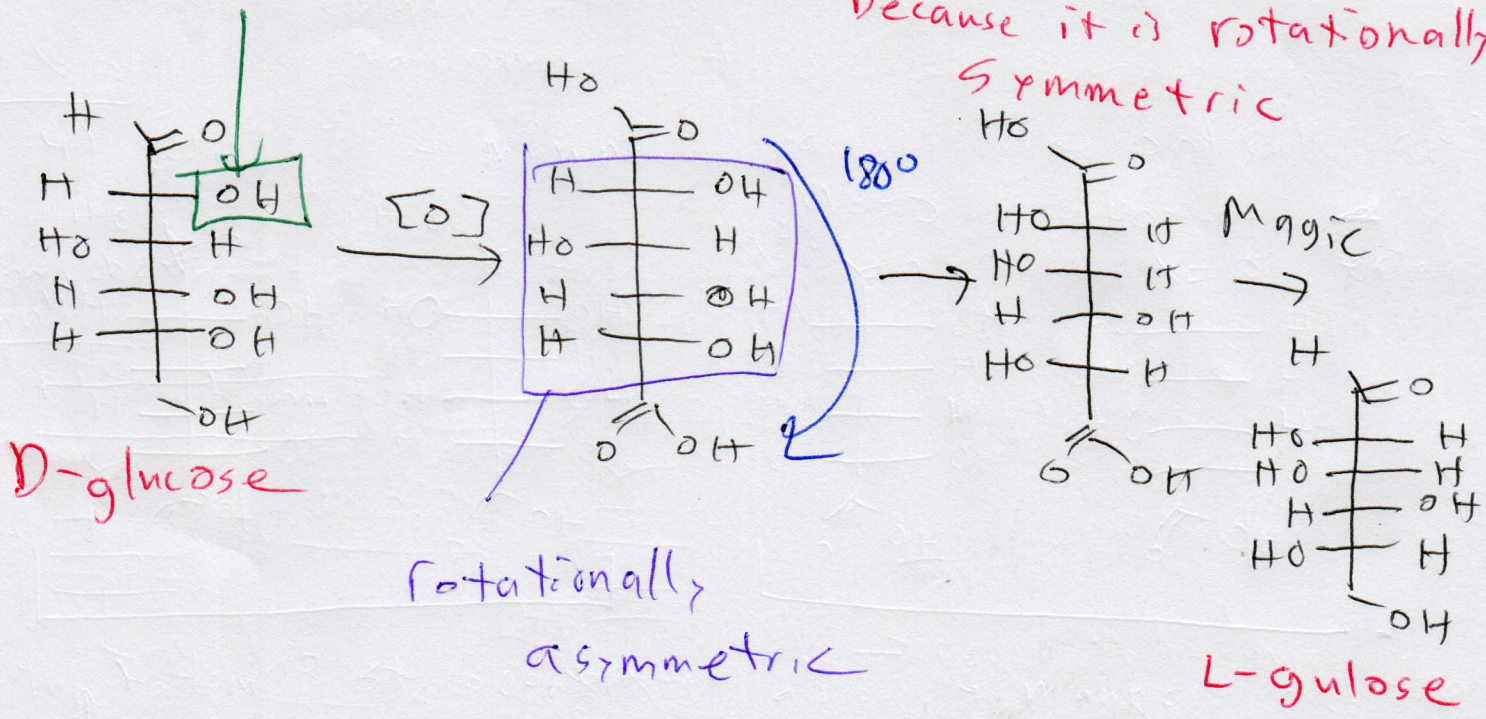


established

SAME!

Only one sugar can make this aldaric acid because it is rotationally symmetric

now established



D-glucose

L-gulose

rotationally asymmetric