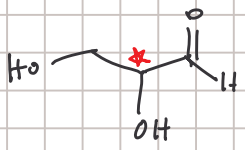
Ch 23 Carbohydrates / Nucleic acids

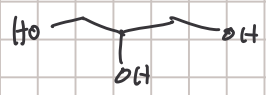
Note Title 5/1/2006

Final next Wed 4:10 S245

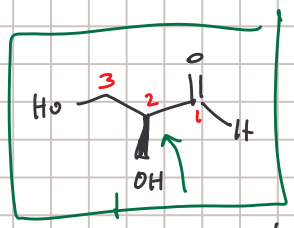
Carbohydrates = sugars = polyhydroxy aldehyde or ketone
(aldose) (ketose)



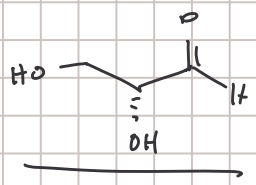
glyceraldehyde
an aldose



glycerol
(glycerin)

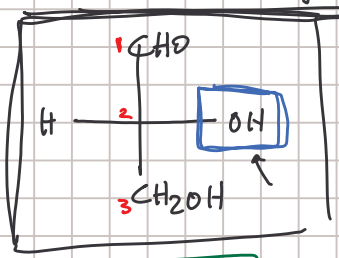


and

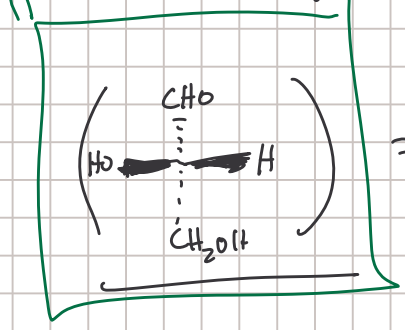


2 enantiomers of glyceraldehyde

Fischer Projections

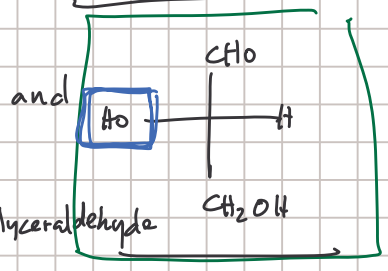


D-glyceraldehyde



=

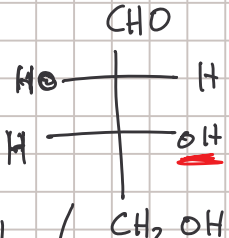
and

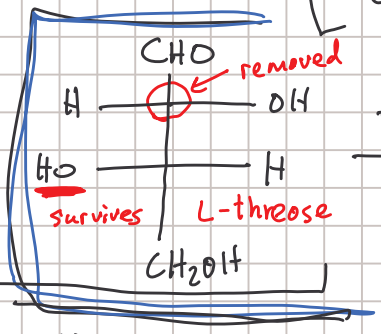


L glyceraldehyde

- most-oxidized C on top
- C chain goes down from there

D-threose



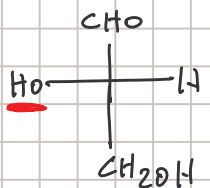


removed

survives

L-threose

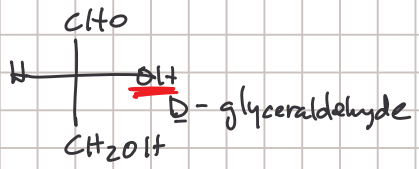
Degradation →



L-glyceraldehyde

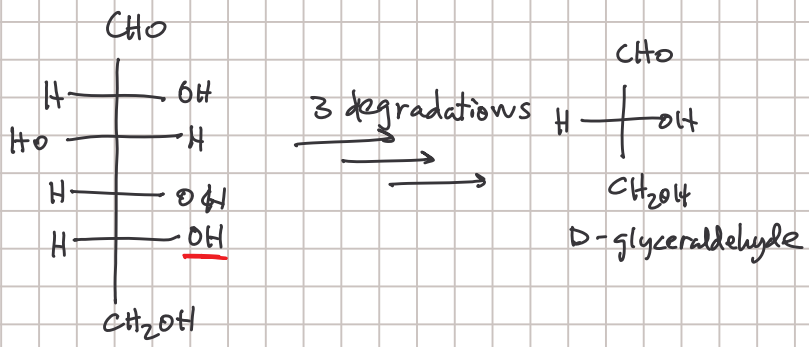
threose enantiomers

degradation →



D-glyceraldehyde

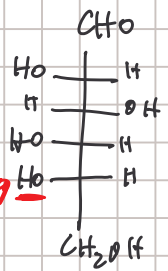
glucose



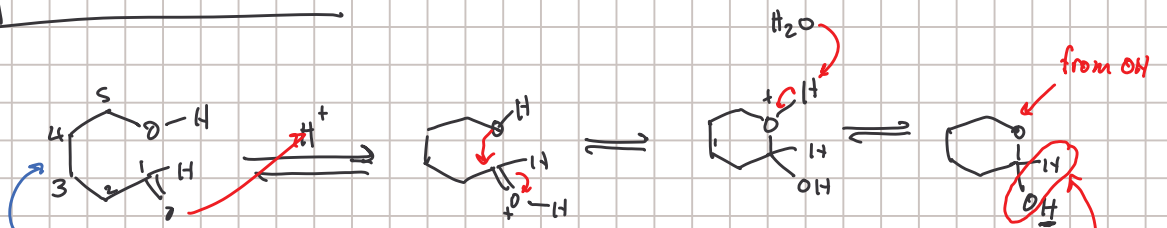
D-glucose

most natural sugars are D enantiomers

unnatural L-glucose



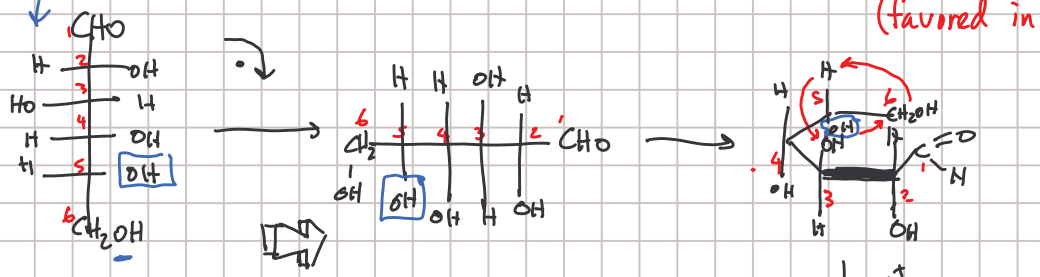
Cyclic hemiacetals



a 5-hydroxyaldehyde

Cyclic hemiacetal

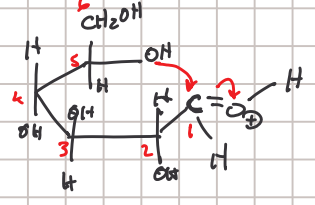
(favored in equilibrium)



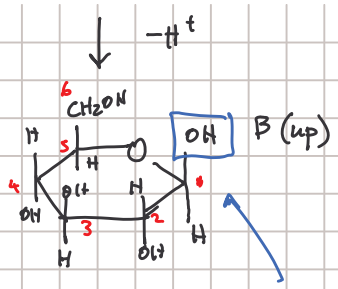
1) tilt 90° CW

2) push C5 & C6 back into paper and curl toward right

3) rotate C5 CCW



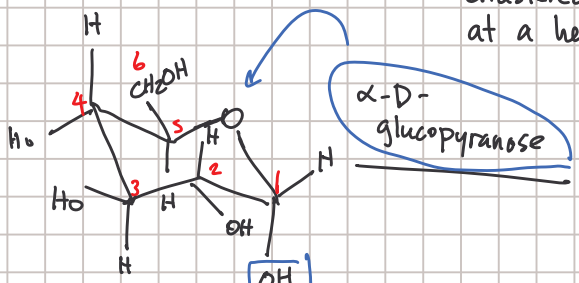
C1 = hemiacetal C
(only C attached to 2 O)



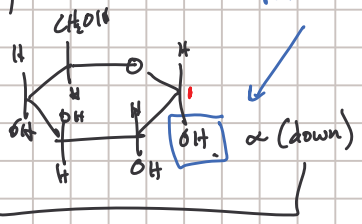
either can be formed

anomers

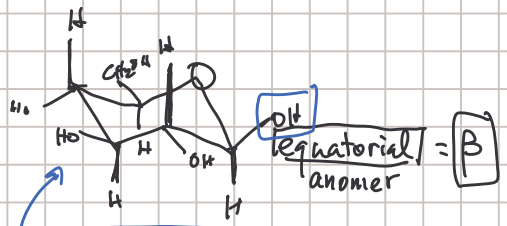
diastereomers different only at a hemiacetal C



OH axial = α
anomer

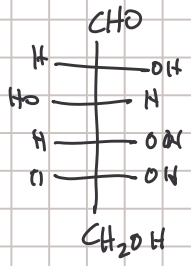


Haworth projection (flat ring from side)



β-D-glucopyranose

6-membered closed hemiacetal form



D-glucose
(open-chain form)

*hint: β-D-glucopyranose has all groups equatorial!

[α-D-glucopyranose ⇌ D-glucose ⇌ β-D-glucopyranose] (solution)

crystallize cold → Pure α-D-glucopyranose

crystallize hot → pure β-D-glucopyranose