

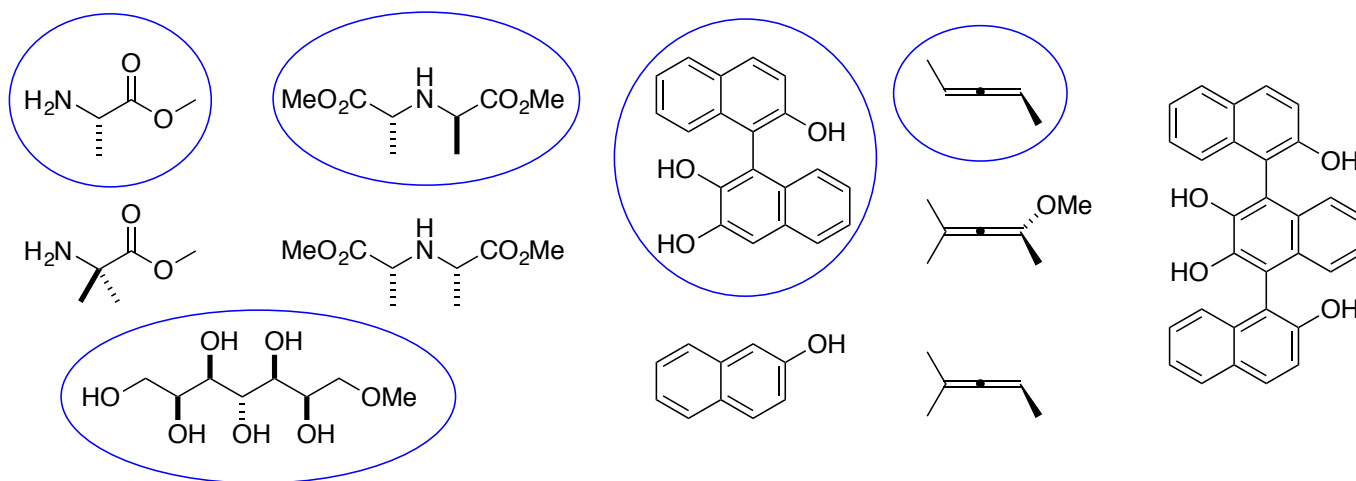
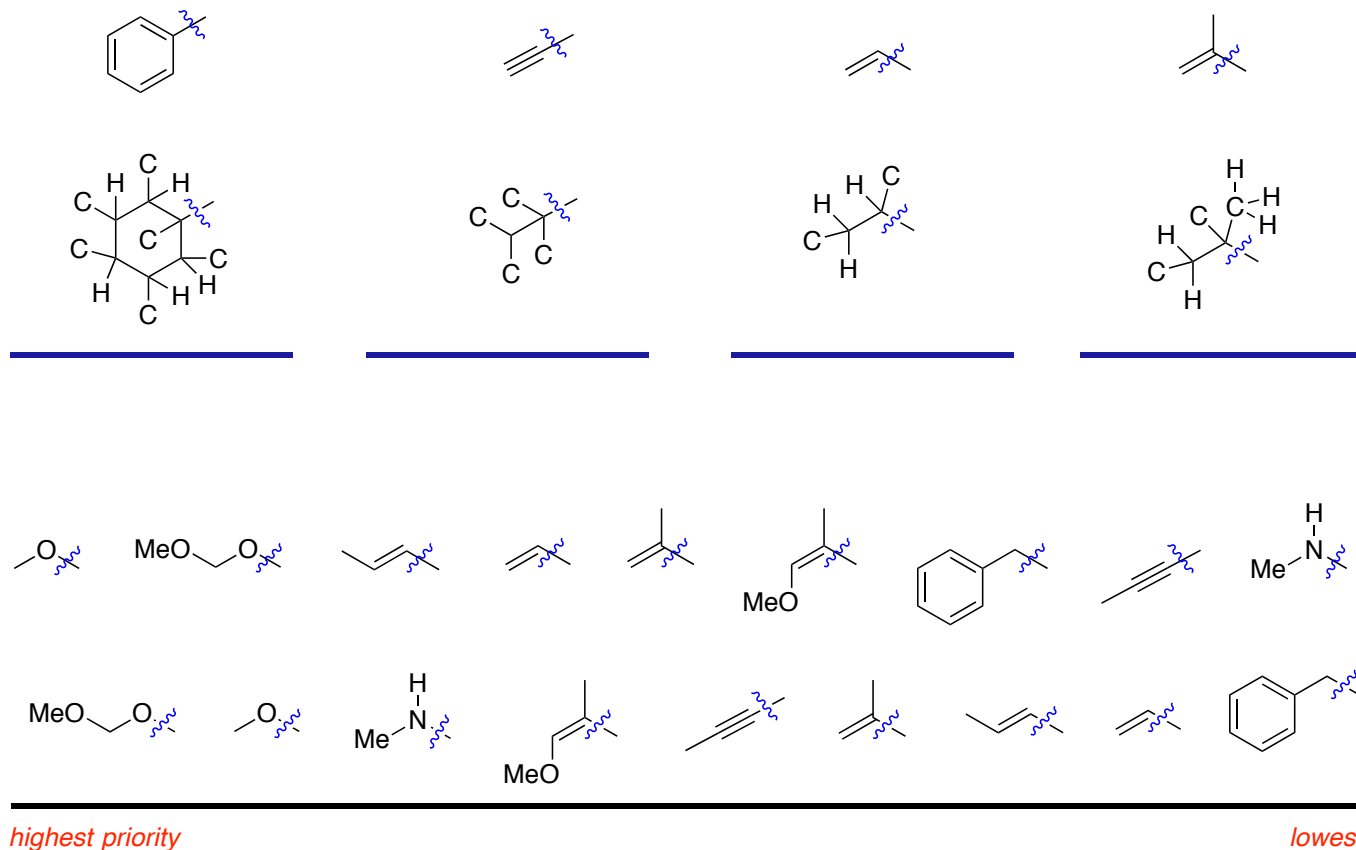
# Stereochemistry Illustrated By Carbohydrates

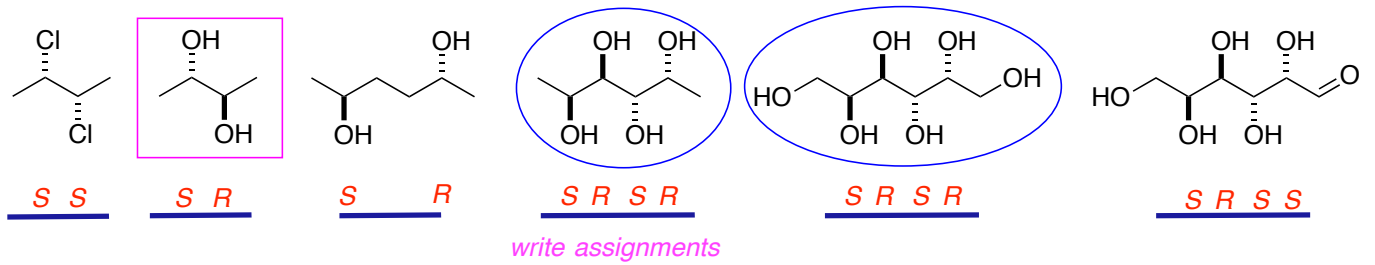
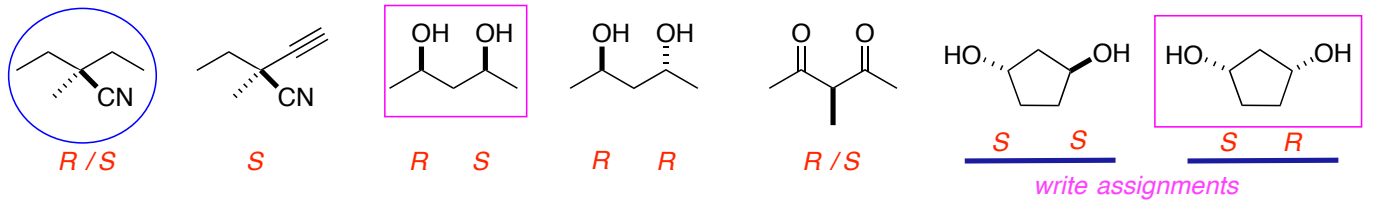
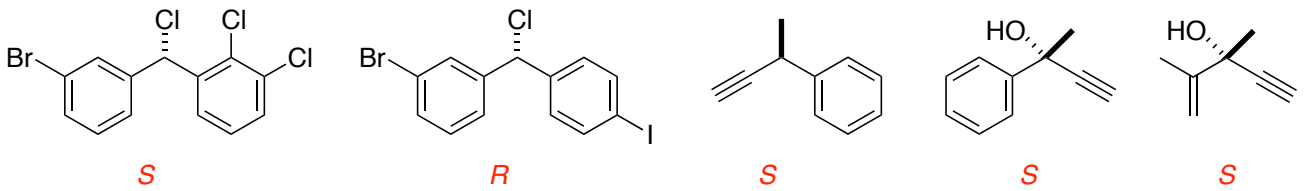
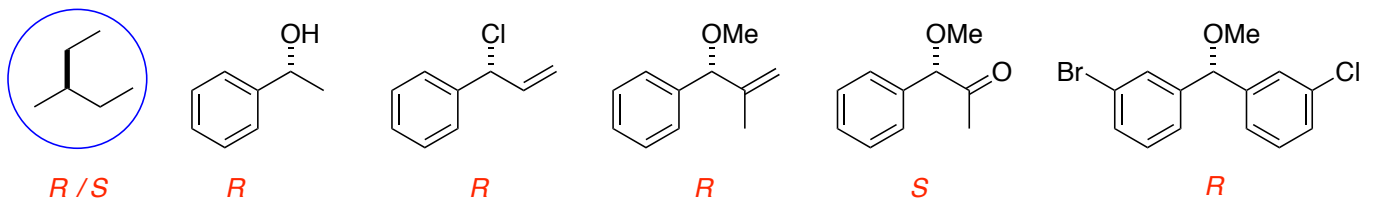
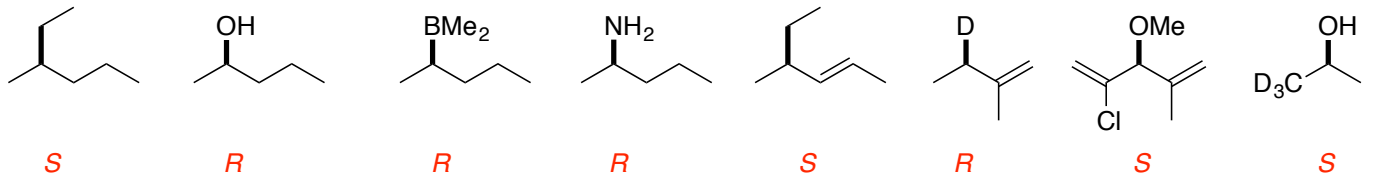
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from chapter(s) \_\_\_\_\_ in the recommended text

## A. Introduction

## B. Assigning R- and S-Configurations

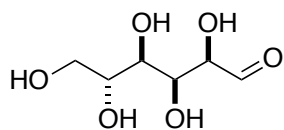




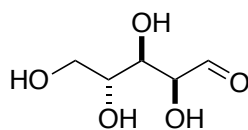
## C. Stereochemical Representations Of Carbohydrates

are all used to describe compounds in this series.

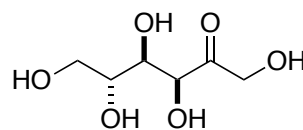
(eg **glucose**): if they contain an aldehyde they are called **aldoses**  
**ketoses**.



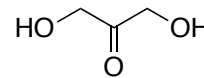
*D-glucose*  
aldose



*D-ribose*  
aldose

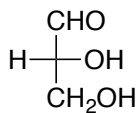


*D-fructose*  
ketose

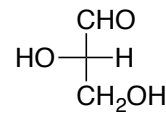


*dihydroxyacetone*  
ketose

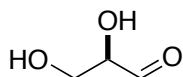
*top*



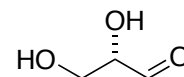
*D-glyceraldehyde Fischer projection*



*L-glyceraldehyde Fischer projection*



*D-glyceraldehyde zig-zag*



*L-glyceraldehyde zig-zag*





## D. Carbohydrates Can Cyclize To Hemiacetals Or Hemiketals



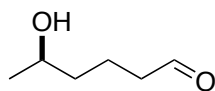
THF



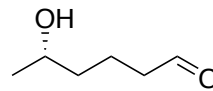
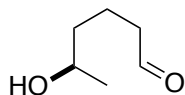
4H-pyran



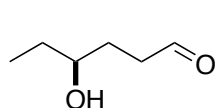
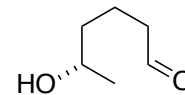
tetrahydropyran



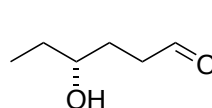
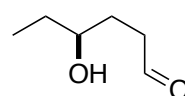
is the same as



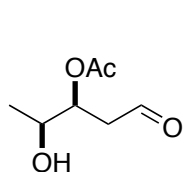
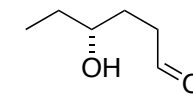
is the same as



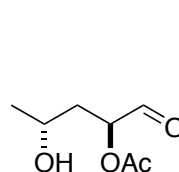
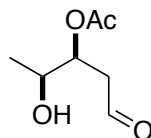
is the same as



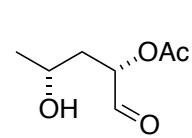
is the same as



is the same as

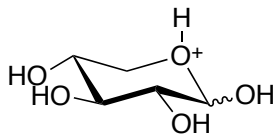
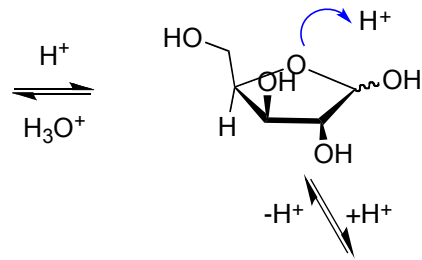
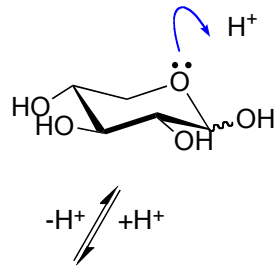


is the same as

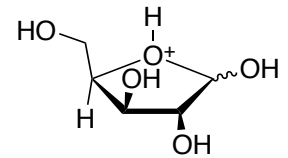


(*six*-membered ring)

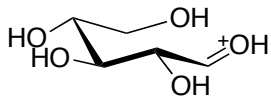
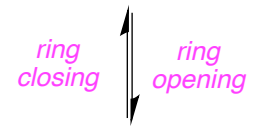
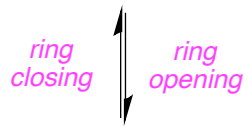
(*five*-membered ring)



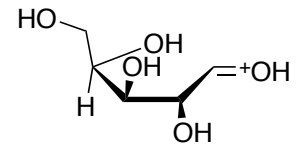
*protonated pyranose form*



*protonated furanose form*



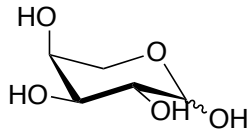
*protonated aldehyde*



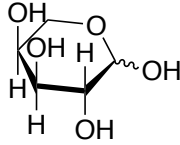
*protonated aldehyde redrawn  
poised for 5-membered ring formation*

Glucose *and*

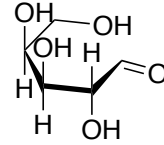




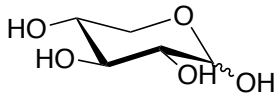
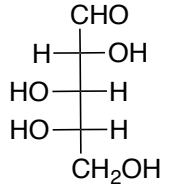
is the same as



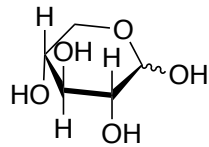
is the cyclized form of



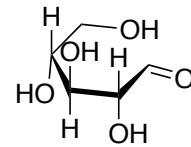
is the same as



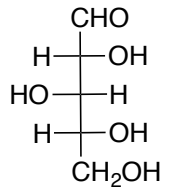
is the same as



is the cyclized form of

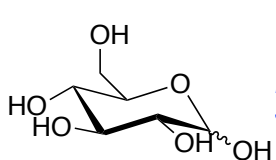


is the same as



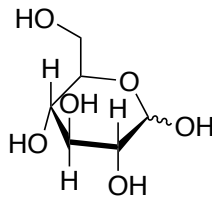
pyranose

hexoses to Fischer projections.

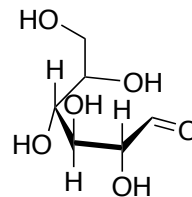


glucose

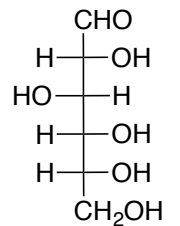
is the same as



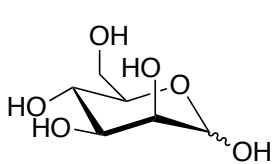
is the cyclized form of



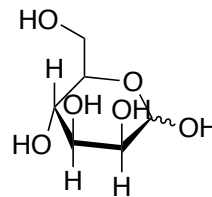
is the same as



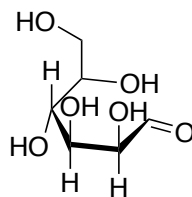
is  $\beta$ -.



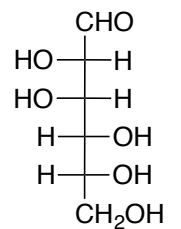
is the same as

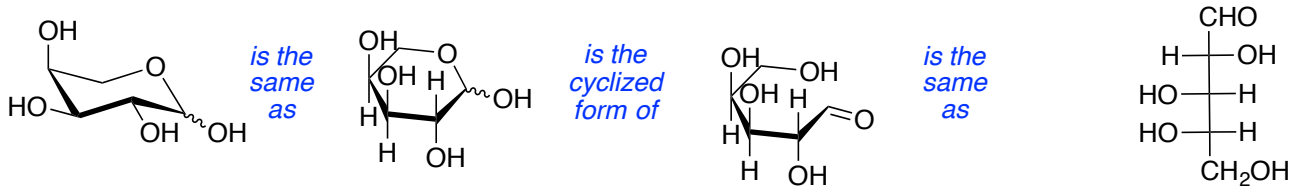
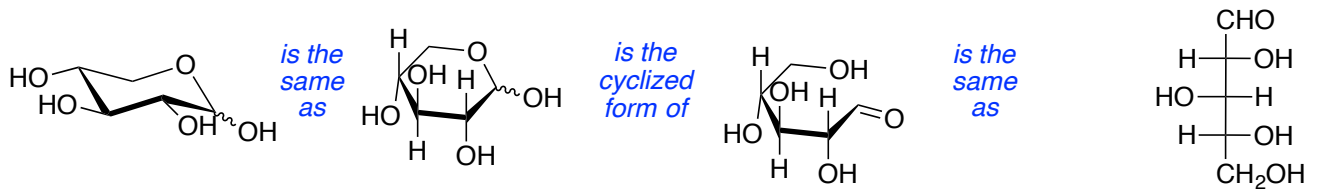
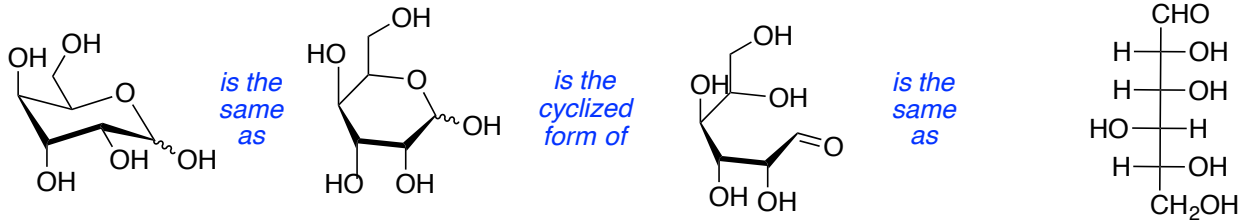


is the cyclized form of

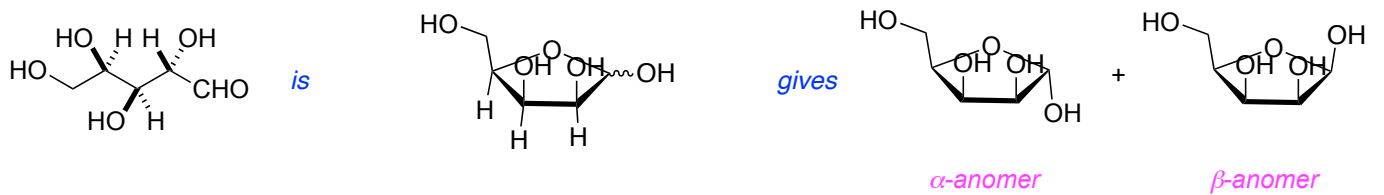


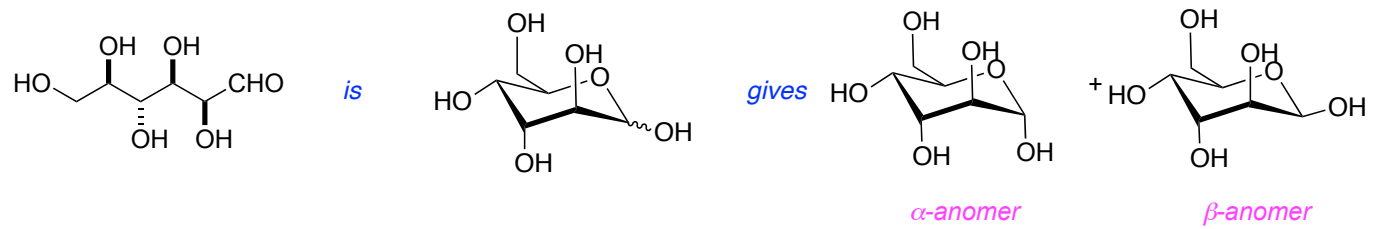
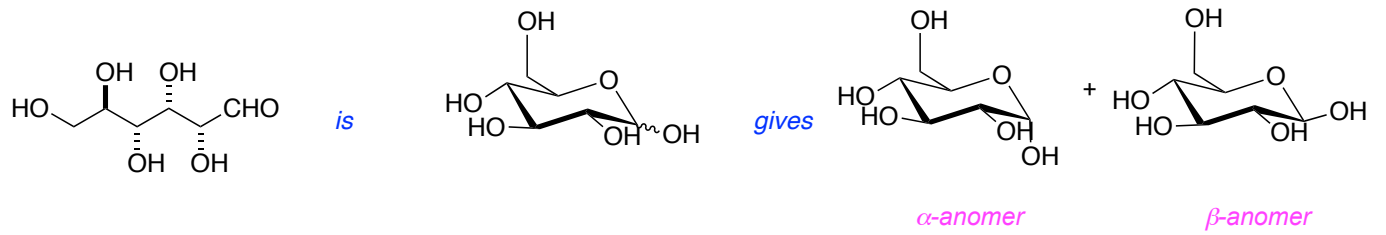
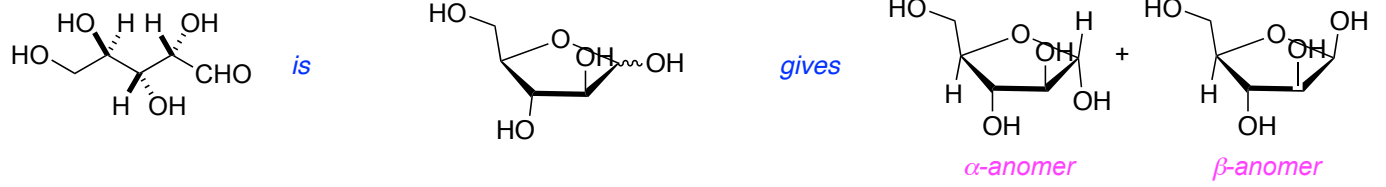
is the same as

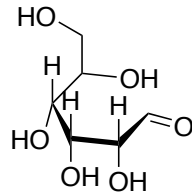
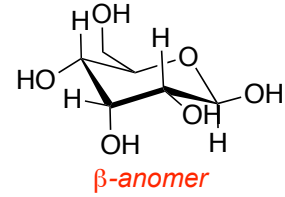
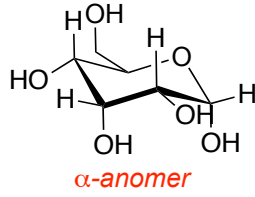
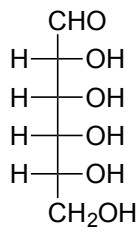




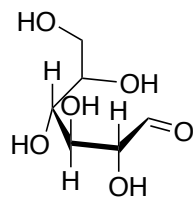
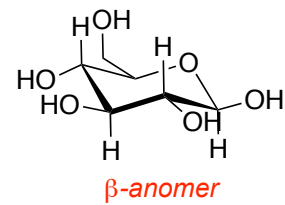
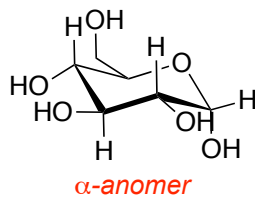
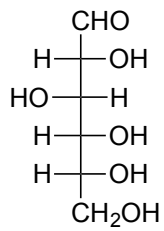
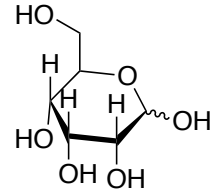
*trans* to the -CH<sub>2</sub>OH



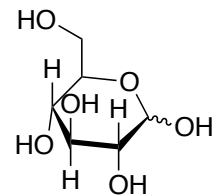


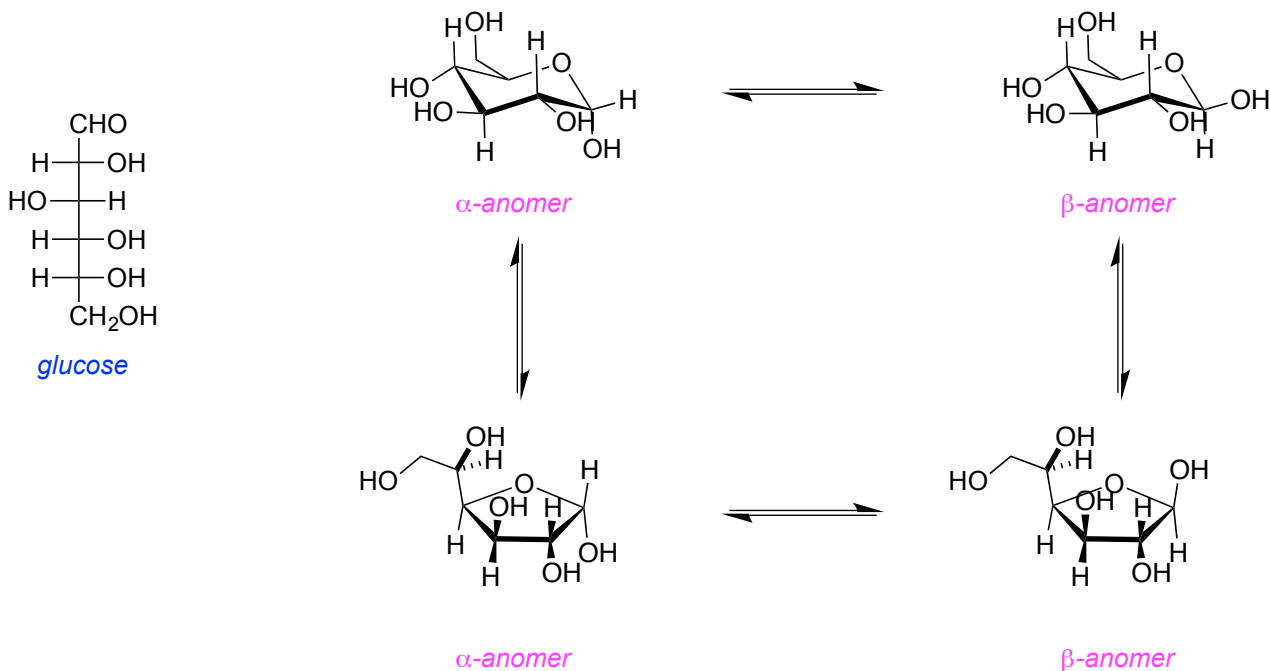


*convert to the cyclized form*

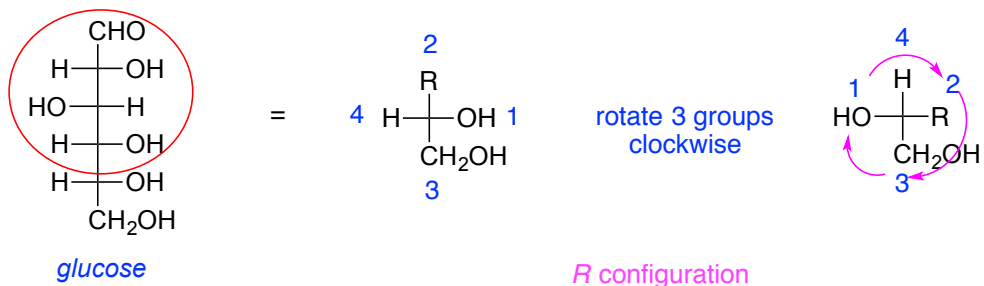


*convert to the cyclized form*





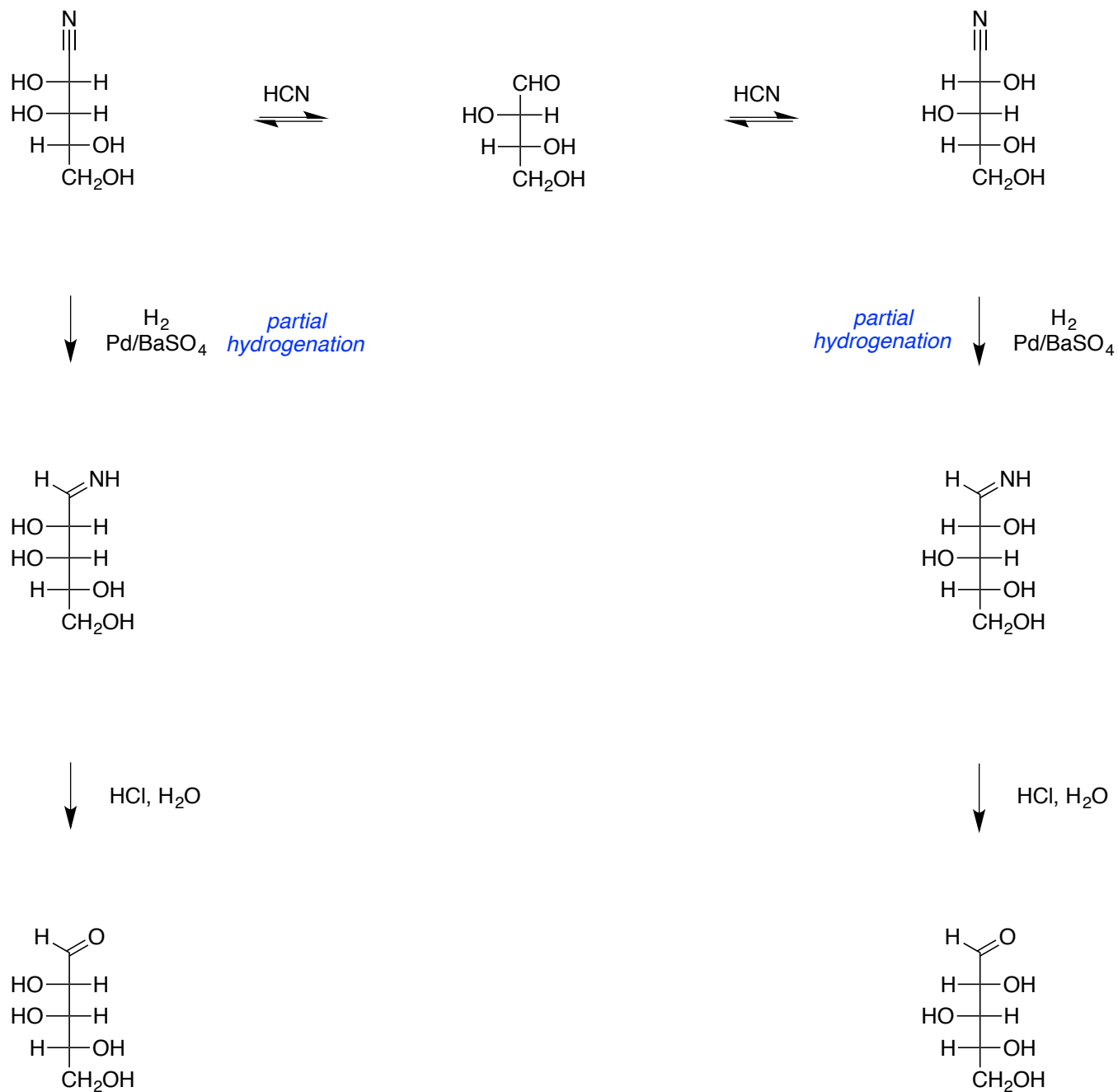
box for reasoning, write answers above



## E. Homologation Of Sugars By Reaction With HCN

*imines*

*aldoses*

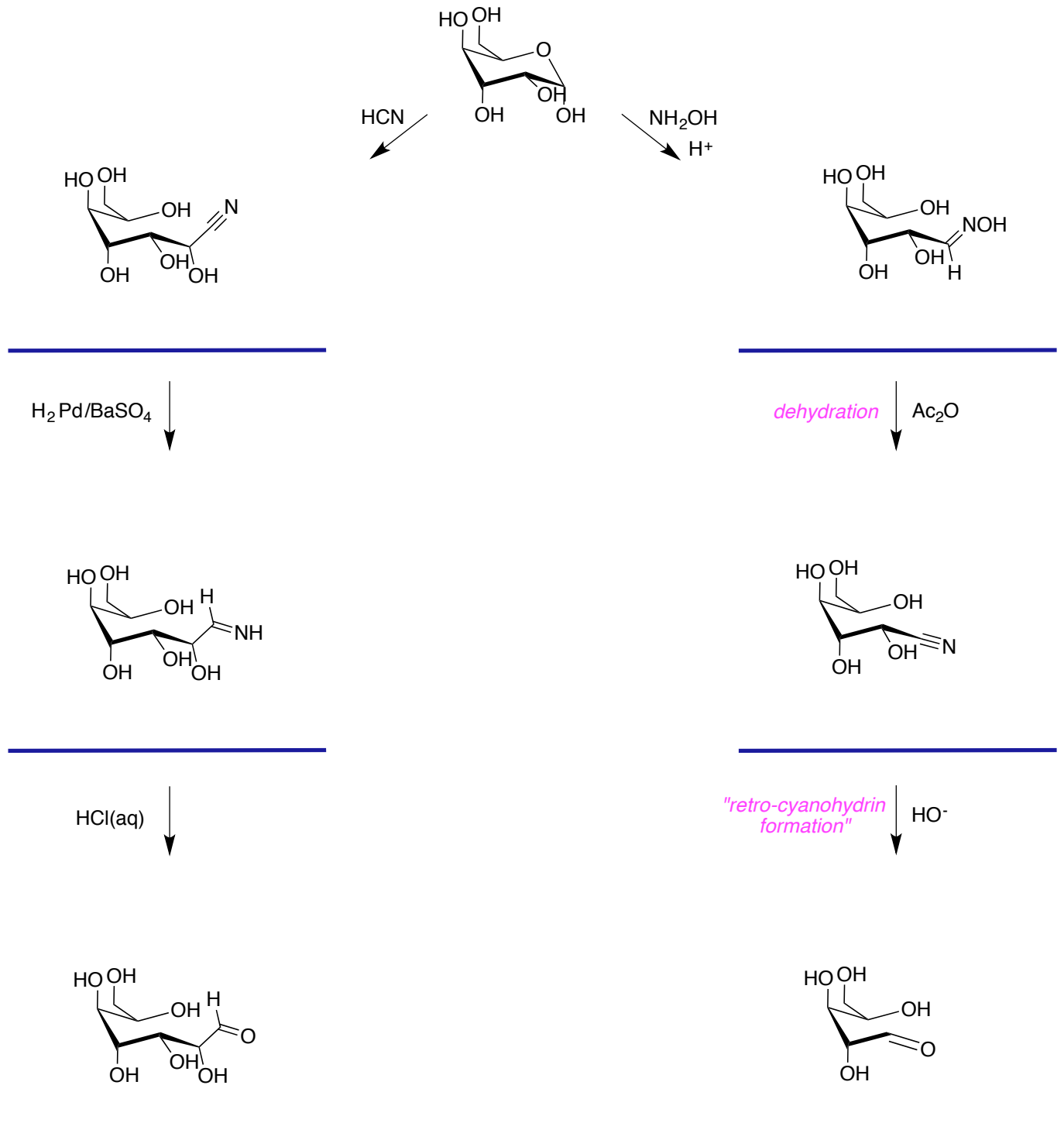


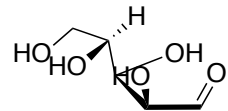
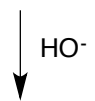
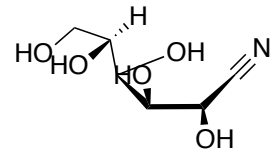
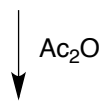
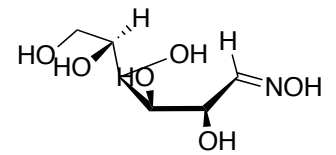
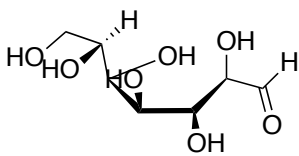
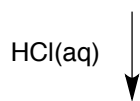
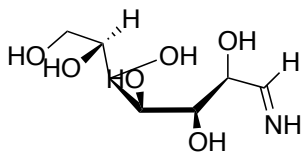
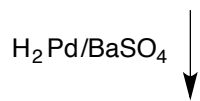
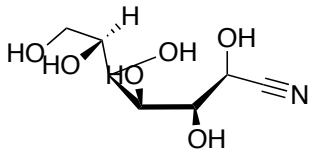
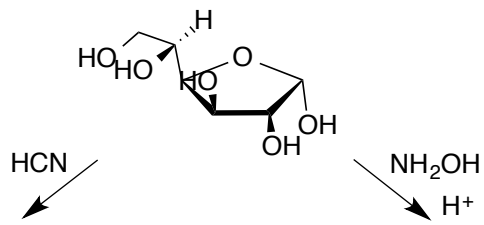
*epimers*

*would not be*

## F. Conversion Of Aldoses To Lower Homologs

*left*  
*right.*



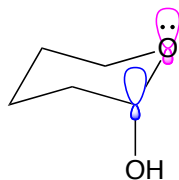






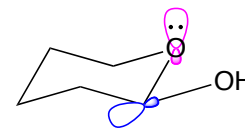
## H. Relative Stabilities Of Anomers

*axial* non-bonded



---

$\alpha$ -anomer  
 $\sigma$ -to- $\sigma^*$  interactions possible

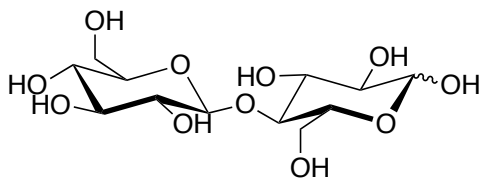


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$\beta$ -anomer  
 $\sigma$ -to- $\sigma^*$  interactions impossible

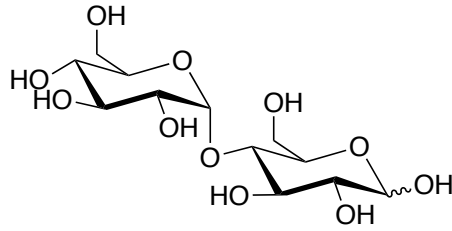
## I. Di- And Oligosaccharides

*acetal or ketal*



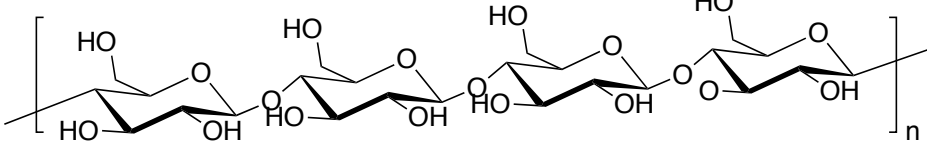
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cellobiose



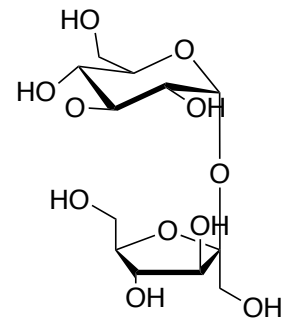
---

*maltose*



*cellulose*

*linkages are:  $\beta$ -1,4*

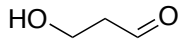


*sucrose*

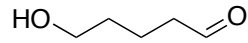
*linkage is:  $\alpha$ 1,  $\beta$ 2*

*poly*-saccharide,  
*di*-saccharide.  
*photosynthesis.*

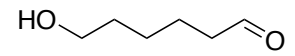
## J. Carbohydrates In Summary



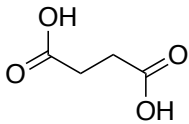
*D-(+)-glyceraldehyde*



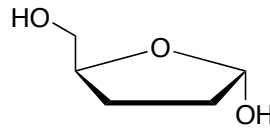
*D-ribose*



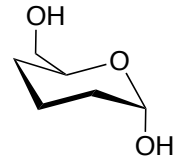
*D-glucose*



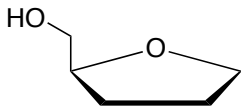
*D-(-)-tartaric acid*



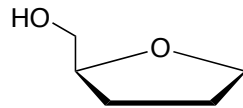
*α-D-ribofuranose*



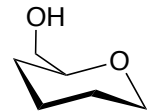
*α-D-glucopyranose*



*β-D-2-deoxyribofuranose*



*β-D-ribofuranose*



*β-D-glucopyranose*

*β-D-ribofuranose.*

*β-D-2-deoxyribofuranose.*