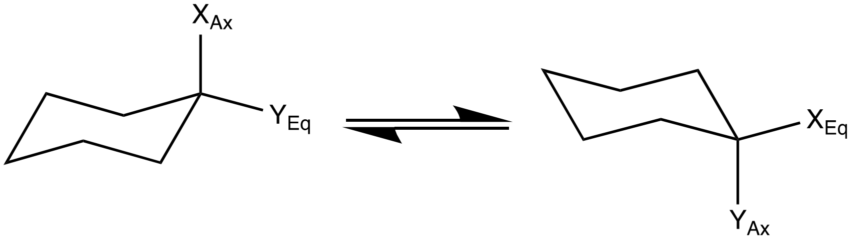
Cyclization of common carbohydrates:

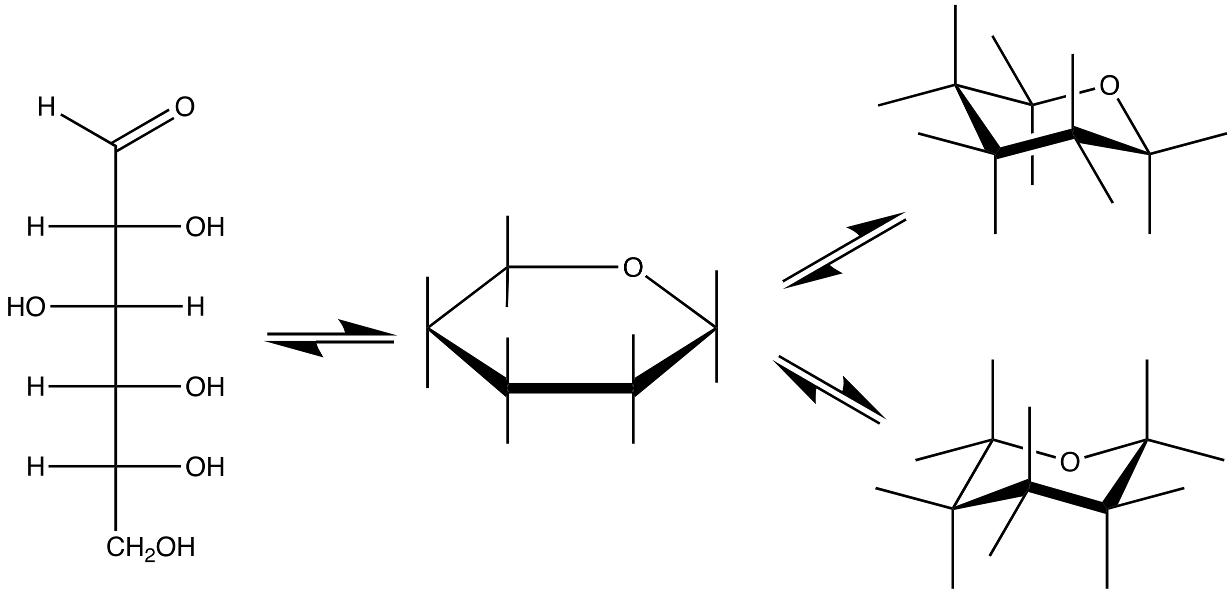
How to interconvert between Fischer projections, Haworth projections, and Chair forms:

1) Take the -OH from the 4th C (for the furanose, 5-member ring) or 5th C (for the pyranose, 6-member ring) from the carbonyl and attack the carbonyl carbon. This forms the ether bond and the anomeric position because the newly formed -OH can be on either side of the ring
2) Fill in the non-anomeric carbon substituents. Substituents on the left side of the of the Fischer projection are above the ring in the Haworth projection and substituents on the right of side are below the ring in the Haworth projection.
3) Determination of the anomeric carbon. Use the Fisher projection with the new C-O bond pointing up. To form the alpha isomer, the -OH on the anomeric carbon belongs on the same side of the ring as the -OH from the carbon that determines the configuration (D- or L-). To form the beta isomer, the -OH on the anomeric carbon belongs on the opposite side of the ring as the -OH on the carbon that determines the configuration (D- or L-).
4) Converting between Haworth projections and chair conformations. Pull the left most carbon, on the Haworth projection, up and the right most carbon down, or vice-versa. Substituents do NOT change which side of the ring they are on when switching between chair conformations they only change from axial to equatorial and vice versa

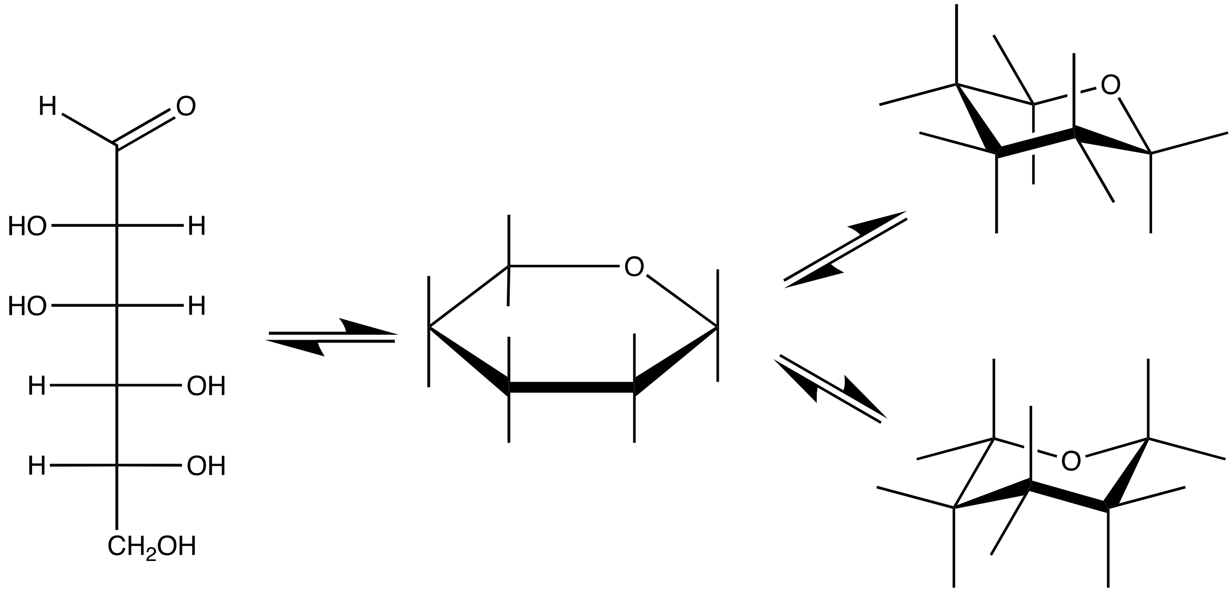


Instructions:

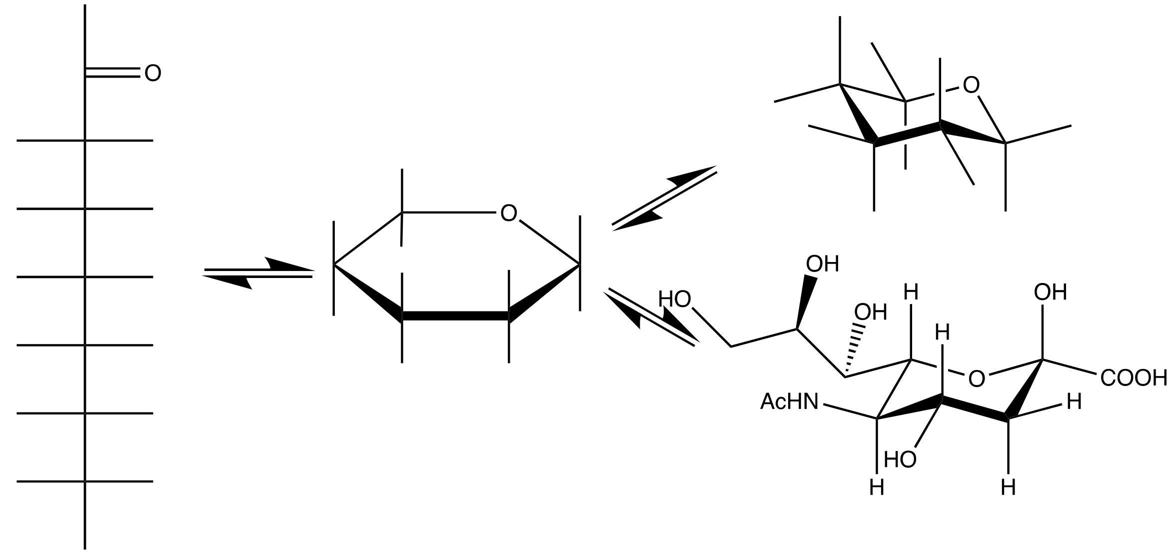
1) Convert between each projection. Follow the instructions above.
2) Identify which chair conformation is more stable by circling the structure. Remember, bigger substituents are more stable in the equatorial position



D-Glucose β-Glu

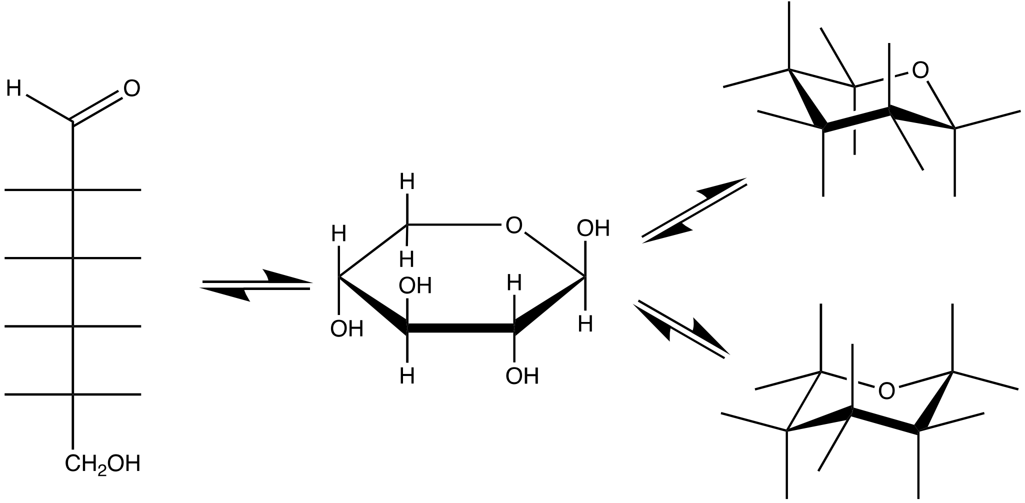


D-Mannose β-Man



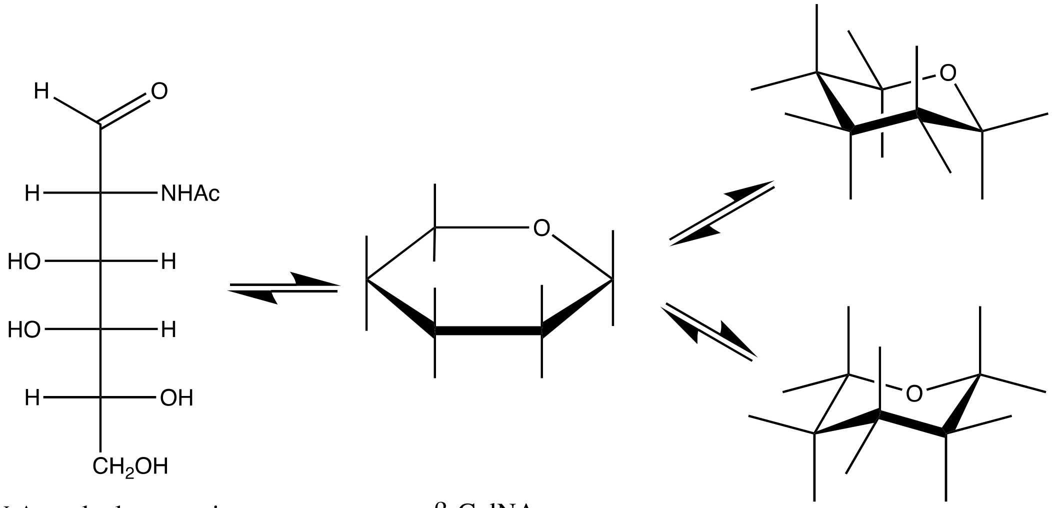
D-*N*-Acetylneuraminic Acid

β-Neu5Ac



D-Xylose

β-Xyl



D-*N*-Acetylgalactosamine

β-GalNAc