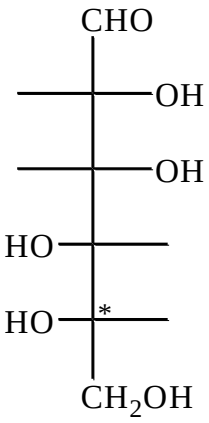
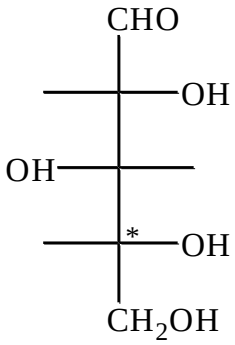
Methods of Converting Fischer Projections of Sugars to Haworth Projections

Three methods of generating Haworth Projections from Fischer projections follow. The first is similar to the one presented in the book on p. 533 but makes placement of the –OH's simpler. Use whichever method you find easiest to remember.

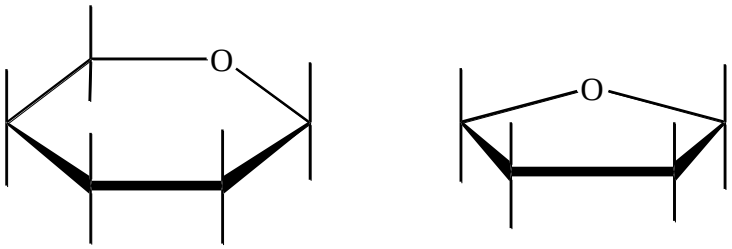
Let's consider two sugars, one an aldohexose, the other an aldopentose. Fischer projections are shown below. One the following two pages, we'll generate Haworth projections of each. Recall the carbon with the star (*) next to it is the one that determines if the sugar is a D-sugar or an L-sugar.



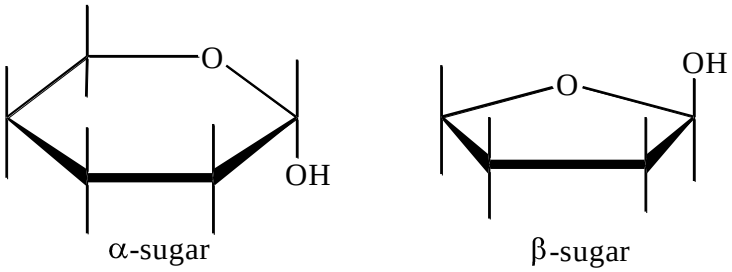


Method 1

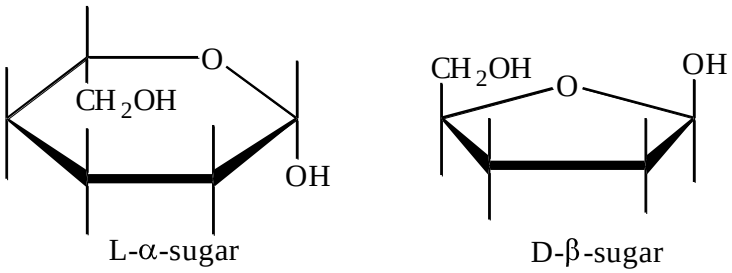
1) Draw the basic structure for the sugar.



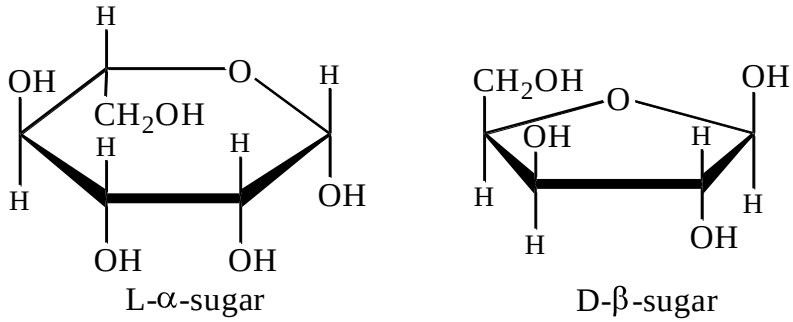
2) If the sugar is a D-sugar place a $-CH_2OH$ above the ring on the carbon to the left of the oxygen, for an L-sugar place it below the ring.



3) For an α-sugar place an –OH below the ring on the carbon to the right of the ring oxygen, for an β-sugar place the –OH above the ring.

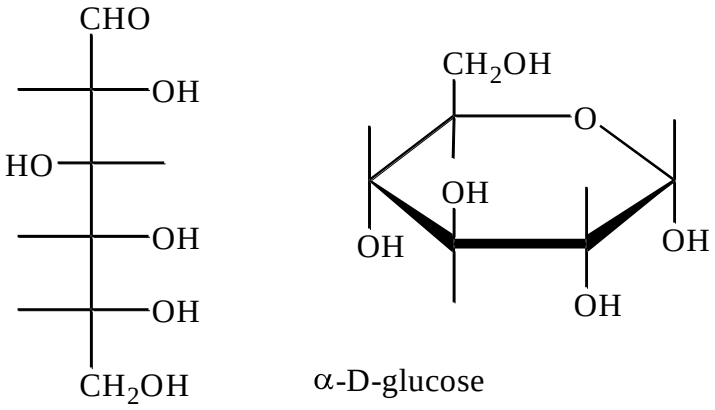


4) Finally, –OH groups on the right go below the ring and those on the left above, using the $-CH_2OH$ group as the reference point for both projections.



Method 2

This method involves memorizing both the Fischer and Haworth projections of glucose, then determining all other structures relative to it. First produce the two structures of α-D-glucose.



α-D-glucose

If you remember that the –CH_2OH group is up, then all you have to do is recall that the –OH groups follow an alternating pattern from it. You then compare the position of the –OH groups on the Fischer projection of the sugar you are interested in with that of glucose to place the –OH groups. Those on the same side go in the same position, those on the opposite side go in the opposite position.