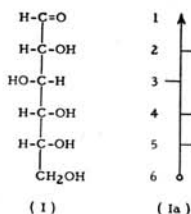


A METHOD FOR RECALLING THE CONFIGURATIONS OF THE ALDOHEXOSES

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The use of mnemonics has been called upon to assist in remembering the projection formulas and, consequently, the configurations of the aldohexoses. Two words, *gam* and *gat*, formed from the first letters of the names of the six sugars; galactose, allose, mannose, gulose, altrose and talose aid in reproducing their structures. In order to use this system of memory aid, a student must know the structure of the open chain form of *d*-glucose and the names of the other sugars.

The method of reproducing the structures of the sugars is as follows: The projection formula for *d*-glucose is drawn (I) and from it is obtained a simpler method of representation (Ia) where the vertical line indicates the carbon chain, the arrow the aldehyde group, the circle the hydroxymethylene group and the short, horizontal lines the secondary hydroxyl groups. The *d*- or *l*-configuration of a carbon atom is indicated by placing

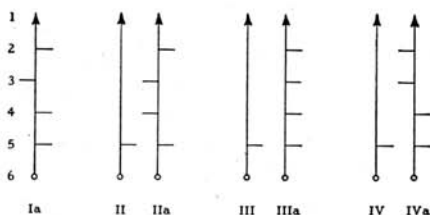


the horizontal line to the right or left of the vertical line, respectively.

The configuration at carbon atom five in an aldohexose determines whether a sugar belongs to the *d* or *l*-series, therefore, molecule Ia must be of the *d*-form. Since the sugars under consideration exist in eight *dl* pairs, a knowledge of the projection

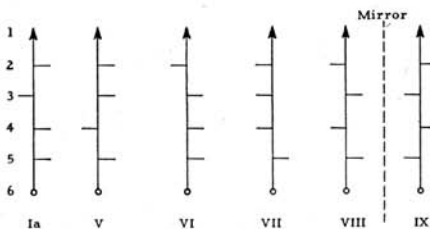
formulas of the *d*-forms is sufficient. Therefore the horizontal line at carbon atom five will be on the right in all eight forms.

To obtain the three sugars from the word *gam*, the figures II, III and IV are drawn.



By interchanging the substituents of *d*-glucose (Ia) at carbon atoms 4, 3, and 2 in that order and keeping the configuration at carbon 5 constant, the skeletal structures IIa, IIIa and IVa, corresponding to *d*-galactose, *d*-allose and *d*-mannose, are obtained.

Using form II, the skeleton form of *d*-glucose and the mnemonic, *gat*, it is easy to reproduce the structures for the next three aldohexoses.



Interchanging the groups at carbon atoms 4 and 3 in *d*-glucose yields *d*-gulose (V); at carbon atoms 3 and 2, *d*-altrose (VI); and at carbons 4 and 2, *d*-talose (VII). (In the two dimensional drawing the transference is represented by mov-

ing the short horizontal lines from one side of the vertical line to the other.)

The structures of *d*-allose and *d*-altrose should not be confused, since the former occurs first in the derivation from *d*-glucose, and is first alphabetically. The same reasoning applies to *d*-galactose and *d*-gulose.

The eight *h*-isomer of the *d*-configuration is *d*-idose (VIIIa), and while it does not fit in the mnemonic words, it is easy to reproduce from

d-glucose by changing the configurations of carbon atoms 4, 3 and 2 simultaneously.

It is well-known that the *l*-configuration of any sugar can be obtained by drawing the mirror image of the *d*-structure. Therefore, IX, the mirror image of VIII is *l*-idose.

Summary. A new system for recalling the configurations of the sixteen isomeric aldohexoses has been devised as well as a method for drawing their structures.