The D,L convention, not to be confused with the d and l descriptors used to designate the direction of specific rotation of chiral compounds, is a convention used to distinguish between enantiomers of chiral monosaccharides and chiral alpha-amino acids, based on the molecule drawn as a Fischer projection in a specific orientation.

Application of D,L convention to monosaccharides:

One enantiomer of a chiral monosaccharide is labeled D and the other L. To determine whether a given enantiomer of a chiral monosaccharide is D or L, use the following procedure.

Step 1: Make sure the acyclic form of the molecule is drawn as a Fischer projection. If the monosaccharide is an aldose, the aldehyde group must be on top; if it is a ketose, the carbonyl carbon must be the second carbon from the top.

eg:

\[
\begin{align*}
\text{CHO} & \quad \text{CH}_2\text{OH} \\
\text{H} & \quad \text{H} \\
\text{H} & \quad \text{OH} \\
\text{H} & \quad \text{OH} \\
\text{CH}_2\text{OH} & \quad \text{CH}_2\text{OH}
\end{align*}
\]

Step 2: Number the carbon atoms starting at the top.

eg:

\[
\begin{align*}
1 & \quad 1 \\
\text{CHO} & \quad \text{CH}_2\text{OH} \\
2 & \quad 2 \\
\text{H} & \quad \text{C} \quad \text{H} \\
3 & \quad 3 \\
\text{H} & \quad \text{OH} \\
4 & \quad 4 \\
\text{H} & \quad \text{H} \\
5 & \quad 5 \\
\text{OH} & \quad \text{H} \\
6 & \quad 6 \\
\text{CH}_2\text{OH} & \quad \text{CH}_2\text{OH}
\end{align*}
\]

Step 3: Locate the carbon atom that bears the second highest number, which is known as the penultimate carbon. If the hydroxy group on the penultimate carbon is on the right of the carbon chain, assign the label D to the compound; if it is on the left of the carbon chain, assign the label L.

eg:
To draw the enantiomer of a given chiral monosaccharide, simply draw its mirror image.

eg:

![Diagram of D-glucose and its mirror image](image)

Application of D,L convention to alpha-amino acids:

One enantiomer of a chiral alpha-amino acid is labeled D and the other L. To determine whether a given enantiomer of a chiral alpha-amino acid is D or L, use the following procedure.

Step 1: Make sure that the molecule is drawn as the Fischer projection in which the carboxylic acid group is on top and the side chain on bottom.

eg:

![Diagram of an alpha-amino acid with D and L labels](image)

Step 2: If the amine group is on the right of the carbon chain, assign the label D to the compound; if it is on the left of the carbon chain, assign the label L.

eg:
To draw the enantiomer of a given chiral alpha-amino acid, simply draw its mirror image.

eg:

L-serine

mirror image of L-serine (D-serine)

see also R,S convention

Contributors

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