

# Chapter 25

## Carbohydrates

# 25.1

## Classification of Carbohydrates

## *Classification of Carbohydrates*

monosaccharide

disaccharide

oligosaccharide

polysaccharide

## *Monosaccharide*

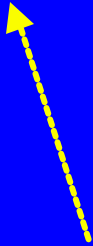
is not cleaved to a simpler carbohydrate on hydrolysis

glucose, for example, is a monosaccharide

## *Disaccharide*

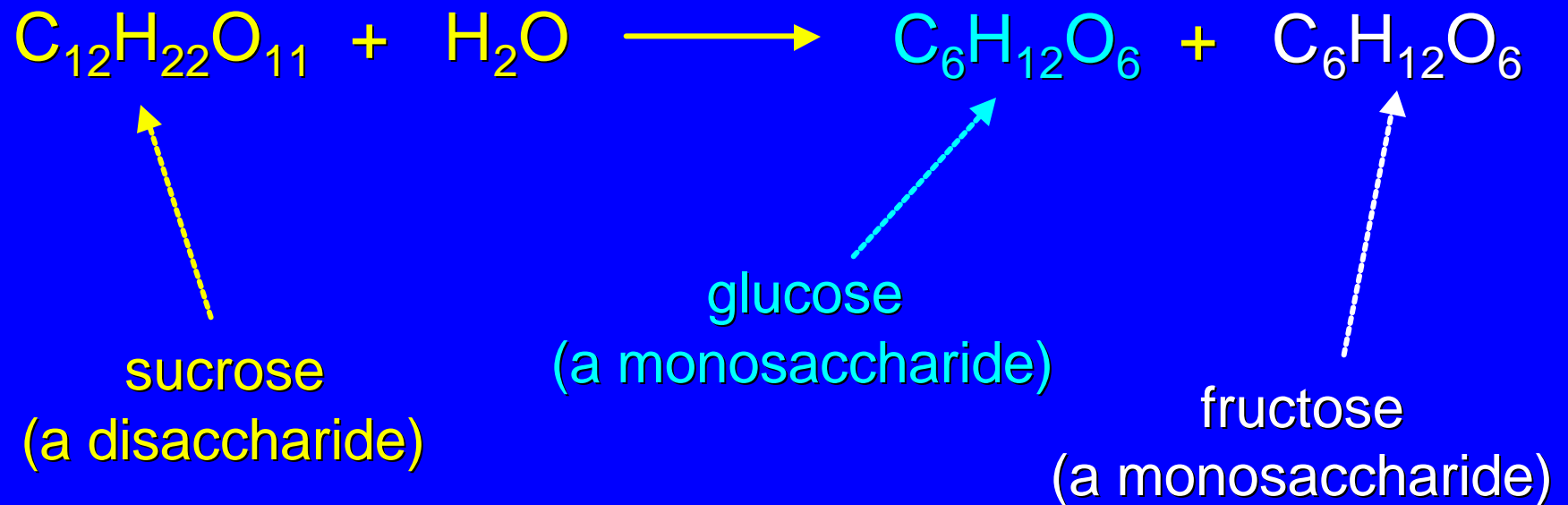
is cleaved to two monosaccharides on hydrolysis  
these two monosaccharides may be the  
same or different



  
sucrose  
(a disaccharide)

## Disaccharide

is cleaved to two monosaccharides on hydrolysis  
these two monosaccharides may be the  
same or different



## *Higher Saccharides*

oligosaccharide:

gives three or more monosaccharide units on hydrolysis

polysaccharide:

yields more than 10 monosaccharide units

## *Table 25.1 Some Classes of Carbohydrates*

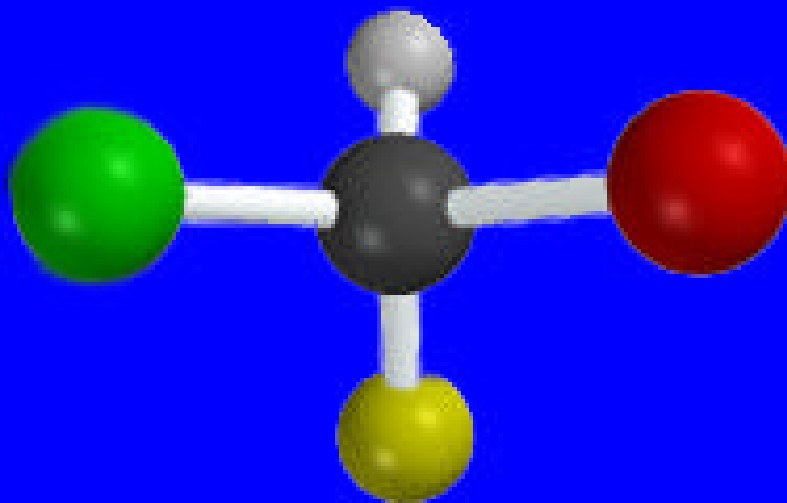
<u><i>No. of carbons</i></u>	<u><i>Aldose</i></u>	<u><i>Ketose</i></u>
4	Aldotetrose	Ketotetrose
5	Aldopentose	Ketopentose
6	Aldohexose	Ketopentose
7	Aldoheptose	Ketoheptose
8	Aldooctose	Ketooctose



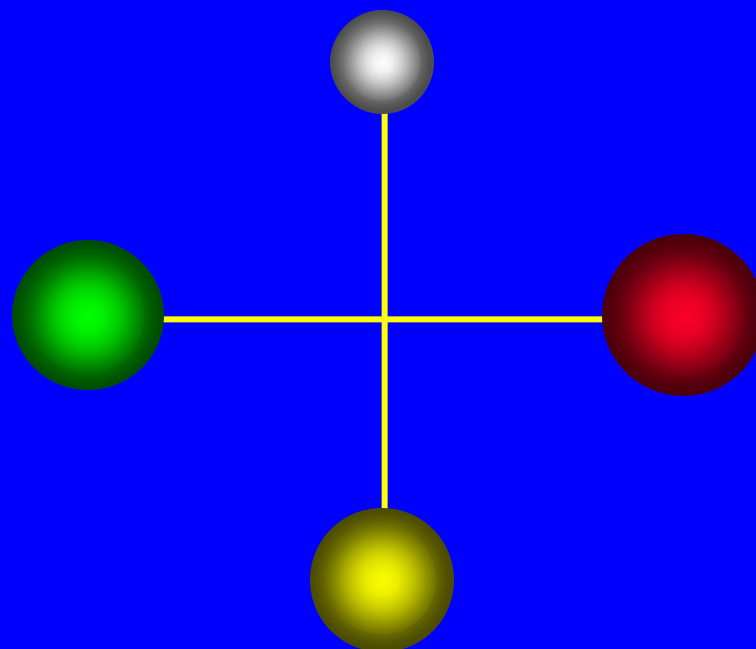
25.2

## Fischer Projections and D-L Notation

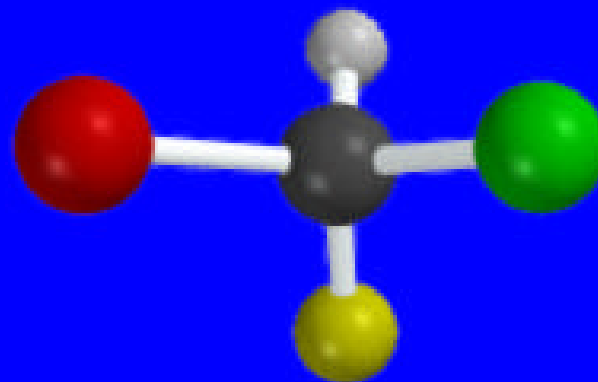
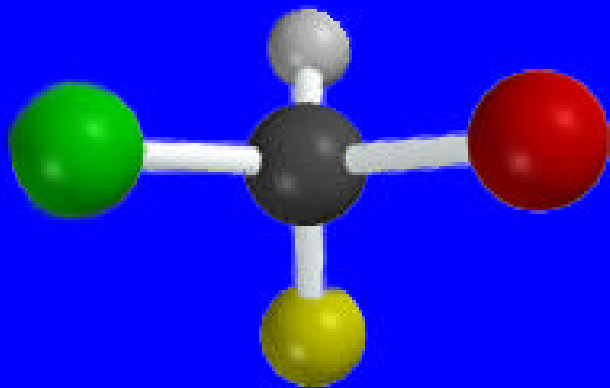
# *Fischer Projections*



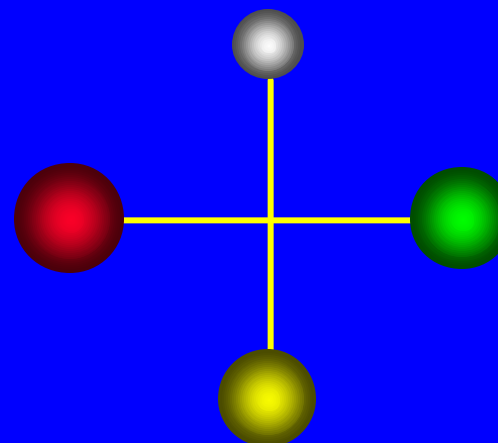
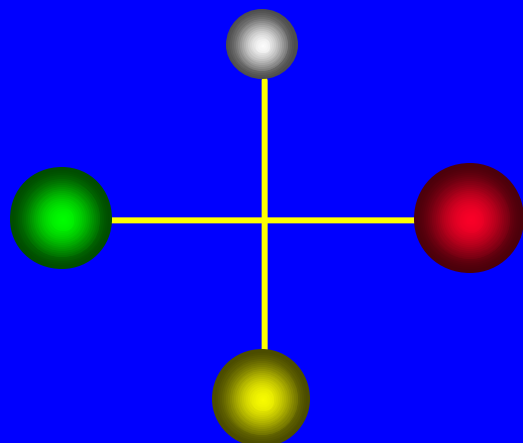
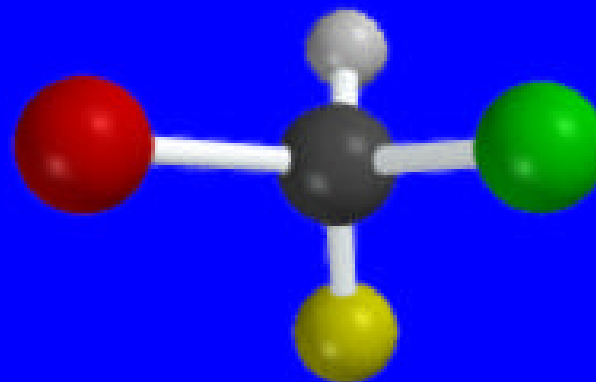
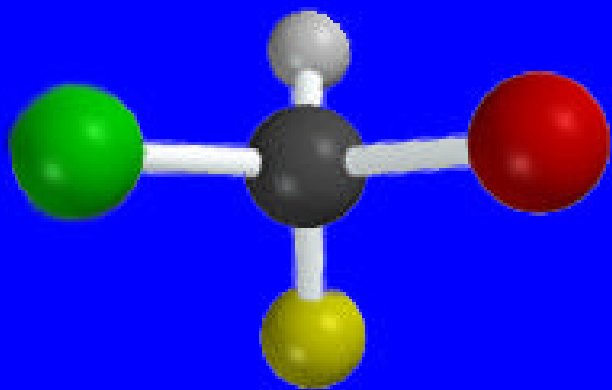
# *Fischer Projections*



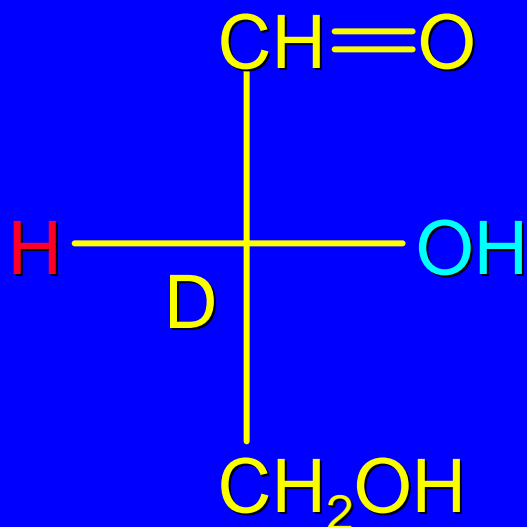
## *Fischer Projections of Enantiomers*



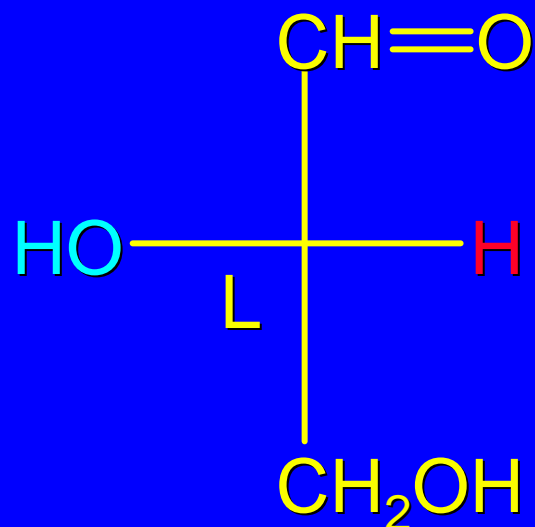
## *Fischer Projections of Enantiomers*



## Enantiomers of Glyceraldehyde



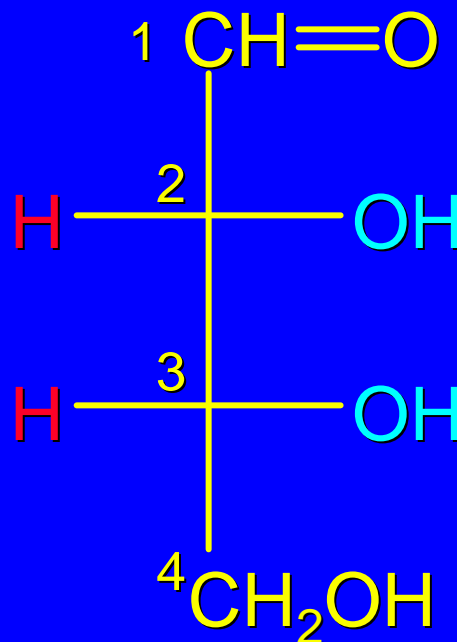
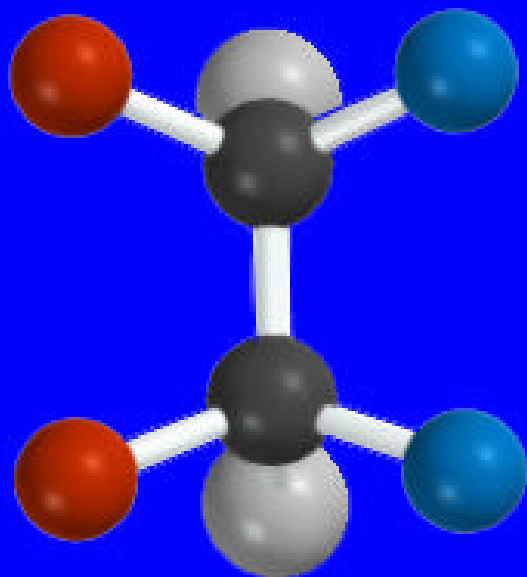
(+)-Glyceraldehyde



(-)-Glyceraldehyde

## 25.3 The Aldotetroses

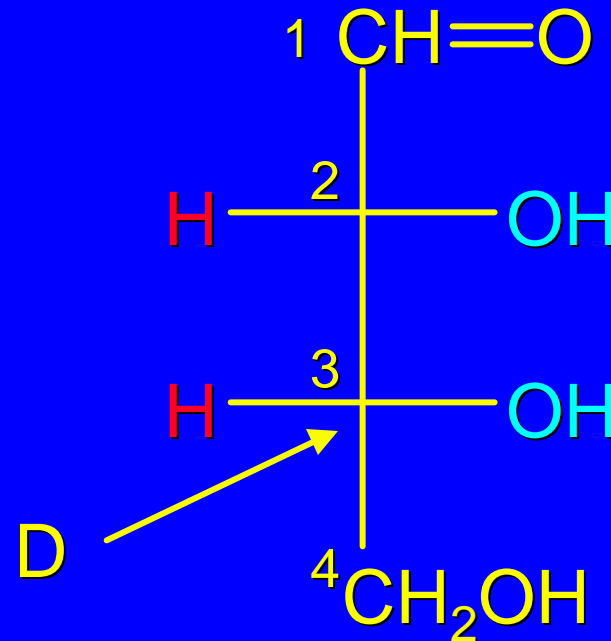
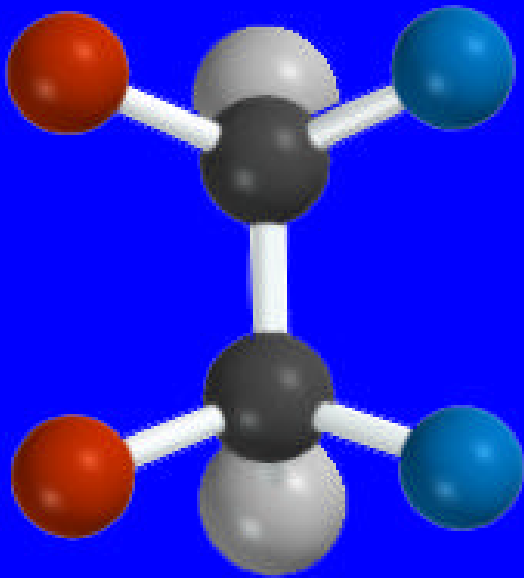
## An Aldotetrose



stereochemistry assigned on basis of whether configuration of highest-numbered stereogenic center is analogous to D or L-glyceraldehyde

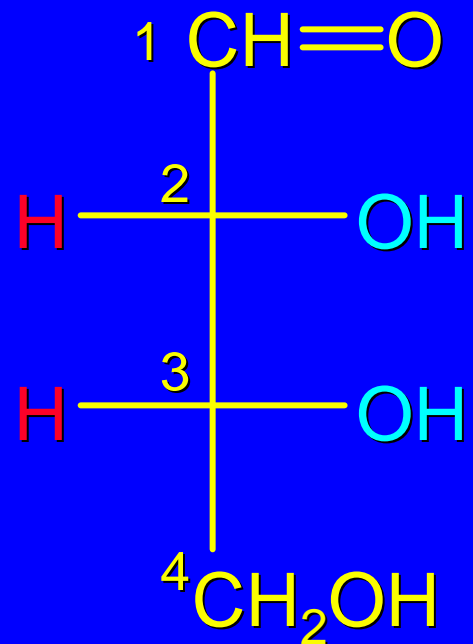
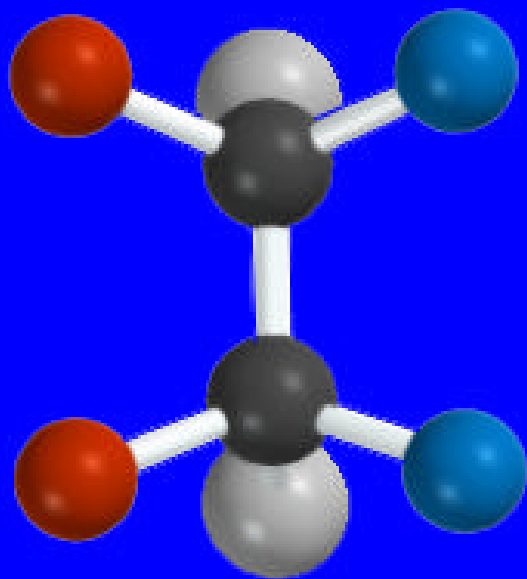


## An Aldotetrose



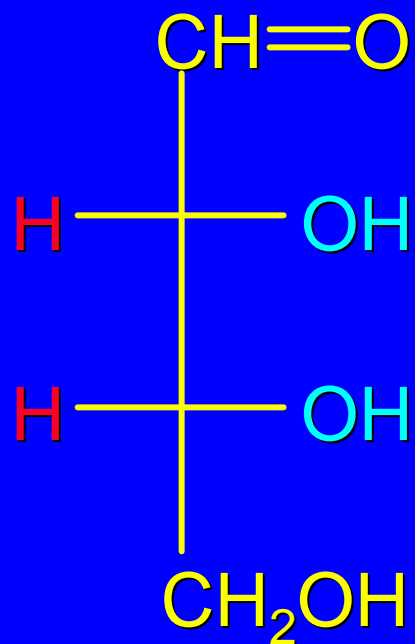
stereochemistry assigned on basis of whether configuration of highest-numbered stereogenic center is analogous to D or L-glyceraldehyde

## An Aldotetrose

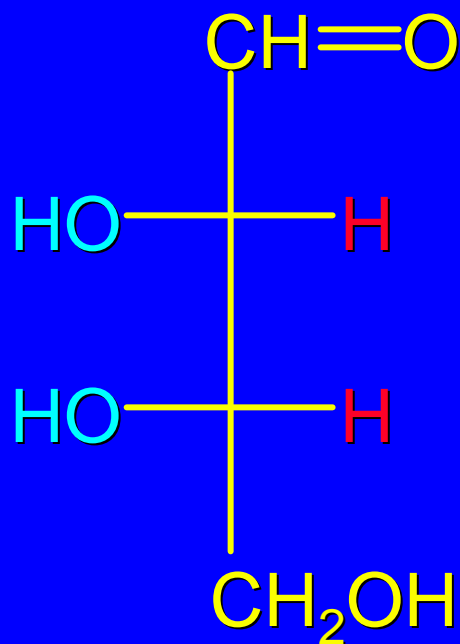


D-Erythrose

## The Four Aldotetroses



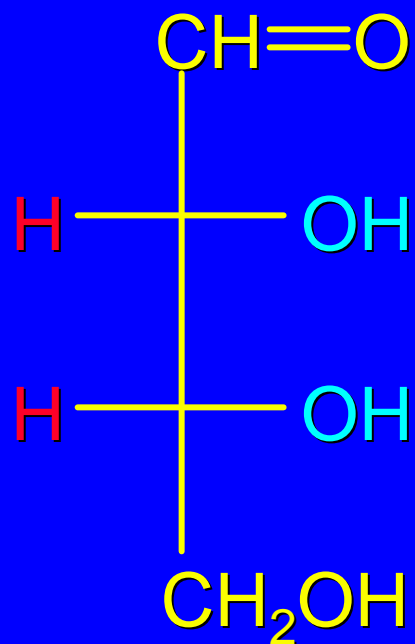
D-Erythrose



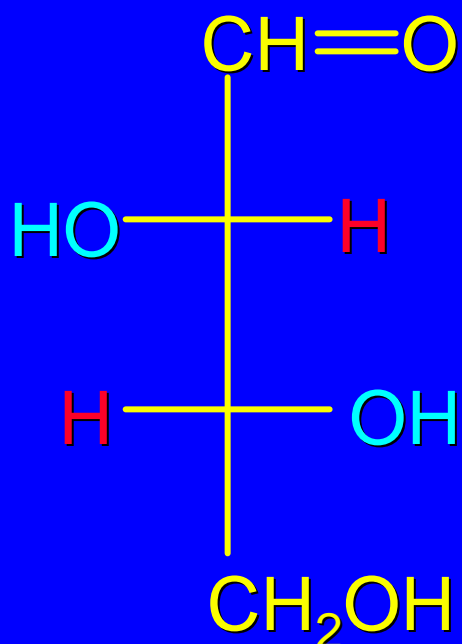
L-Erythrose

D-Erythrose and L-erythrose are enantiomers

## *The Four Aldotetroses*



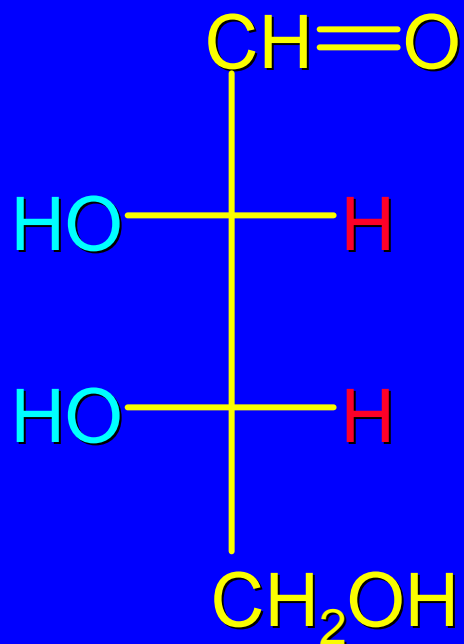
D-Erythrose



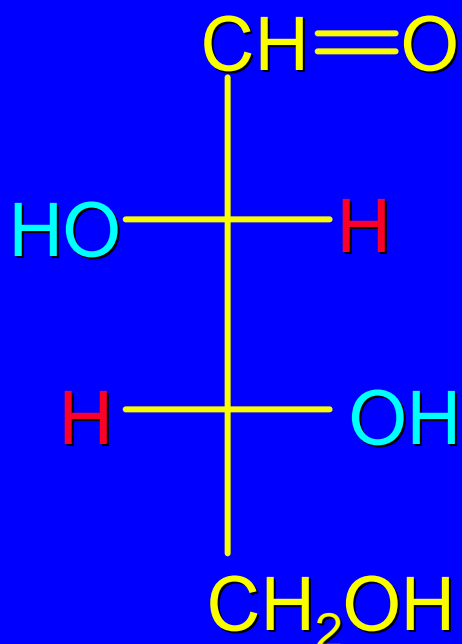
D-Threose

D-Erythrose and  
D-threose are  
diastereomers

## The Four Aldotetroses



L-Erythrose

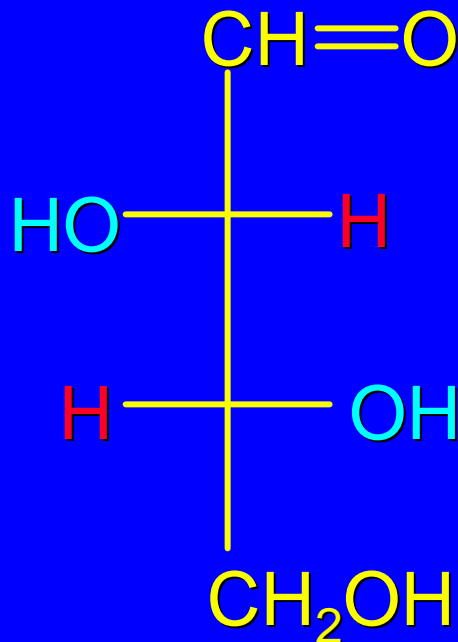


D-Threose

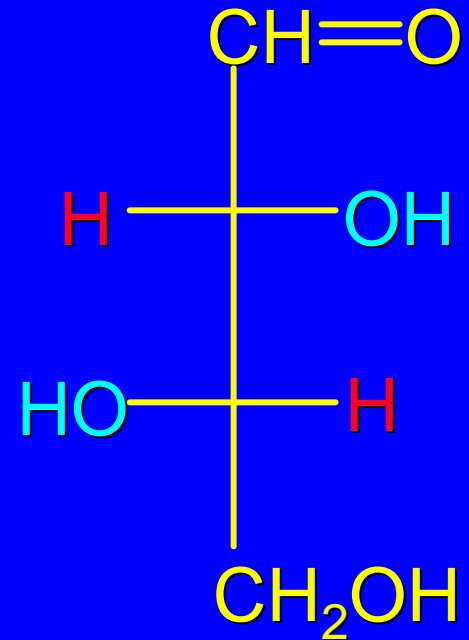
L-Erythrose and  
D-threose are  
diastereomers

## *The Four Aldotetroses*

D-Threose and  
L-threose are  
enantiomers

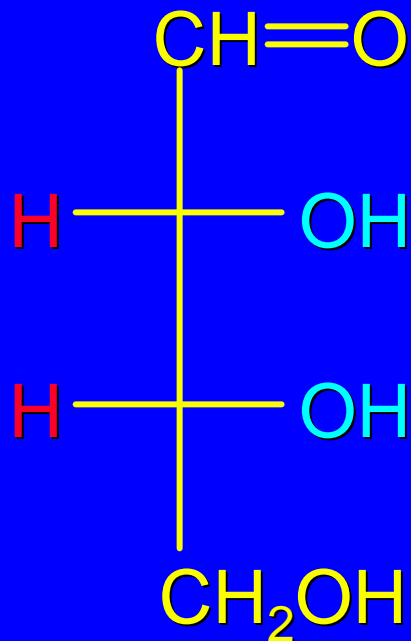


D-Threose

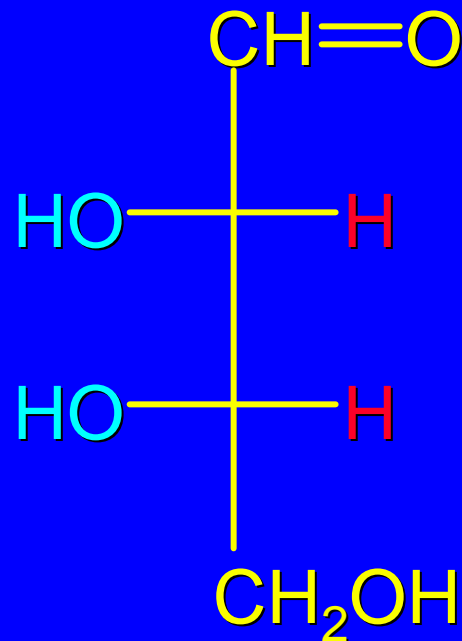


L-Threose

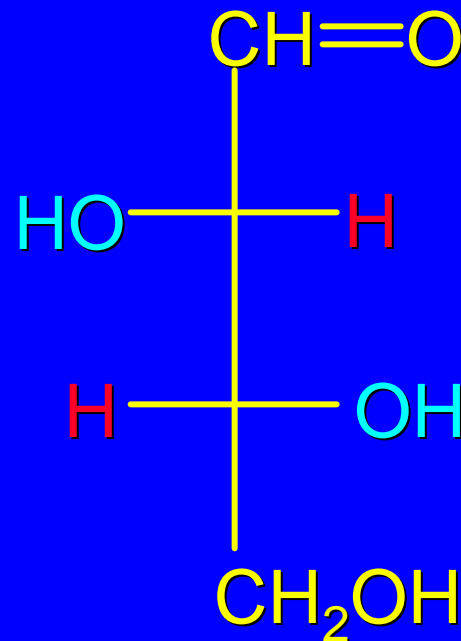
## The Four Aldotetroses



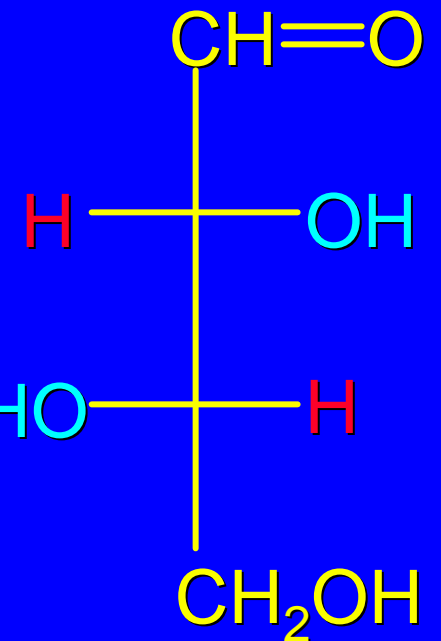
D-Erythrose



L-Erythrose



D-Threose



L-Threose

## 25.4

# Aldopentoses and Aldohehexoses



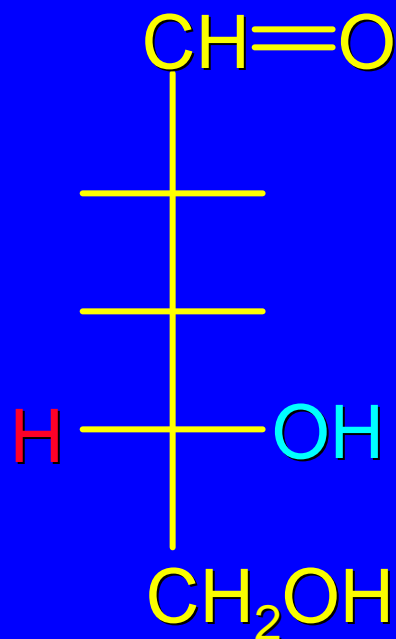
## *The Aldopentoses*

There are 8 aldopentoses.

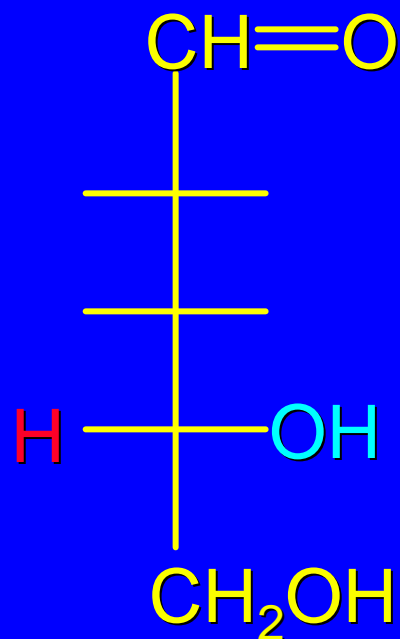
Four belong to the D-series; four belong to the L-series.

Their names are ribose, arabinose, xylose, and lyxose.

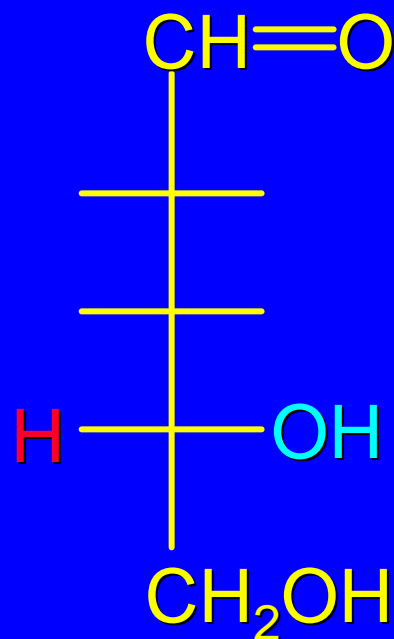
## *The Four D-Aldopentoses*



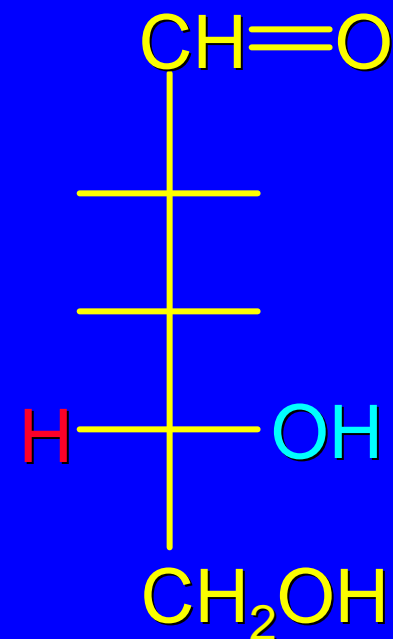
D-Ribose



D-Arabinose

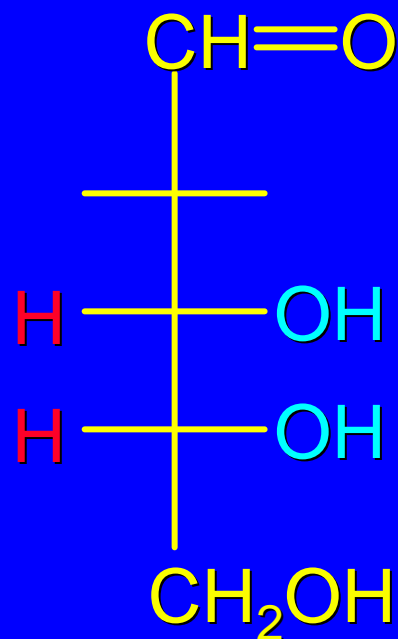


D-Xylose

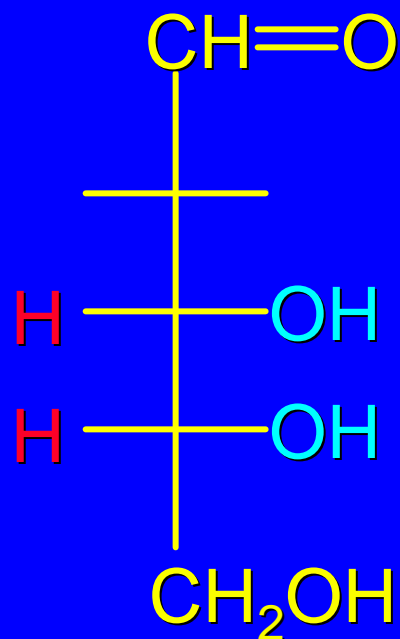


D-Lyxose

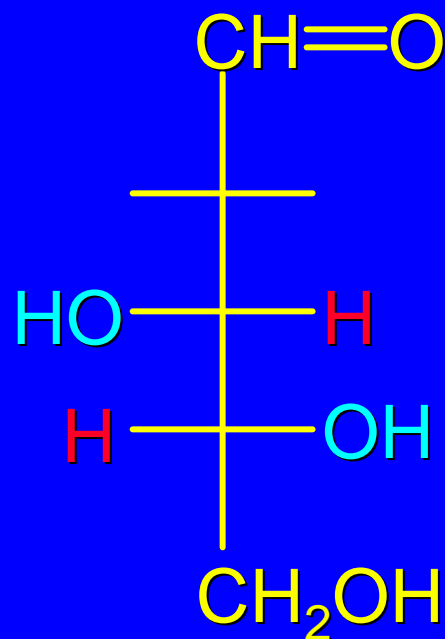
## The Four D-Aldopentoses



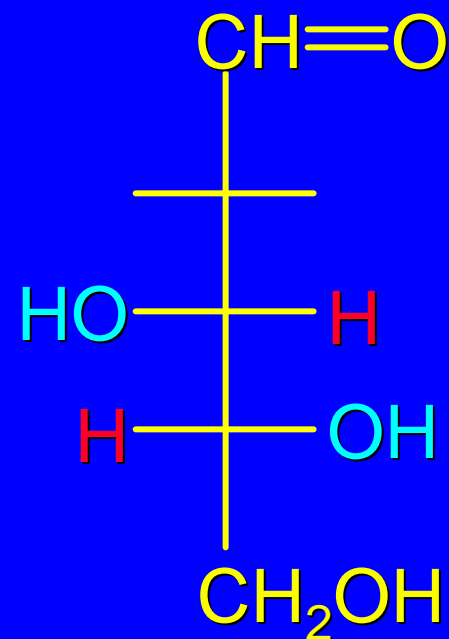
D-Ribose



D-Arabinose

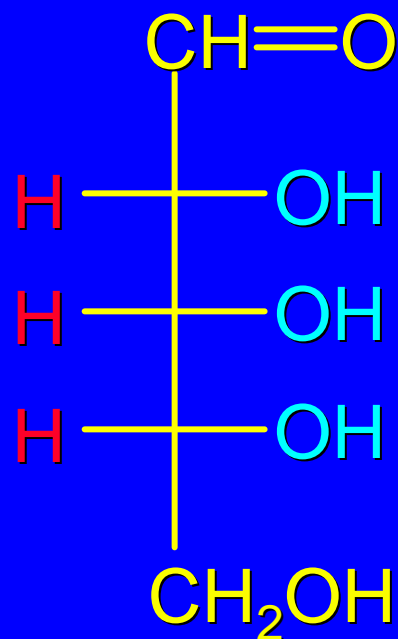


D-Xylose

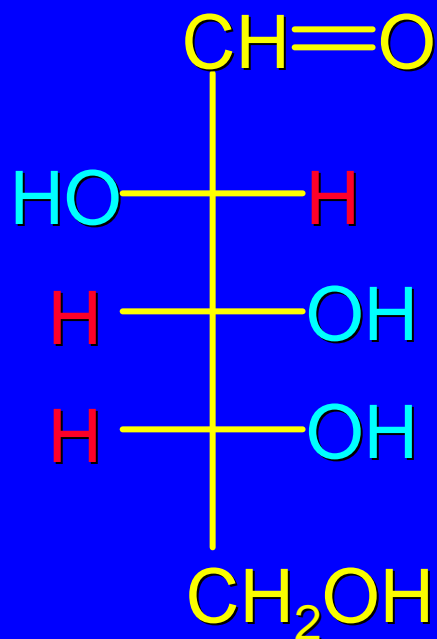


D-Lyxose

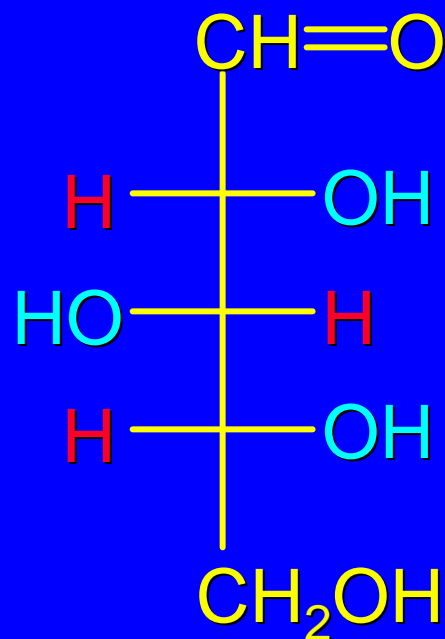
## The Four D-Aldopentoses



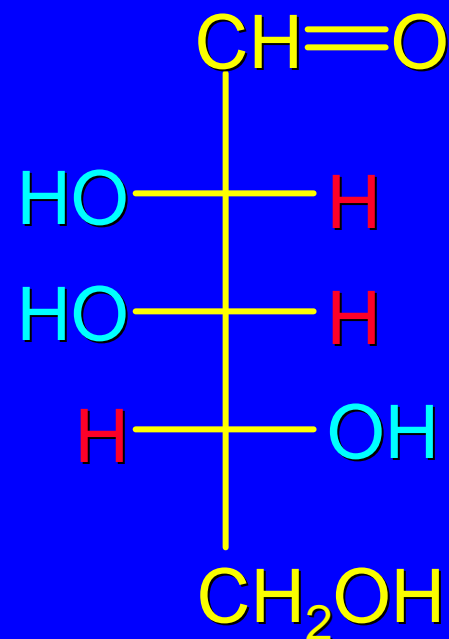
D-Ribose



D-Arabinose

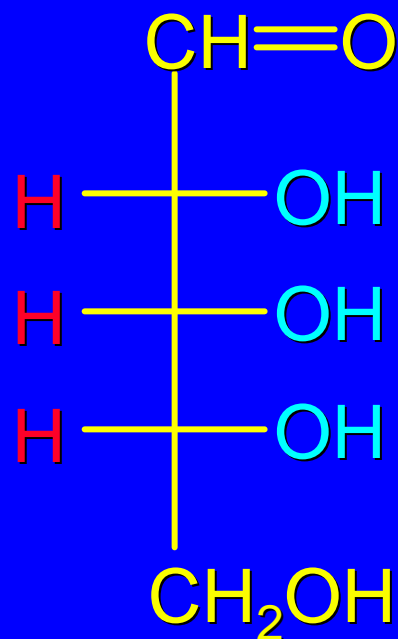


D-Xylose

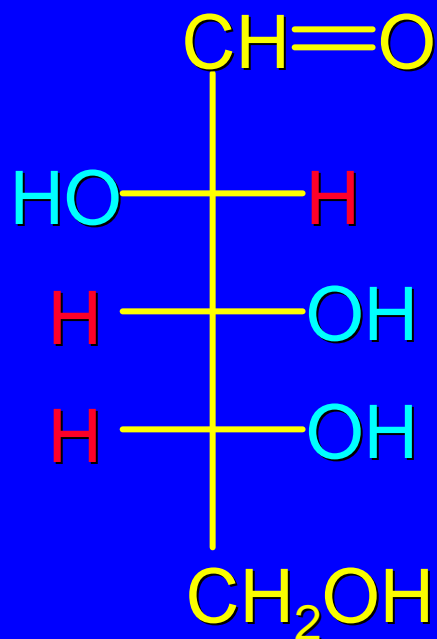


D-Lyxose

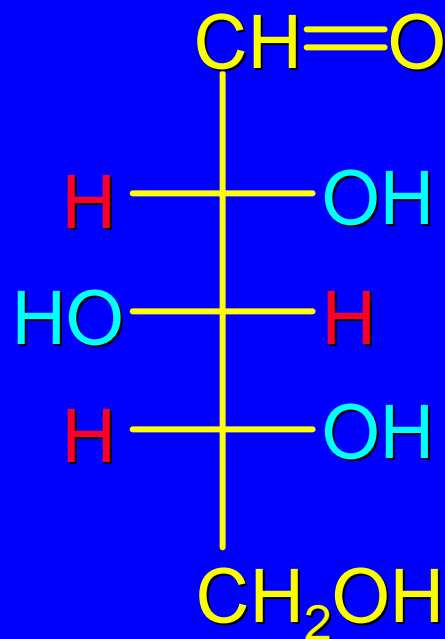
## The Four D-Aldopentoses



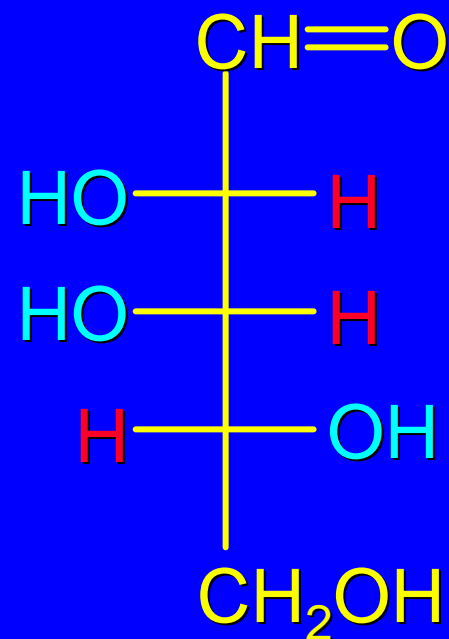
D-Ribose



D-Arabinose



D-Xylose



D-Lyxose

## *Aldohexoses*

There are 16 aldopentoses.

8 belong to the D-series; 8 belong to the L-series.

Their names and configurations are best remembered with the aid of the mnemonic described in Section 25.5.