

YADHARSHINI

BIOMOLECULES

Unit 1. CARBOHYDRATES

DANTULARI NARAYANA RAJU COLLEGE (AUTONOMOUS)

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INTRODUCTION

* General names for carbohydrates include sugars, starches, saccharides, and polysaccharides. The term saccharide is derived from the Latin word "sacchararum" from the sweet taste of sugars.

* The name "carbohydrate" means a "hydrate of carbon." The name derives from the general formula of carbohydrate is $C_x(H_2O)_y$ - x and y may or may not be equal and range in value from 3 to 12 or more. For example glucose is: $C_6(H_2O)_6$ or is more commonly written, $C_6H_{12}O_6$ sweet taste of sugars.

- The name "carbohydrate" means a "hydrate of carbon

CLASSIFICATION

- * There are a variety of interrelated classification schemes. The most useful classification scheme divides the carbohydrates into groups according to the number of individual simple sugar units.
- * Monosaccharides contain a single unit; eg. Glucose
- * disaccharides contain two sugar units; eg. galactose
- * polysaccharides contain many sugar units as in polymers - most contain glucose as the monosaccharide unit. eg. starch

REACTIONS OF CARBOHYDRATES

❁ ENOLIZATION

❁ REDUCING PROPERTIES

❁ OXIDATION

❁ DEHYDRATION

❁ OSOZONE FORMATION

❁ FORMATION OF ESTERS

EPIMERIZATION

- * Epimers are diastereomers that differ in configuration of only one stereogenic centre.
- * The sugars α -glucose and β -glucose are epimers.
- * Epimerisation is a chemical process where an epimer is transformed into its chiral counterpart. It can happen in condensed tannins depolymerisation reactions. Epimerisation can be spontaneous (generally a slow process), or catalyzed by enzymes, e.g. the epimerization between the sugars N-acetylglucosamine and N-acetylmannosamine, which is catalyzed by Renin-Binding Protein.

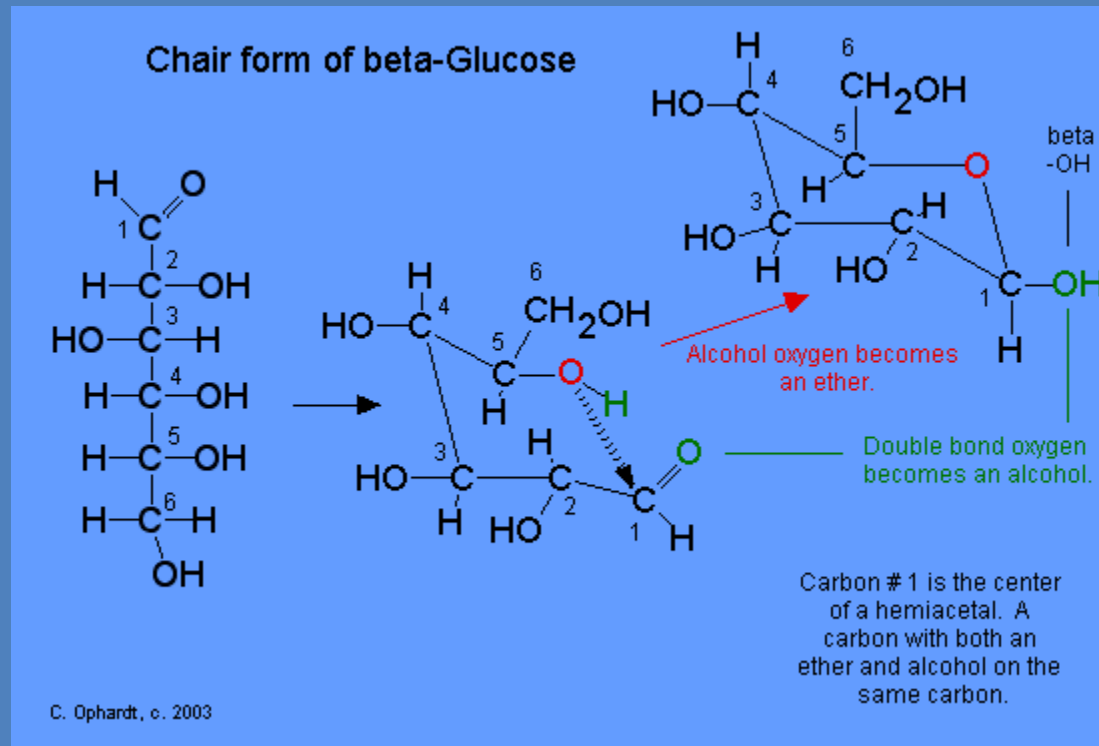
MUTAROTATION

Mutarotation is the change in the optical rotation that occurs by epimerization (that is the change in the equilibrium between two epimers, when the corresponding stereocenters interconvert).

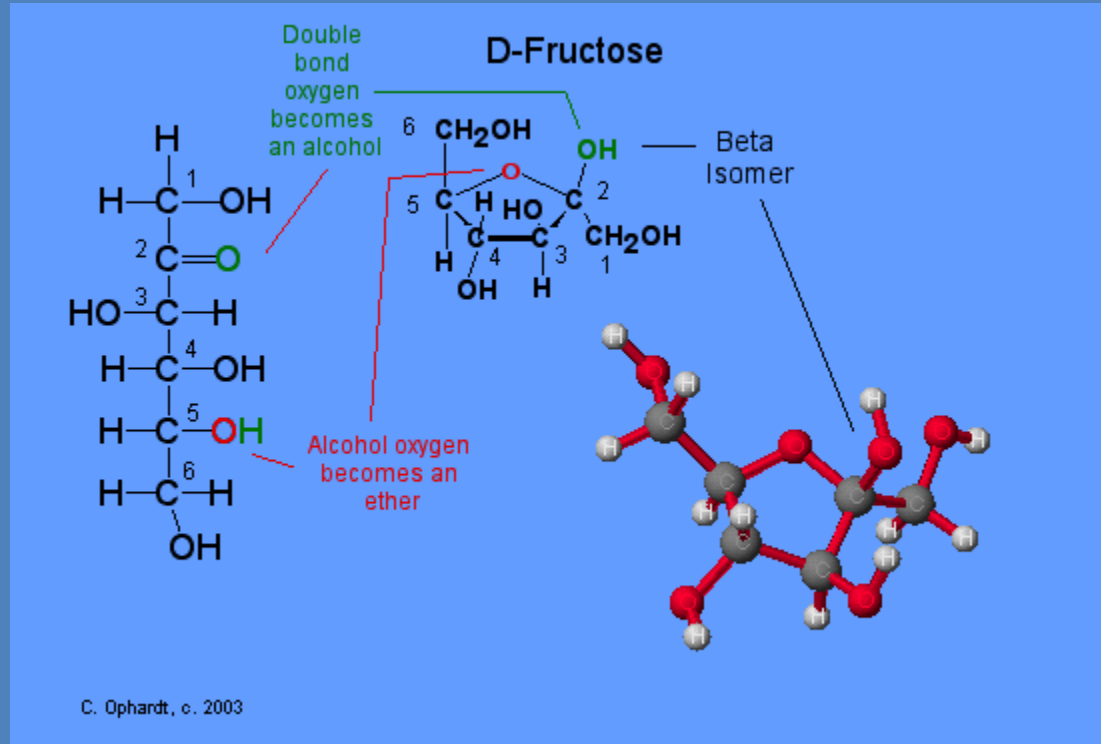
Cyclic sugars show mutarotation

As α and β anomeric forms interconvert

Structure of Glucose



Structure of Fructose



METHODS OF ASCENDING SUGAR SERIES

- KILIANI-FISCHER'S CYANOHYDRIN SYNTHESIS
- SOWDEN'S METHOD
- WOLFROM'S METHOD
- KOCHETKOV'S METHOD

METHODS OF DESCENDING SUGAR SERIES

- * WOHL'S METHOD
- * RUFF'S METHOD
- * WEERMAN'S METHOD
- * MACDONALD'S METHOD

Thank you