

Sugar – an Organic Chemistry Lesson Plan

Objective – Teach students about the classifications and characteristics of carbohydrates

Class Outline

1. What is sugar?

A carbohydrate. Explain importance of carbohydrates as biomolecules (starch, cellulose, sugars). Generic chemical formula and name derivation.

2. Mono, di, and polysaccharides.

Monosaccharides – glucose, fructose, galactose.

Glucose – produced in plants via photosynthesis from CO₂ & H₂O.

Fructose – primary sugar in fruits,

Mono. Rxns - -OH groups can convert to esters and ethers, making molecule easier to work with and soluble in organic solvents.

Disaccharides – two monos. lactose, sucrose, maltose

Interesting note – Lactose is composed of glucose and galactose. Lactose-intolerant individuals lack the enzyme necessary to break lactose into its component pieces.

Common polysaccharides – glycogen, cellulose

3. Sugar enantiomers - Distinguishing D & L configurations

Orientation of OH attached to alpha carbon – up is D, down is L. D is more common. Draw chain structure to provide visualization.

4. Naming structures –

Aldoses and ketoses

Aldo- and Keto- identify the nature of the carbonyl group. -ose designates a sugar. Number of carbons in the monosaccharide indicated by root (Tri-, tet-, pent-, hex-).

Ex: glucose (an aldohexose), fructose (ketohexose)

Draw Fischer projections so students can visualize the aldehyde and ketone structures in a sugar.

5. Drawing Fischer diagrams

up-down lines are in plan, left-right are out of plane

6. Relevance – High fructose corn syrup

What HFCS is, structural difference between sucrose and HFCS, what it is in, studies are inconclusive as to whether its effects in the body are different than ‘real’ sugar.

Homework – Chapter 25, Problems 2-36, even.