NAMING RULES FOR CARBOHYDRATES

by F. Deis

Sugars end in **-OSE**

ISOMERS have atoms rearranged -- frequently used for KETOSE vs ALDOSE
Example: D-Glucose can be isomerized to give D-Fructose

To name the **KETO** form of a sugar, the general rule is to rename the ALDO form by changing -OSE to **-ULOSE**. It is assumed that C-2 "used to be" a D-hydroxyl before becoming a KETO group.
Example: D-Erythrulose, isomer of either D-Erythrose or D-Threose

EPIMERS differ only by arrangement about one asymmetric carbon:
Example: D-Galactose is the 4-epimer of D-Glucose

ANOMERS differ by the configuration about the carbonyl carbon after formation of an acetal, ketal, hemiacetal, or hemiketal ring structure. The alpha anomer of a D-sugar is D (or down in Haworth projection) and the beta anomer of a D-sugar is L (or up in Haworth).

MUTAROTATION is the chemical interconversion of alpha and beta anomers.

SUGAR ALCOHOLS: Delete "-OSE" and add "ITOL"
Example: D-Ribitol, found in Riboflavin, is a reduced form of D-Ribose

HEMIACETAL has hydroxyl and ether on the same carbon: Acetal has two "ethers." Hemiacetals are easy to hydrolyze, acetal is harder. Hemiketal and Ketal are parallel. Sugars of 5 or more carbons exist in solution mostly in the ring form, i.e. hemiacetal or hemiketal.

GLYCOSIDIC LINKAGE: this term refers only to attachment at the anomeric carbon -- the formation of a glycosidic linkage can turn a hemiacetal into an acetal. It tends to stabilize the sugar. Bonds formed at other hydroxyls are not glycosidic – only one per sugar.

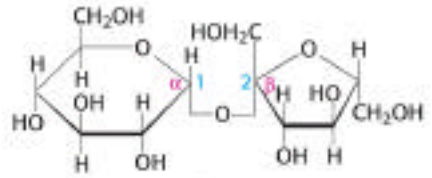
REDUCING SUGARS are sugars which can reduce test reagents – the sugars themselves become oxidized. Any sugar with an "unprotected" carbonyl, i.e. a hemiacetal or hemiketal, is a "reducing" sugar. This would include all normal monosaccharides. Acetals and ketals are non-reducing.

SUGAR ACIDS: Glucose oxidized to COOH at C-1 is Gluconic Acid. At C-6, Glucuronic. At both C-1 and C-6, Glucaric Acid.

POLYMERS: Change -OSE to -AN. Glucan, Fructan, Xylan.

HAWORTH FORM: "Pyranose" - six membered ring. "Furanose" - five membered ring.

WAYS TO DRAW **SUCROSE** (note, it's a **non-reducing** sugar!):
Fructose upside down, backwards!



Sucrose
(α-D-Glucopyranosyl-(1 → 2)-β-D-fructofuranose