**CHEM 8B, Lecture 13** – Carbohydrate Nomenclature

- Fischer Projections

- Stereochemistry

- Haworth Projections & Chair Conformations

**Fischer Projections & Conventions**

** ** assign R/S

**Sugar Classification**

D / L assignment based on **penultimate carbon** only

Prefix: *aldo*- or *keto*- for aldehyde or ketone, respectively

Infix: -*tri-, -tetr-, -pent-, -hex-, -hept*-, etc. for the number of carbons

Suffix: *-ose* for sugars!



Stereochemistry Review (**Enantiomers** vs. **Diastereomers** and **Epimers**)



Equilibrium between Open and **Closed Forms of Sugars: Pyranoses** and Furanoses



*If it were LEFT UP to me, I’d be DOWN RIGHT angry!*



Draw the C2-epimer of glucose in open and closed form (Haworth & chair):



**Reactions of Monosaccharides, Part 1**

(head start on lecture 14)

*Is the sugar reacting with a nucleophile or electrophile?*



Glycosidic Substitution



Nucleophilic Acyl Substitution



*Draw the products in each reaction…*



Next time…

- Ch 25.6: Reactions of sugars for unknown identification

 - Reduction

 - Oxidation

 - Kiliani-Fischer Chain Extension

 - Wohl-Degradation

**CHEM 8B, Lecture 14** – Carbohydrate Reactions

Last time…pyranose reactions: acylation, alkylation, and glycosides

Today…Fischer projection reactions: identification of unknowns

 - Oxidation & reduction

 - Chain lengthening & shortening

**Redox Reactions of Carbohydrates**



 Ketoses too



 While we’re on the subject…



**Optical Activity** = chirality

- Rotates plane-polarized light (PPL)

*Assign R/S configuration of each and determine relationships*



Apply to reactions...







**Chain Lengthening: Kiliani-Fisher Synthesis**



**Chain Shortening: Wohl Degradation**



A New Kind of Puzzle!

(Similar to 25.66) Unknown **A** is a D-aldotetrose that is reduced with sodium boro***hydride*** to optically active alditol **B**. When unknown **A** is subjected to Kiliani-Fisher synthesis, unknowns **C** and **D** are produced. Unknown **C** is oxidized with warm dilute nitric acid to yield optically active aldaric acid **E** while unknown **D** is oxidized to optically inactive aldaric acid **F**. Show the reaction schemes and determine the structures of unknowns **A-F**.



Tomorrow…Q&A Session starts @ 10am, BYOQ

This weekend…catch up & get ahead!

- Carbohydrate HW (worksheet & text)

- Exam 2

- Re-do HW / Worksheets

- Lecture 15-16 Reading Questions

Next week…

- Amino Acids & Lipids

- Cumulative Final Exam Friday 8/30

 - No Chapter 18 (ethers & epoxides)