CONCEPT: MONOSACCHARIDE CONFIGURATIONS

●Recall: configurations of monosaccharide chiral carbons can be designated using _____ different systems:

1) Cahn-Ingold-Prelog (____/____). 2) Fischer's Convention (____/____).

1) R/S Configuration

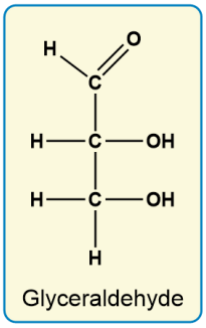
●Cahn-Ingold-Prelog system designates *absolute* ____/____ configurations.

□ Assign priorities 1 → 4 (based on atomic _____) to each chemical group attached to the chiral carbon.

□ Determine if priorities 1 → 2 → 3 (ignoring 4) are in a *clockwise* (____) or *counter-clockwise* (___) configuration.

□ Only if priority ____ is on a *wedge* (popping out of the page), assign the *opposite* configuration that it "looks like."

EXAMPLE: Determine the Cahn-Ingold-Prelog (R/S) configurations for glyceraldehyde's chiral center:



Glyceraldehyde

2) D/L Configuration

●Fischer's Convention designates ____/____ configurations *relative* to _____ enantiomers.

□ ____ configuration = -OH group _____; *usually* D = ____ configuration.

□ ____ configuration = -OH group _____; *usually* L = ____ configuration.

●Monosaccharides have the *same* configuration as the _____ numbered chiral carbon.

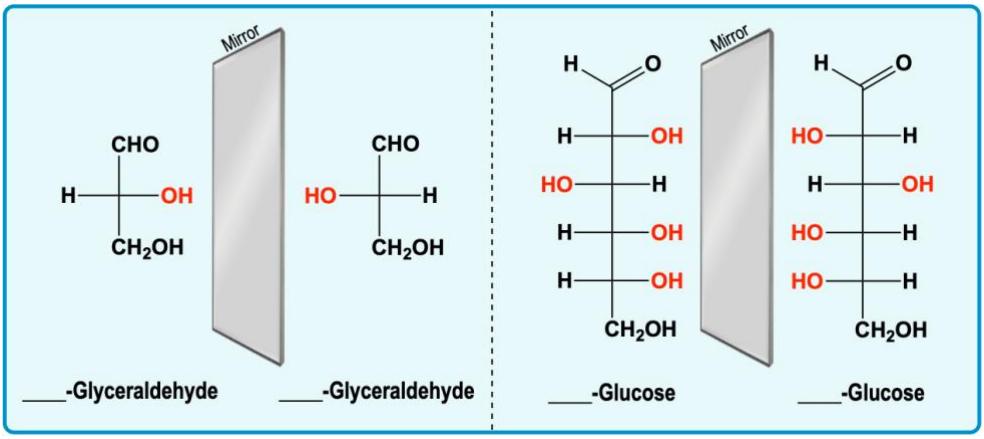
□ In other words, a monosaccharide's configuration is that of the chiral carbon _____ from its carbonyl group.

EXAMPLE: Determine the Fischer Convention (D/L) configurations of the following glucose monosaccharides?

Standard Fischer Projection:

- Carbonyl group is on _____.

- _____ carbon-chain is *vertical*.



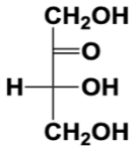
●Unlike biological *amino acids* (which are usually ___ configuration), biological *carbohydrates* are usually ___ configuration.

□ The reason why life prefers L-amino-acids but ____-carbohydrates is *unknown*.

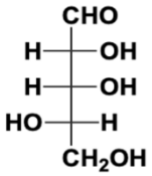
CONCEPT: MONOSACCHARIDE CONFIGURATIONS

PRACTICE: Identify the D/L and R/S configuration of all of the following monosaccharides:

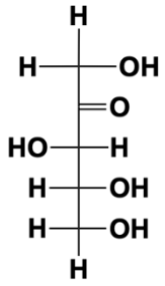
a) _____



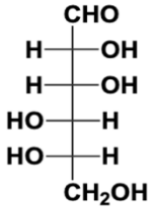
b) _____



c) _____



d) _____



PRACTICE: How many D-stereoisomers are possible for a D-ketopentose?

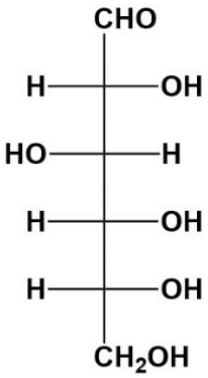
a) 4. b) 8. c) 24. d) 2. e) 16.

PRACTICE: Which TWO of the following traits apply to Fischer's Convention for naming stereoisomers?

a) Utilizes (+) and (-) designations.
b) Utilizes (D) and (L) designations.
c) Utilizes (R) and (S) designations.
d) Requires drawing the compound with aldehyde/ketone at the top.
e) Based on optical properties of the compound in solution.
f) Reflects stereochemistry at multiple centers.

PRACTICE: How many possible epimers of D-glucose exist?

a) 1. b) 2. c) 4. d) 6. e) 8. f) 16.



D-Glucose