CONCEPT: HEMIACETAL VS. HEMIKETAL

Cyclization of Monosaccharides

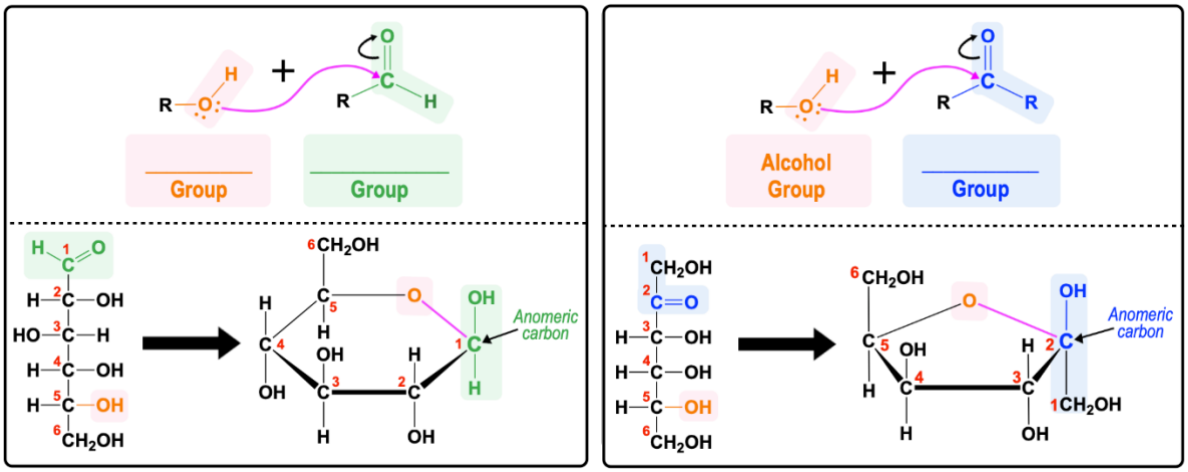
●Sugars cyclize via a *nucleophilic addition* reaction between an _____ & an aldehyde/ketone.

□ Alcohols = _____.

□ Aldehydes & ketones = *electrophilic*.

□ Monosaccharide cyclization forms an _____ *carbon*.

EXAMPLE: Alcohols react with aldehydes & ketones during monosaccharide cyclization.



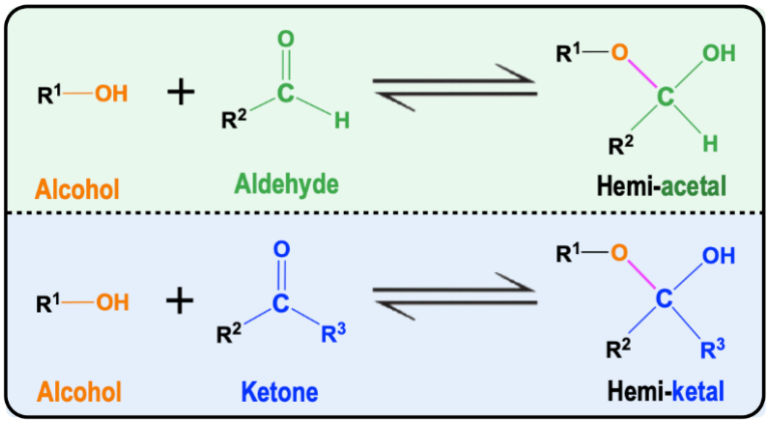
Cyclization Forms Hemiacetals & Hemiketals

●Upon monosaccharide cyclization, the *anomeric carbon* becomes part of a relatively _____ *hemiacetal* or *hemiketal*.

□ *Hemiacetals*: *half* of an _____ group resulting from -OH + aldehyde.

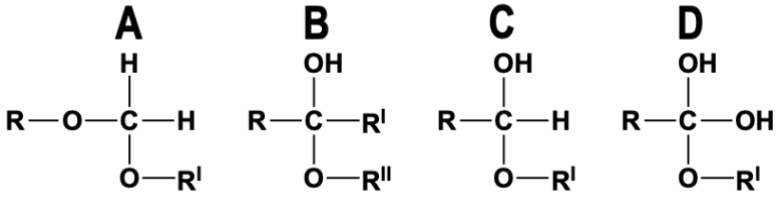
□ *Hemiketals*: *half* of a _____ group resulting from -OH + ketone.

EXAMPLE: Hemiacetals & Hemiketals:



PRACTICE: Which of the following is a hemiketal?

a) A.
b) B.
c) C.
d) D.

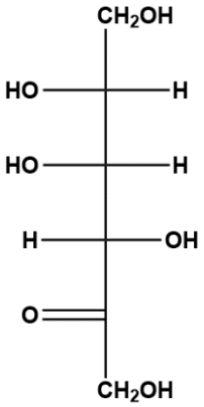


CONCEPT: HEMIACETAL VS. HEMIKETAL

PRACTICE: For monosaccharides to cyclize, an alcohol group must attack a carbonyl group within the same sugar.

A) Which carbon of the linear ketohexose shown below has the reactive carbonyl?

a) C1. b) C2. c) C3. d) C4. e) C5.



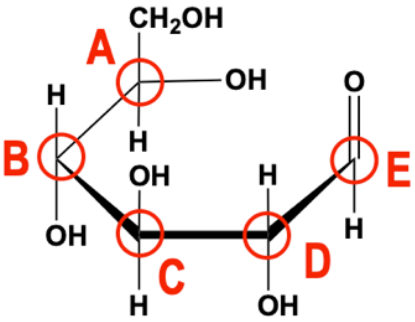
B) Upon cyclization, would a hemiacetal or hemiketal form?

a) Hemiacetal. b) Hemiketal.

PRACTICE: Use the image of the following glucose molecule to answer the questions.

A) Upon cyclization, which of the red circled carbons becomes the anomeric carbon?

a) A. b) B. c) C. d) D. e) E.



B) Upon cyclization, would a hemiacetal or hemiketal form?

a) Hemiacetal. b) Hemiketal.

PRACTICE: In the reaction shown below the compound on the far right is a:

a) Acetal.
b) Alcohol.
c) Ether.
d) Ester.
e) Hemiacetal.