CHE 312: Physical Chemistry

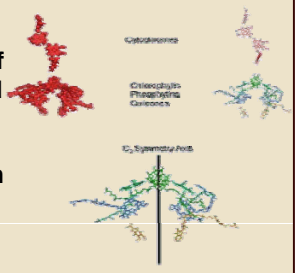
(Short Course - 3 credits)

Summer Session I – C

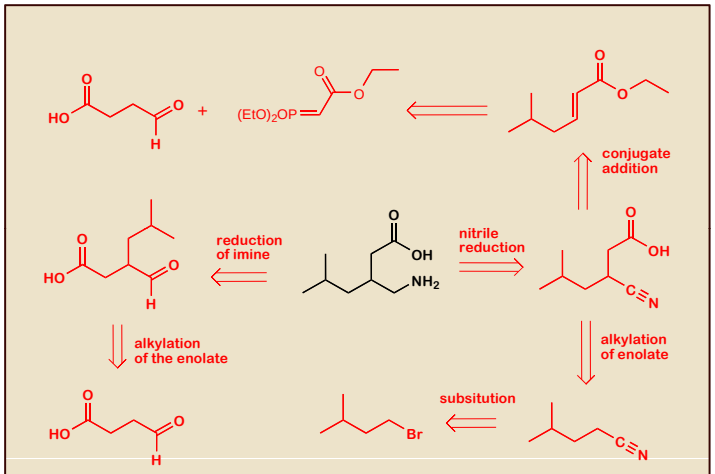
Mo and We 1:30 – 4:55 PM, Javits Lectr. 110

Instructor: Fernando Raineri

Intended primarily for *students of the biological sciences*. The course covers the fundamental concepts of chemical), transport processes, and chemical kinetics, *with special emphasis on applications to biological systems*. [Meets Biochem Major Requirement for P-Chemistry]

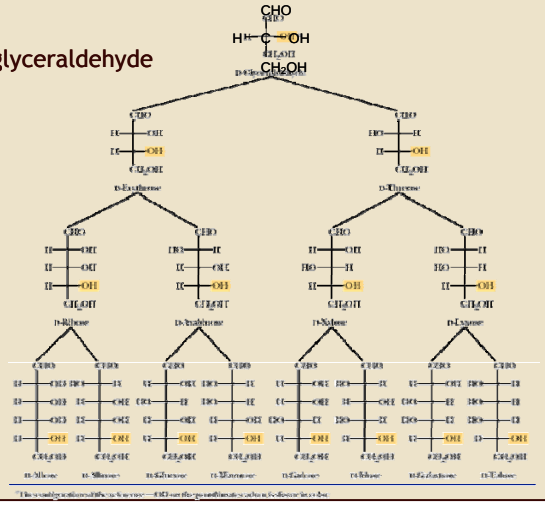


Information on summer courses see
http://www.chem.stonybrook.edu/summer.html

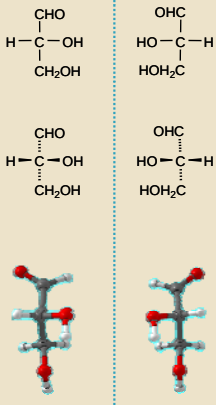


What are the structures of all of the D sugars?

D-glyceraldehyde



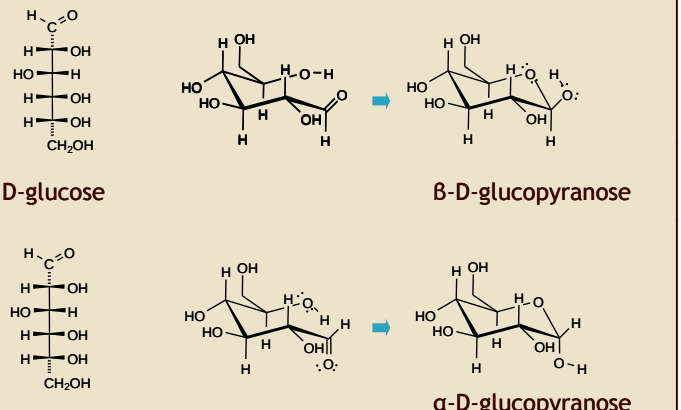
D-glyceraldehyde
R-glyceraldehyde
(+)-glyceraldehyde
(*d*)-glyceraldehyde



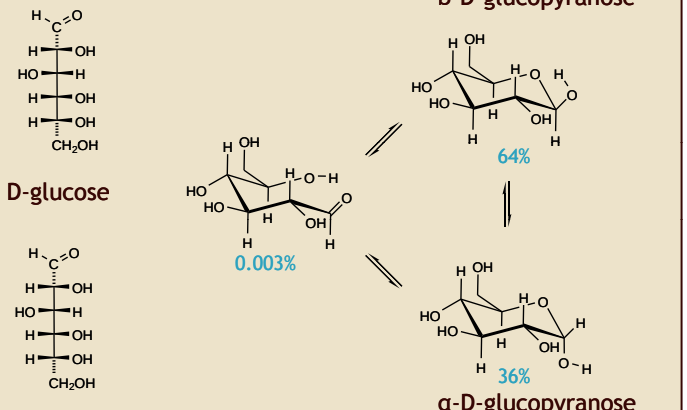
L-glyceraldehyde
S-glyceraldehyde
(-)-glyceraldehyde
(*l*)-glyceraldehyde

mirror plane

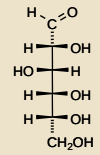
What are the isomers of D-glucose?



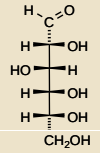
What are the isomers of D-glucose?



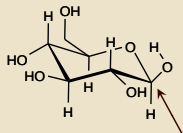
What is the stereochemical relationship of the α and β isomers to each other?



D-glucose

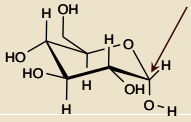


β-D-glucopyranose



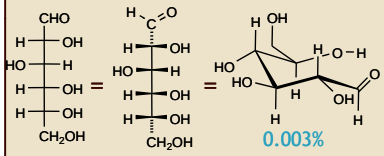
diastereomers
anomers

anomeric carbon



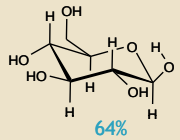
α-D-glucopyranose

Review: Glucose



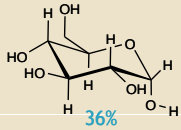
D-glucose

β-D-glucopyranose



64%

0.003%

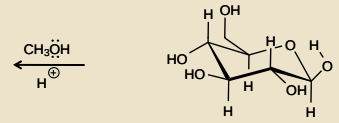


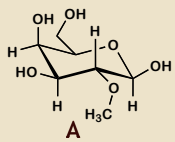
36%

α-D-glucopyranose

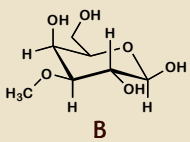
Predict the product of the following reaction.

a mono methyl ether

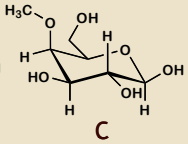




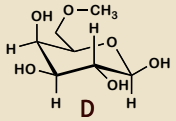
A



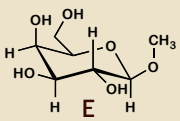
B



C



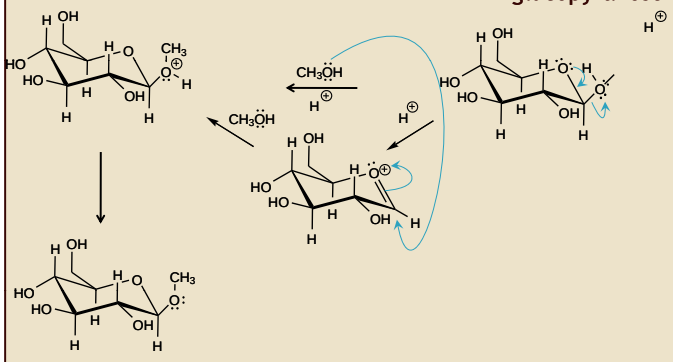
D



E

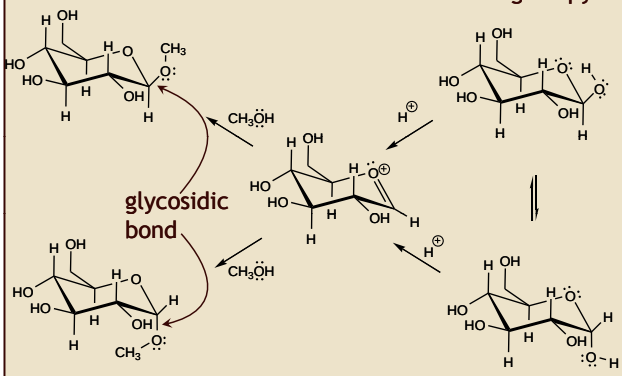
Predict the product of the following reaction.

β-D-glucopyranose



Why is the hydroxyl group on the anomeric carbon so reactive?

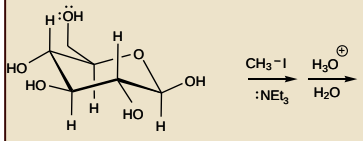
β-D-glucopyranose



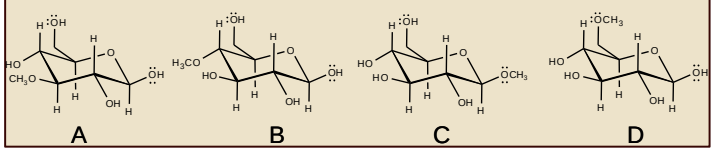
glycosidic bond

α-D-glucopyranose

Predict the initial product of the following reaction sequence.

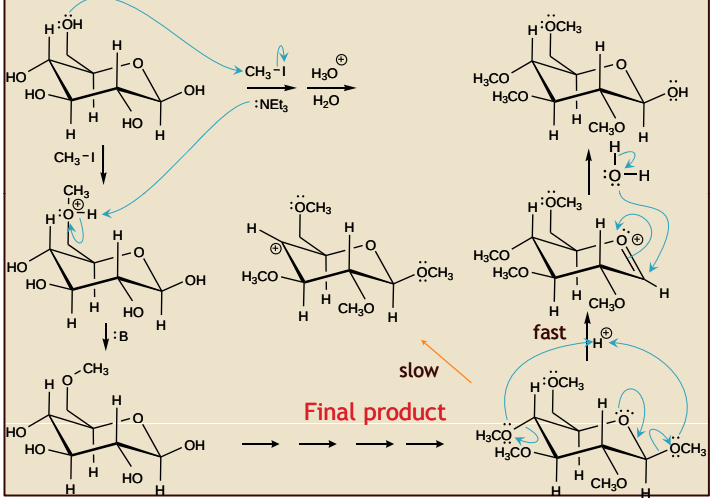


a mono methyl ether

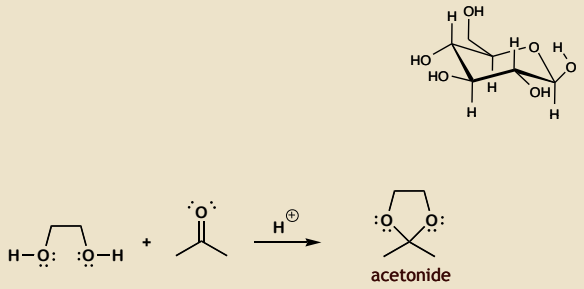


A B C D

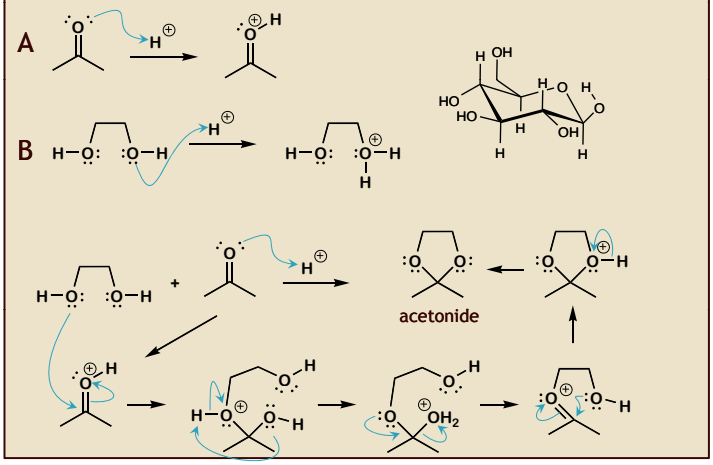
Predict the initial product of the following reaction sequence.



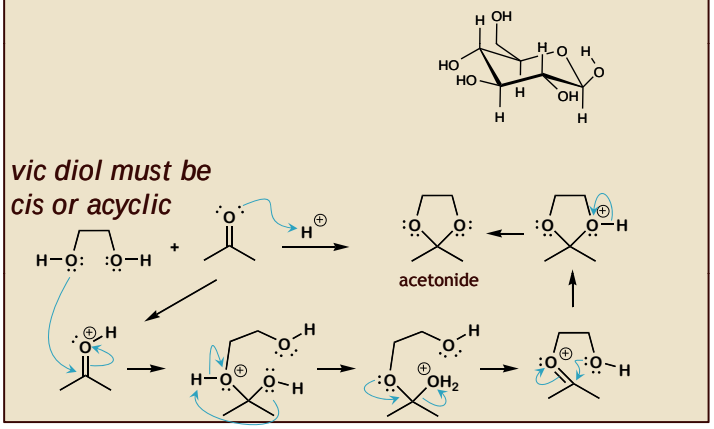
Carbohydrates are vicinal diols. Vicinal diols react with acetone to form acetonides



What is the first step in the mechanism of this reaction?



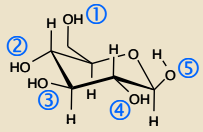
On a carbohydrate the -OH groups must be *cis* or acyclic.



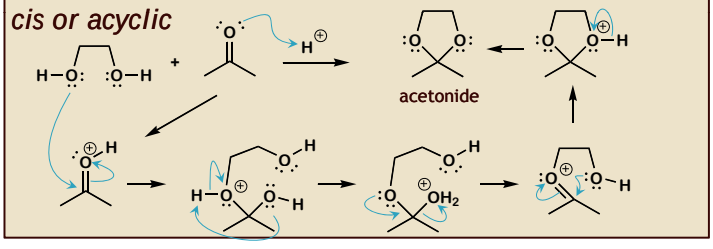
Which -OH groups on the following glucose are *cis*?

A ① + ②
B ② + ③
C ③ + ④
D ④ + ⑤
E none
F all

ß-D-glucopyranose

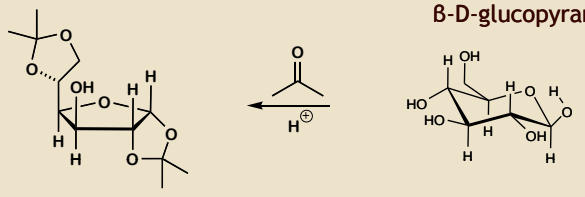


vic diol must be cis or acyclic



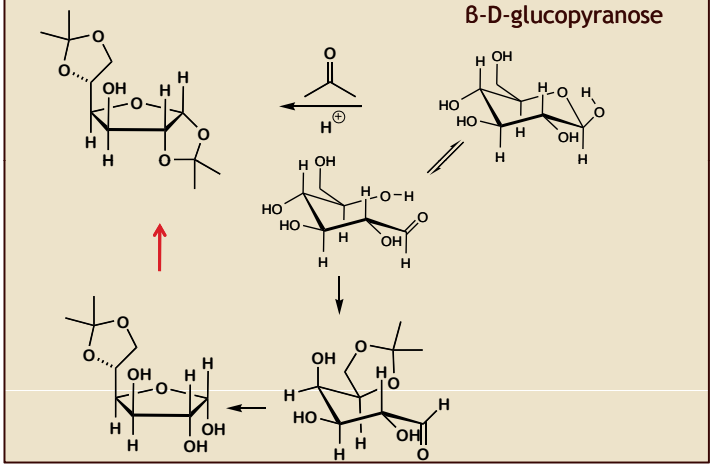
Would glucose be predicted to react with acetone in the presence of acid?

ß-D-glucopyranose



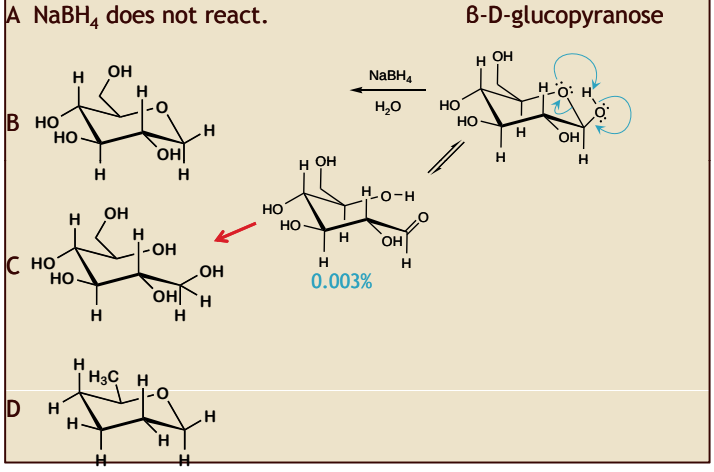
A Yes B No

How can this occur?



What happens when glucose is treated with $NaBH_4$?

A $NaBH_4$ does not react.



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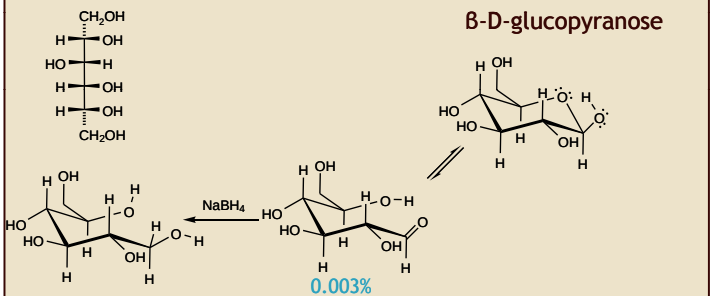
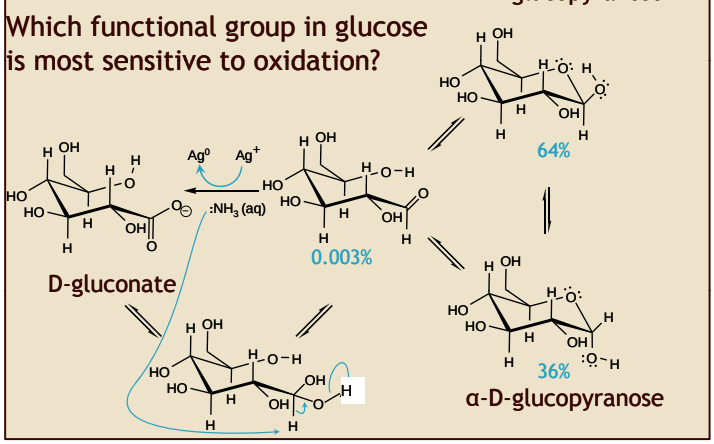


What happens when glucose is treated with oxidizing agents?

Which functional group in glucose is most sensitive to oxidation?



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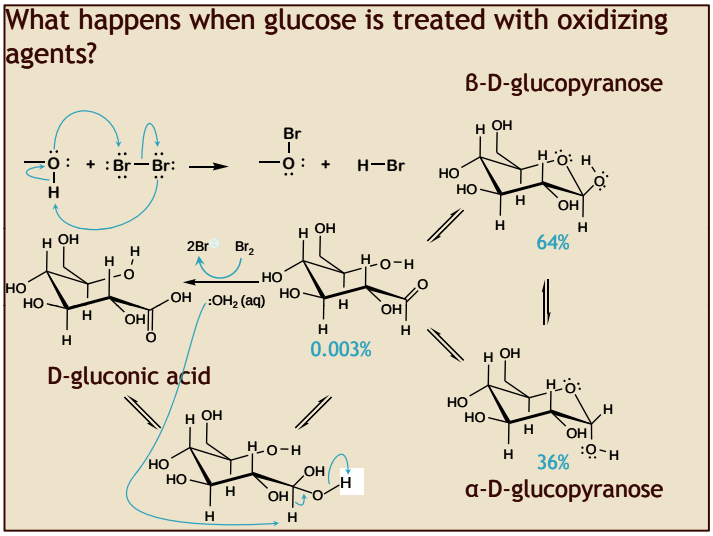

Nitric acid performs further oxidation on glucose.

Which -OH group is most susceptible to further oxidation?