Why is the following compound appropriate for today's lecture.

Streptomyces griseus

(-)-geosmin

A. It is a carbohydrate.
B. It can form an acetonide.
C. It is a D-terpene.
D. It is Earth Day.

Would glucose be predicted to react with acetone in the presence of acid to give an acetonide?  A. Yes    B. No

Would you expect the optical rotations of these two pure compounds to be A. different or B. the same?

\[
\begin{align*}
\beta\text{-D-glucopyranose} & \quad [\alpha]_b = +18.7 \\
\alpha\text{-D-glucopyranose} & \quad [\alpha]_b = +112
\end{align*}
\]

When either of these pure compounds is added to water the optical rotation changes to +52.7°. This process is called mutarotation.

\[
\begin{align*}
\beta\text{-D-glucopyranose} & \quad [\alpha]_b = +18.7 \\
\alpha\text{-D-glucopyranose} & \quad [\alpha]_b = +112
\end{align*}
\]
Why does the optical rotation change to the same value?

A. Both the α and β anomers ring open to the acyclic form which has an optical rotation of 52.7°.

B. They both form the same hydrate which has an optical rotation of 52.7°.

C. They both equilibrate to the same mixture of α and β anomers which has an optical rotation of 52.7°.

D. None of these explanations is correct.

Why isn’t the amount of the β anomer higher?

Which bond, A. C-H or B. C-OH, has the lower energy LUMO?

Which HOMO-LUMO interaction would be the more stabilizing?
What happens when glucose is treated with NaBH₄?

A  NaBH₄ does not react.

B  β-D-glucopyranose

C  0.003%

D

Is silver A. an oxidizing agent or B. a reducing agent?

β-D-glucopyranose

↓

α-D-glucopyranose

Which hydroxyl group is most susceptible to oxidation?

D-gluconic acid

β-D-glucopyranose

↓

α-D-glucopyranose

What happens when glucose is treated with oxidizing agents?

D-gluconic acid

β-D-glucopyranose

↓

α-D-glucopyranose
What happens when glucose is treated with oxidizing agents?

![Diagram of glucose treatment with nitric acid]

What is the product of this reaction?

Are all of these glucaric acids chiral?

![Diagrams of glucose and galactose treatment with nitric acid]

Which of the following pentoses give the same aldaric acid on treatment with nitric acid?

![Chemical structures of ribose, arabinose, xylose, and lyxose]

Which of the following pentoses give an achiral aldaric acid on treatment with nitric acid?

![Chemical structures of ribose, arabinose, xylose, and lyxose]

An important reaction in the development of carbohydrate chemistry is their reaction with phenyl hydrazine. What is the product of this reaction?

![Diagram of osazone reaction with phenyl hydrazine]

Which of the following pentoses give the same osazone on treatment with phenylhydrazine?

![Chemical structures of ribose, arabinose, xylose, and lyxose]