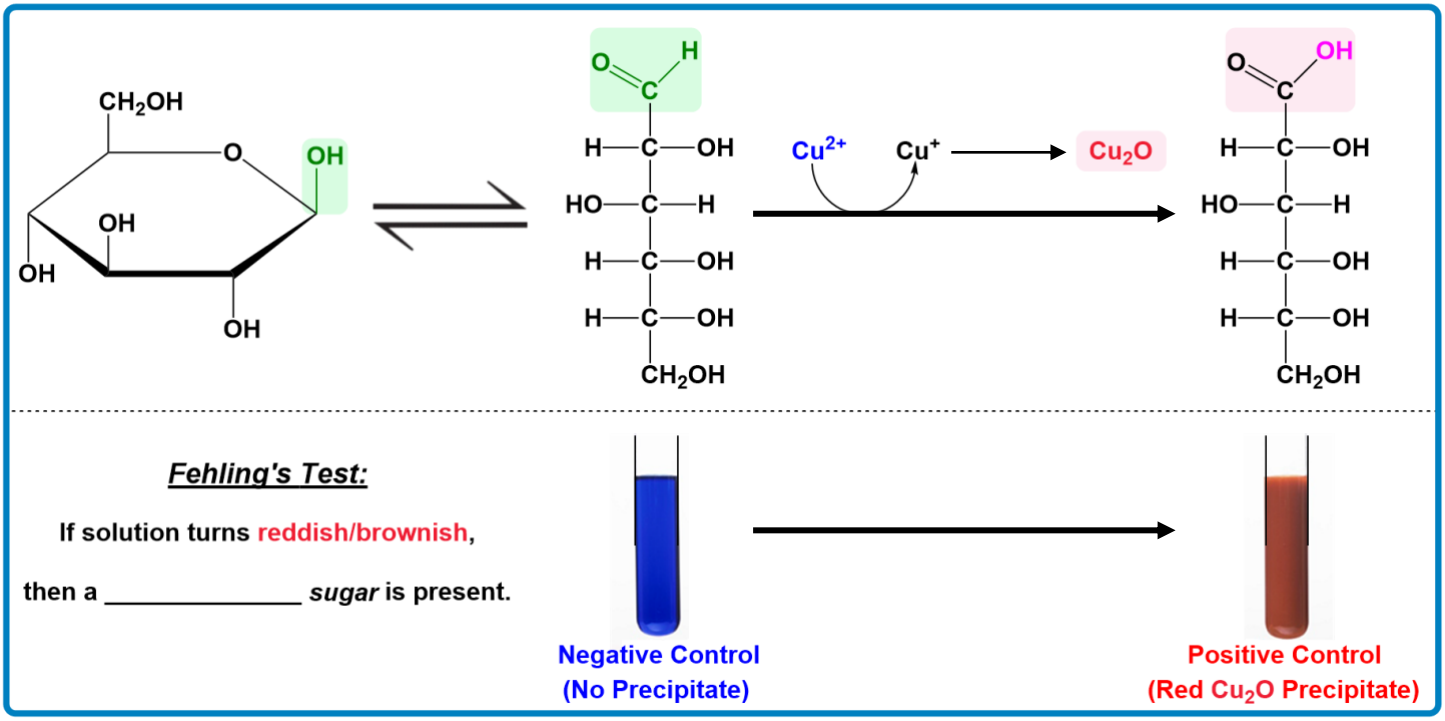
CONCEPT: REDUCING SUGARS TESTS

Fehling's Test for Reducing Sugars

- _____ *Test*: an experimental *color-change* reaction that tests for the presence of _____ *sugars*.
  - □ Blue Cu_{2+} + _____-*Reducing Sugar* = Blue Cu_{2+}.
  - □ Blue Cu_{2+} + *Reducing Sugar* = _____ Cu_2O.

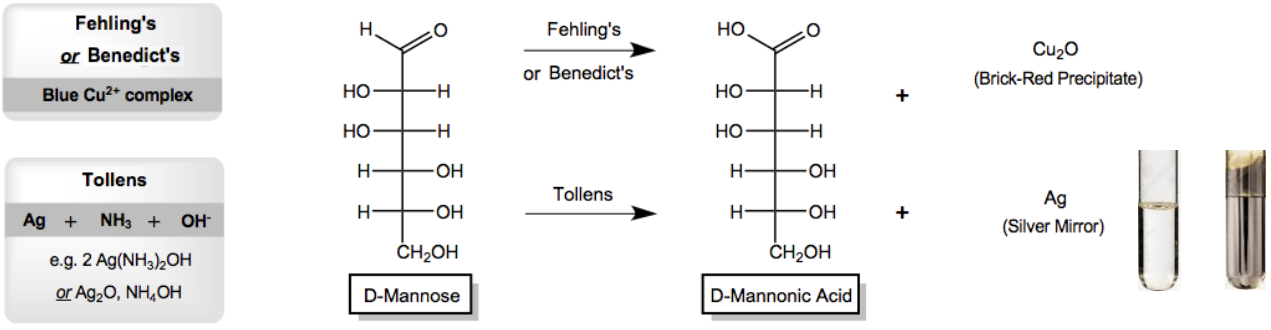


Benedict's Test for Reducing Sugars

- The Benedict's test is very _____ to the Fehling's test in terms of reaction & overall test result.
  - □ Benedict's solution uses slightly *different* reagents giving it a *longer* shelf-life, otherwise, Fehling's ≈ Benedict's.

Tollens' Test for Reducing Sugars

- Tollen's test uses silver (_____) as the oxidizing agent instead of Cu_{2+}, but still tests for presence of *reducing sugars*.



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PRACTICE: Which of the following would you predict to be the LEAST reactive in a Fehling's test for reducing sugars?

a) D-Glucose. b) L-Glucose. c) D-Mannose. d) D-Ribose. e) D-Fructose.

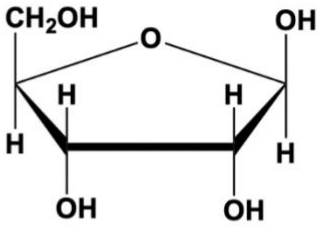
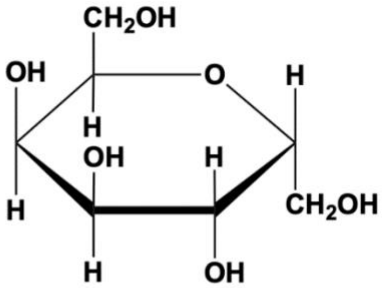
PRACTICE: Which of these statements is false?

a) The Fehling's test allows us to detect the presence of reducing sugars.
b) The Benedict's test allows us to detect the presence of sugars with a free aldehyde or ketone group.
c) All simple, linear monosaccharides are reducing sugars.
d) All disaccharides have exposed carbonyl groups and are also reducing sugars.
e) Sucrose and other non-reducing sugars will not react with Tollens' solution.

PRACTICE: Select the incorrect statement below:

a) Sugars that contain aldehyde groups that are oxidized to carboxylic acids are classified as reducing sugars.
b) Reducing sugars reduce the Cu^{2+} in Benedict's solution to Cu^{+} which then forms a red precipitate, copper (I) oxide.
c) Any monosaccharide that contains a free hemi-acetal will be a reducing sugar.
d) Glycosides have acetals and therefore are reducing sugars.
e) Acetals of monosaccharides can't undergo mutarotation or oxidation, meaning that acetals are nonreducing.
f) Fructose (though a ketose) is also a reducing sugar because in the open-chain form, a rearrangement between the hydroxyl group on C1 and the ketone group on C2 provides an aldehyde group that can be oxidized.

PRACTICE: In the table below, indicate what the result of a Fehling's, Benedict's, and Tollen's test would be for each of the two sugars and what conclusion can be made about the properties of the sugars.

Sugar Molecule:		
Fehling's Test		
Benedict's Test Result		
Tollen's Test Result		
Final Conclusion		