Date 3/12/2021

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Aim :- To study the different properties of carbohydrates and determine an unknown carbohydrate.

Materials Required:

Chemicals

1) Distilled Water
2) Sodium Hydroxide (NaOH)
3) Conc. Sulphuric acid
4) Iodine solution
5) Conc. Nitric acid
6) Fehling's soln A & B
7) Benedict's reagent
8) Tollen's reagent
9) Iodine reagent
10) Water bath
11) Test tubes and pipettes.
12) Starch, Glucose, Sucrose Lactose.

Theory:

- Carbohydrates are widely distributed in plants and animals they have important structural and metabolic roles.
- Chemically carbohydrates are aldehyde or ketone derivatives of polyhydric alcohols.
- Glucose is the most important carbohydrate; the major metabolic fuel of mammals (except ruminants) and a universal fuel of fetus.
- It is the precursor for synthesis of all the other carbohydrates in the body.

Different types of Carbohydrates are :-

1) Monosaccharide - simplest form
2) Disaccharides - two monosaccharides
3) Oligosaccharides - three to ten monosaccharides.
4) Polysaccharides - condensation products of ten or more monosaccharides

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Solubility Test

→ Take a small amount of glucose, lactose, sucrose and starch in four test tubes A, B, C and D.
→ Now add small volume of distilled water to the four test tubes and then shake the test tube well.
→ We can see that glucose, lactose and sucrose are soluble in water whereas starch is insoluble in water.

Molisch's Test

→ Take a small quantity of aqueous solutions of glucose, lactose, sucrose and suspension of starch in the four test tubes.
→ Now add a few drops of Molisch's Reagent in the four test tubes
→ In the test tube A, pour conc. sulphuric acid slowly along side the test tube in small amount.
→ In a similar way put conc. sulphuric acid of small amount in other test tubes as well.
→ The Molisch's Reagent forms a coloured product that appears as a purple ring at the interface between the acid and the test layer

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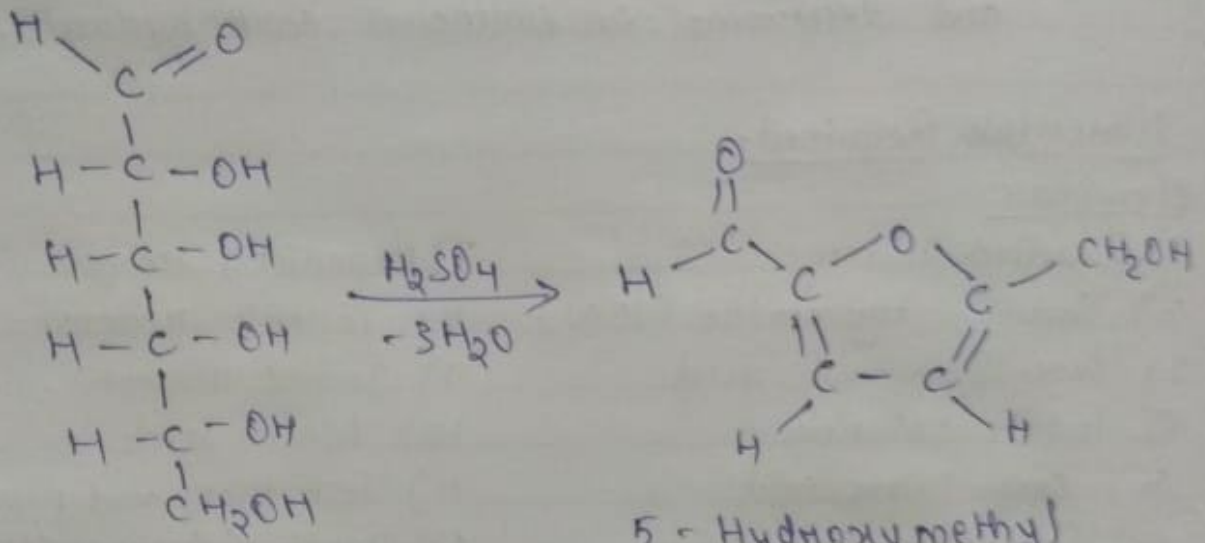
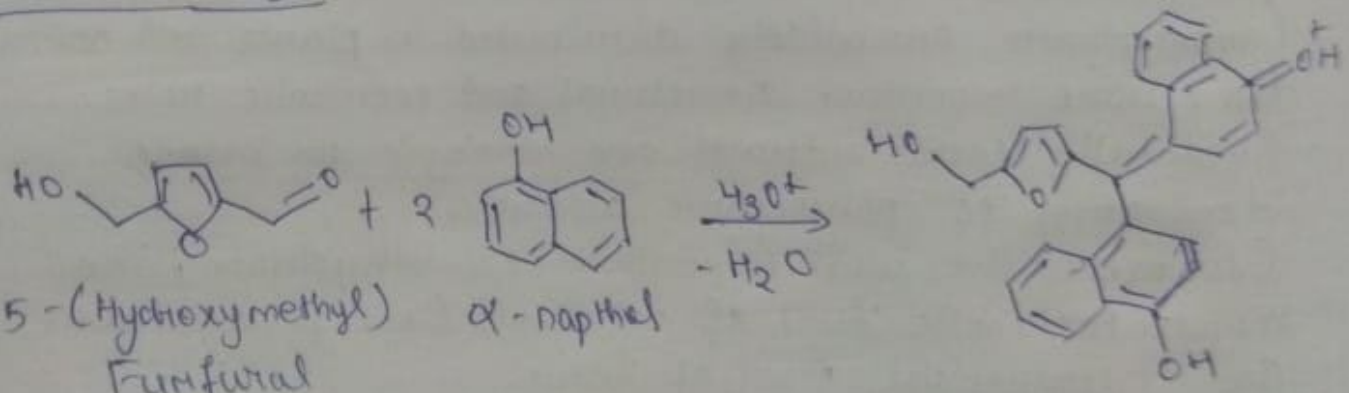


Carbohydrate

5 - Hydroxymethyl Furfural

Molisch Test



5 - (Hydroxymethyl) Furfural

α - napthol

Purple - Coloured Dye.

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Fehling's Test

→ Take a small quantity of aqueous solutions of glucose, lactose, sucrose and suspension starch in the four test tubes A, B, C & D.
→ Using a dropper add a small quantity of fehling's solution A into the test tubes A, B, C and D.
→ Now using a dropper, add a small quantity of Fehling's solution B into the test tubes A, B, C, D.
→ Heat the test tube in a boiling water bath for sometimes.
→ Glucose and Lactose form red precipitate of Cu_2O and others don't. Hence, Glucose & Lactose are reducing and others are non-reducing.

Benedict's Test

→ Take a small quantity of aq. solution of the four carbohydrates in the respective test tubes.
→ Add Benedict's Reagent to each Test Tube.
→ Heat the test tubes in boiling water bath.
→ Reducing sugars like Glucose and Lactose form red precipitate and others don't as they are non-reducing.

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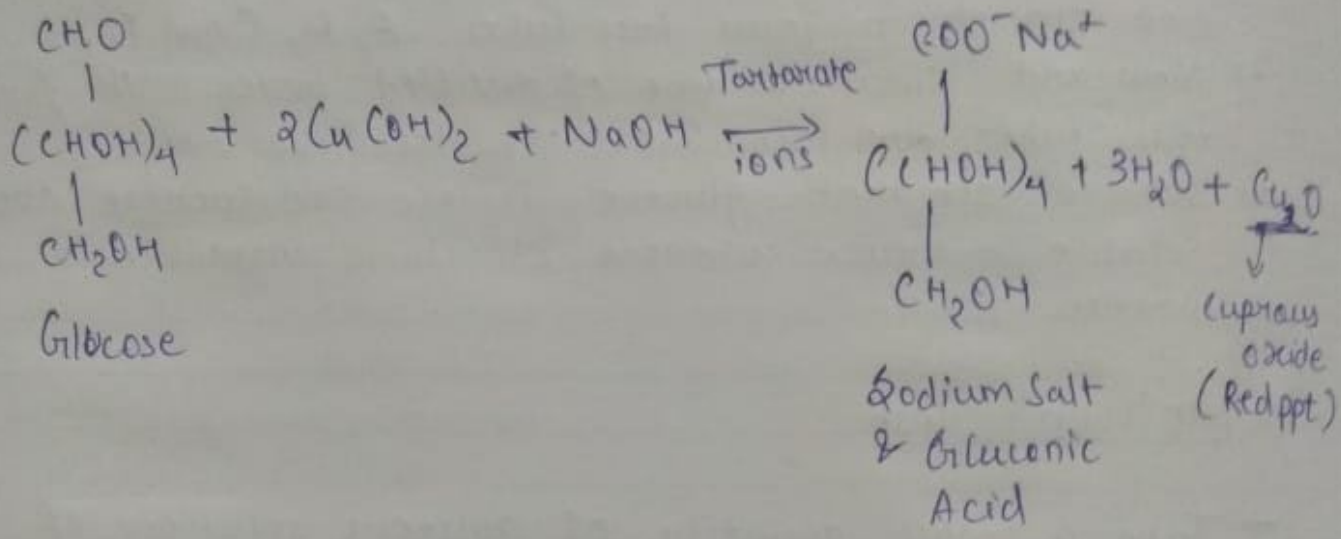
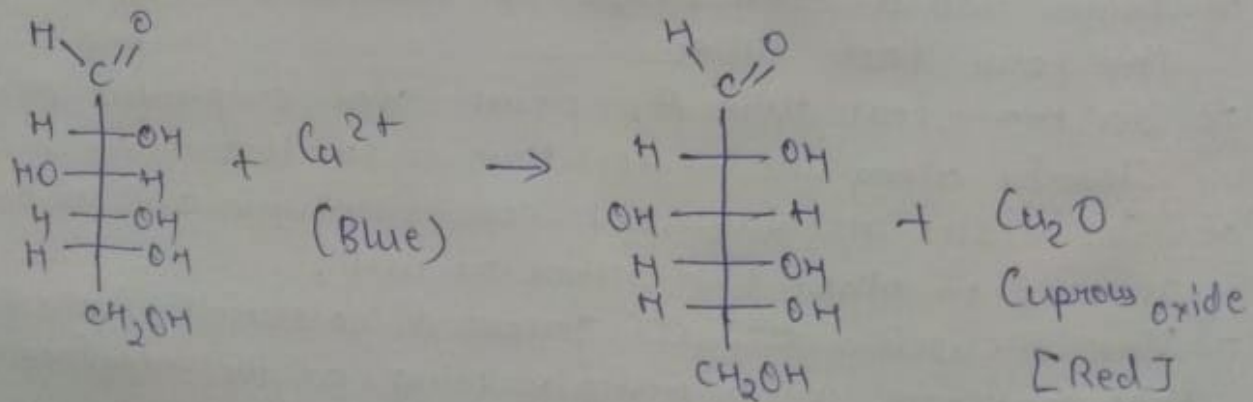
Fehling



Benedicts



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Tollen's Test

→ Take a small quantity of solution in each test tubes of the four sugars.
→ Add a small amount of Tollen's Reagent.
→ Heat the test tuber in boiling Water Bath.
→ Glucose and Lactose produce silver mirror and no such silver mirror is produced in sucrose and starch.

Iodine Test

→ Take a small quantity of aqueous solution of the four carbohydrates in respective test tubes.
→ Add a small quantity of iodine in each test tube.
→ Starch Reacts with iodine to form iodine-starch complex and others don't form any complex.

CONCLUSION

We come to know about a lot of properties of carbohydrates and test to differentiate Reducing and non-Reducing sugars.

Teacher's Signature

Tollen's