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Qualitative Analysis of Carbohydrates

Experiment 2 - Practical Notes

Name: _____ Roll no.: _____ Date: _____

Aim

To distinguish glucose, fructose, lactose, sucrose and starch using a sequence of qualitative reactions.

Principle

Molisch reaction supports the presence of a carbohydrate. Reducing sugars reduce alkaline copper reagents; fructose becomes reducing through alkaline rearrangement. Sucrose is non-reducing before hydrolysis, while starch forms a coloured complex with iodine.

Requirements

- Assigned glucose, fructose, lactose, sucrose and starch solutions; distilled-water blank.
- Instructor-prepared Molisch, Benedict, Seliwanoff and iodine reagents; labelled tubes and controlled water bath.

Procedure

1. General reaction

Run Molisch only as an instructor-supervised test: a violet interface supports carbohydrate. Strong-acid addition is performed according to the laboratory method.

2. Reducing sugar reaction

Mix the assigned aliquot with Benedict reagent and heat in a boiling-water bath for the prescribed interval. Compare precipitate colours with the water blank.

3. Ketose distinction

Run Seliwanoff under controlled heating. A rapid cherry-red response supports a ketose such as fructose; prolonged heating weakens specificity.

4. Starch reaction

Add dilute iodine to an unheated starch aliquot. Record blue-black colour and compare with the other carbohydrates.

5. Sucrose hydrolysis

Compare untreated sucrose with a teacher-prepared hydrolysed and neutralised sucrose aliquot using the reducing-sugar reaction. Record the change.

6. Conclude

Use the combined pattern and known controls. Colour intensity alone is not a quantitative glucose estimate.

Observations and Record

Carbohydrate	Benedict, before hydrolysis	Iodine
Glucose	Positive	No blue-black
Fructose	Positive	No blue-black
Lactose	Positive	No blue-black
Sucrose	Negative; positive after hydrolysis	No blue-black
Starch	Usually negative in this test	Blue-black

Worked Example

The numbers below are illustrative; enter your own observations in the record.

- Teaching pattern: Benedict positive, rapid Seliwanoff positive and iodine negative supports fructose among these five assigned substances.

Result

Record the observed outcome and calculated value, with units. State whether the stated laboratory specification was met; do not copy the worked example as your result.

Precautions

- Use matched heating times and reagent ratios. Sucrose can become Seliwanoff-positive after acid hydrolysis; interpret the reaction time.
- Acidic carbohydrate tests are supervised. Use water baths, eye protection and prepared reagents.

Viva Questions and Answers

1. Why does fructose reduce Benedict reagent?

In alkaline solution it rearranges through an enediol intermediate to reducing aldoses.

2. Why is sucrose initially non-reducing?

Both anomeric centres participate in its glycosidic bond.

3. What does iodine detect here?

A coloured complex with the helical starch structure, especially amylose.

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