Food tests: starch and reducing sugars

Student activity • practical and reasoning

YEAR 10 / LESSON 7 / BIOLOGY + SCIENCE (DOUBLE AWARD)

The question

What can a positive food test actually tell us?

Test labelled samples alongside known positive and negative controls. Separate an observed colour from a justified conclusion.

Equipment

- Eye protection, spotting tile and labelled droppers
- Four heat-resistant tubes, rack, tube holder, 2 cm^3 measuring syringes and timer
- Supplied water, 1% glucose, 1% starch, food extract, dilute iodine and Benedict's reagent
- Access to a teacher-controlled 80 °C water bath

Wear eye protection. Do not taste food or reagents. Hot water and tubes burn: use holders and a rack, keep tubes open, and let them cool. Report splashes immediately and rinse affected skin with water. Avoid food allergens and follow the teacher's spill instructions.

Course coverage: Shared Biology / Double Award: 2.7–2.9. Carbohydrates and food tests.

Plan, model or apparatus sketch

Draw and label the apparatus or biological model; identify one limitation.

Method and reasoning

Read the whole sequence before starting

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1. Wear eye protection. Label separate aliquots of water, 1% glucose, 1% starch and a teacher-supplied food extract. Use a clean dropper for each sample; do not taste anything.

2. Place a small drop of each sample in separate wells. Add one drop of supplied dilute iodine to each and record the colour beside its sample label.

3. Place 2 cm^3 of each sample in a separate heat-resistant test tube and add 2 cm^3 of Benedict's reagent. Keep tubes unstoppered and point their mouths away from people.

4. Use a rack and tube holders to place the tubes in the teacher-controlled 80 °C water bath for five minutes. Keep hands away from hot water; do not heat directly in a flame.

5. Place tubes in the rack to cool. Record colour and any precipitate; compare with the glucose and water controls before drawing conclusions.

6. Explain why Benedict's detects reducing sugars rather than proving glucose specifically. Compare glucose building blocks with starch and glycogen chains.

Cleanup

- Collect copper-containing Benedict's mixtures in the labelled waste container; follow the school's disposal route.
- Return iodine mixtures as directed, rinse apparatus, clean the bench and wash hands.

Record your evidence

Blank spaces are for your own work

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Reference and task data

Iodine gives blue-black with starch; a negative test retains the reagent colour. A positive Benedict's test forms a green/yellow/orange/brick-red precipitate after heating, depending on conditions. Blue alone is negative under the test conditions. These tests are qualitative; coloured food extracts can obscure a result. Controls are part of your observations, not supplied measurements.

Sample	Iodine observation	Benedict observation	Conclusion / limit
Water			
Glucose standard			
Starch standard			
Food extract			

Show your calculations, labelled model or correction here.

Explain and evaluate

Use evidence and show calculation steps where relevant

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1. Which elements occur in carbohydrates?

2. Name the positive iodine result.

3. Why include water and a glucose standard?

4. Does a positive Benedict’s result identify glucose uniquely?

5. Why use equal sample and reagent volumes?

6. How are starch and glycogen related to glucose?