

WJEC England Biology A Level

SP CC 01: Food tests

Practical notes



Introduction

Qualitative tests can be used to identify the presence of a substance in food. You need to be able to use chemical tests for five biological molecules:

- Reducing sugars
- Non-reducing sugars
- Proteins
- Starch
- Lipids (fats and oils)

Equipment

- Test solution
- Benedict's reagent
- 0.5 mol dm^{-3} hydrochloric acid
- Dilute sodium hydroxide solution
- Biuret reagent
- Iodine-KI reagent
- Ethanol
- Distilled water
- 5 boiling tubes
- 2 test tubes
- 3 dropping pipettes
- $4 \times 5 \text{ cm}^3$ syringes
- Water bath

Risk assessment

Hazard	Risk	Precaution	Emergency
Benedict's reagent	Irritation to eyes	Avoid contact with eyes; wear safety goggles	Flood eye(s) with tap water; seek medical assistance
Hydrochloric acid	Irritation to skin	Wear gloves when handling HCl	Remove contaminated clothing; run the affected area under cold water; seek medical assistance
	Irritation to eyes	Wear safety goggles	Flood eye(s) with tap water; seek medical assistance



Biuret reagent	Irritation to eyes	Wear safety goggles	Flood eye(s) with tap water; seek medical assistance
	Corrosive	Wear gloves when handling reagent	Remove contaminated clothing; run the affected area under cold water; seek medical assistance
Iodine-KI reagent	Irritation to eyes	Wear safety goggles	Flood eye(s) with tap water; seek medical assistance
	Irritation to skin	Wear gloves when handling solution	Remove contaminated clothing; run the affected area under cold water; seek medical assistance
Boiling water	Scalding	Handle boiling water with care; use tongs to transfer boiling tubes; wear safety goggles	Run burn under cold water; seek medical assistance
Ethanol	Highly flammable	Make sure that there are no naked flames in the room	Put out small fires with a damp cloth; evacuate the building

Method

Testing for reducing sugars

1. Add 2cm³ of test solution and **Benedict's reagent** to a boiling tube
2. Heat in a boiling water bath (80°C or higher) for five minutes
3. Remove boiling tube and observe the **colour** of the **precipitate** formed

Testing for non-reducing sugars

Test the solution for the presence of **reducing sugars**. If no colour change is observed...

1. Add two drops of **hydrochloric acid** to 2cm³ of test solution. *HCl hydrolyses the non-reducing sugar's glycosidic bonds, releasing reducing sugars into solution.*
2. Heat the boiling tube in a water bath (80°C or higher) for two minutes
3. Allow to cool



4. Add two drops of **dilute sodium hydroxide solution** to the boiling tube. *This neutralises the excess HCl.*
5. Re-test the resulting solution with **Benedict's reagent**
6. Record the **colour** of the **precipitate** formed

Testing for proteins

1. Add 2 cm³ of test solution and **Biuret reagent** to a boiling tube
2. Shake gently to mix
3. Record observations

Testing for starch

1. Add 2 cm³ of test solution to a test tube
2. Add two drops of **iodine-KI reagent** and gently mix
3. Record observations

Testing for lipids

1. Add 2 cm³ of test solution to a test tube
2. Add 5 cm³ of **ethanol** and shake. Allow the mixture to settle.
3. Take a boiling tube and fill it half full with distilled water
4. Pour the mixture into the boiling tube
5. Record observations

Results

Biological molecule	Positive test
Reducing sugars	Colour change from green to yellow to orange to brown to brick red depending on the quantity of reducing sugar present
Non-reducing sugars	Colour change from green to yellow to orange to brown to brick red depending on the quantity of non-reducing sugar present
Protein	Colour change from pale blue to purple
Starch	Colour change from yellow-brown to blue-black (amylose) or red-purple (amylopectin)
Lipids	White, cloudy emulsion forms

