Food tests: proteins and lipids

Student activity • practical and reasoning

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The question

How do controls distinguish a positive result from cloudiness already present?

Compare a protein test with an ethanol-emulsion test, using separate aliquots and known standards.

Equipment

- Eye protection, tube rack, tubes, measuring syringes and dedicated droppers
- Ready-prepared Biuret reagent, small teacher-dispensed ethanol portions and water
- Labelled protein standard, oil and selected food sample; approved tube stoppers

Wear eye protection. Biuret reagent is alkaline: avoid skin and eye contact and report splashes immediately. Ethanol is highly flammable: no ignition sources or heating. Use small quantities, keep stock capped, and do not taste any sample.

Course coverage: Shared Biology / Double Award: 2.7–2.9. Proteins, lipids 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 and keep ethanol away from flames, heaters and hot water baths. Label water, a protein standard, vegetable oil and a supplied food sample; do not taste.

2. For the protein test, add 2 cm^3 of ready-prepared Biuret reagent to 2 cm^3 of each aqueous sample in separate tubes. Mix gently and compare the colour after two minutes.

3. For the lipid test use fresh dry tubes. Add 2 cm^3 ethanol to one small drop of oil or a small supplied food portion, fit the approved stopper and gently invert; no heating.

4. Let solids settle. Transfer about 1 cm^3 of the clear ethanol extract into a separate tube containing 2 cm^3 water. Compare with an ethanol-plus-water negative control.

5. Record the original appearance and final colour or cloudiness separately. Repeat an unclear result with a fresh aliquot; do not infer lipid from an already cloudy suspension.

6. Link proteins to amino acids and lipids to glycerol and fatty acids. Explain why a food can contain more than one type of biological molecule.

Cleanup

• Keep ethanol-containing waste in the designated solvent-waste container, away from ignition sources.

• Collect copper-containing Biuret waste separately as directed; do not mix waste streams. Clean equipment and wash hands.

Record your evidence

Blank spaces are for your own work

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Reference and task data

Biuret turns violet/lilac when sufficient protein is detected. A lipid-containing ethanol extract forms a white emulsion on addition to water; the ethanol-water control should remain clear. Protein contains nitrogen as well as carbon, hydrogen and oxygen; some amino acids also contain sulfur. Lipids contain carbon, hydrogen and oxygen. These are expected test criteria, not class results.

Sample	Biuret observation	Emulsion observation	Conclusion / limit
Negative controls			
Protein standard			
Oil standard			
Food sample			

Show your calculations, labelled model or correction here.

Explain and evaluate

Use evidence and show calculation steps where relevant

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1. What smaller units form proteins?

2. What smaller components form a lipid molecule?

3. Give a positive Biuret observation.

4. Why must the emulsion test use a clear extract and a negative control?

5. Why must no flame be present?

6. Can one food give positive tests for protein and lipid?