Food tests: practical

Science

Unit: Human digestive system

Oak National Academy

Outcome

I can carry out tests for nutrients and some of the substances they are broken down into.

Keywords

food test

reagent

qualitative

quantitative

Keywords

A **food test** shows if a specific type of food is present in a sample.

A **reagent** is a chemical used to test for a type of food.

A **qualitative** test is one that gives an indication of presence, but not an exact figure.

A **quantitative** test is one that gives a measurable, numerical, value.

Lesson outline

Food tests: practical

- Testing for starch
- Testing for sugar
- Qualitative and quantitative measurements

Testing for starch

Explanation

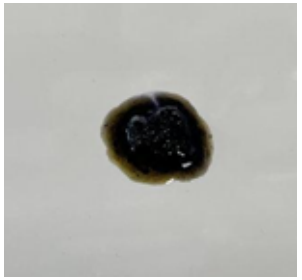
Starch is a carbohydrate, a large food molecule that must be broken down by the body, before being absorbed.

It is possible to test for the presence of starch.

This **food test** uses the **reagent** iodine.

The reagent iodine is normally a brown/orange colour.

If starch is present, iodine turns blue/black.



Testing for starch

Check

What colour does iodine turn in the presence of starch?

a brown/orange

b blue/black ✓

c no change

Testing for starch

Explanation

We are going to test a number of different foods for starch.

bread

potato

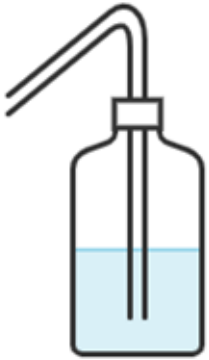
meat

Testing for starch

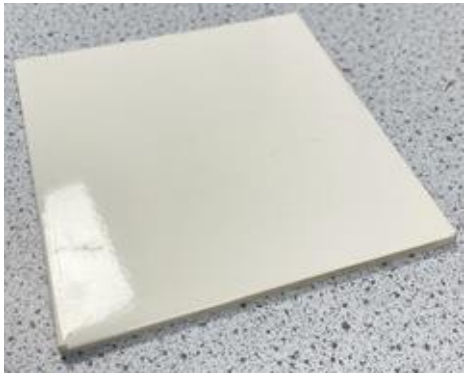
Explanation

To test for starch, you will need:

pestle and mortar



distilled water



spotting or white tile

iodine solution

Caution: iodine solution is an irritant.
Wear safety goggles.

Testing for starch

Explanation

Watch the video clip which shows the method for testing a food sample for the presence of starch.

Testing for starch

Explanation

Method

1. Grind the food into small pieces using a pestle and mortar.
2. Add a few drops of distilled water to the sample to create a suspension.
   - A suspension is where the tiny food particles float in the water but do not dissolve.
3. Put a small amount of the food sample onto a white tile.
4. Add one or two drops of iodine solution and note the colour.

Caution: iodine solution is an irritant.
Wear safety goggles.

Testing for starch

Check

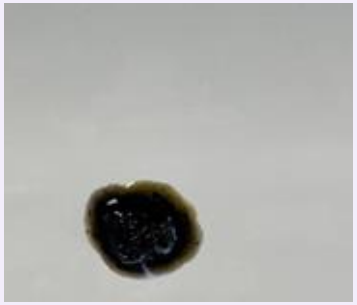
Starting with the first, put these statements in the correct order to describe the method of testing food for starch.

a	Add a few drops of water to create a suspension.	2
b	Add one or two drops of iodine solution and observe any colour change.	4
c	Transfer a small sample to a white tile.	3
d	Grind food using a pestle and mortar.	1

1) Follow the method to test bread, potato and meat for starch.

2) Write a conclusion: do the bread, potato and meat contain starch? How do you know?

1) These images show the results you should have got.



bread

potato

meat

2) Write a conclusion: do the bread, potato and meat contain starch? How do you know?

You might have written:

- Bread and potato contains starch because iodine turned blue/black.
- Meat does not contain starch because it remained brown/orange.

Lesson outline

Food tests: practical

- Testing for starch
- Testing for sugar
- Qualitative and quantitative measurements

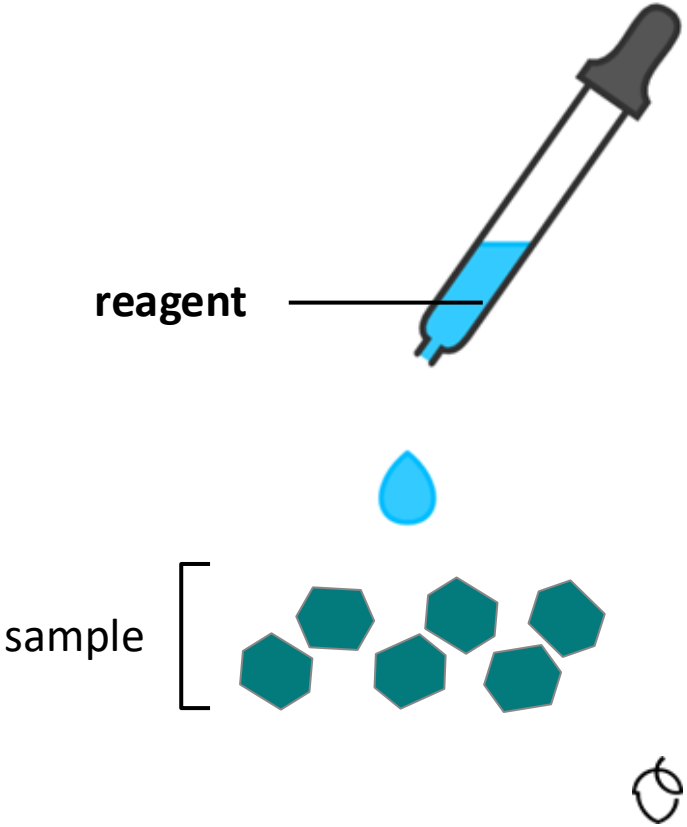
Testing for sugar

Explanation

There is a **food test** for smaller food molecules such as reducing sugars.

A reducing sugar is a specific type of sugar which reacts with the **reagent** Benedict's solution.

Reducing sugars include glucose (found in energy drinks) and fructose (found in fruit).

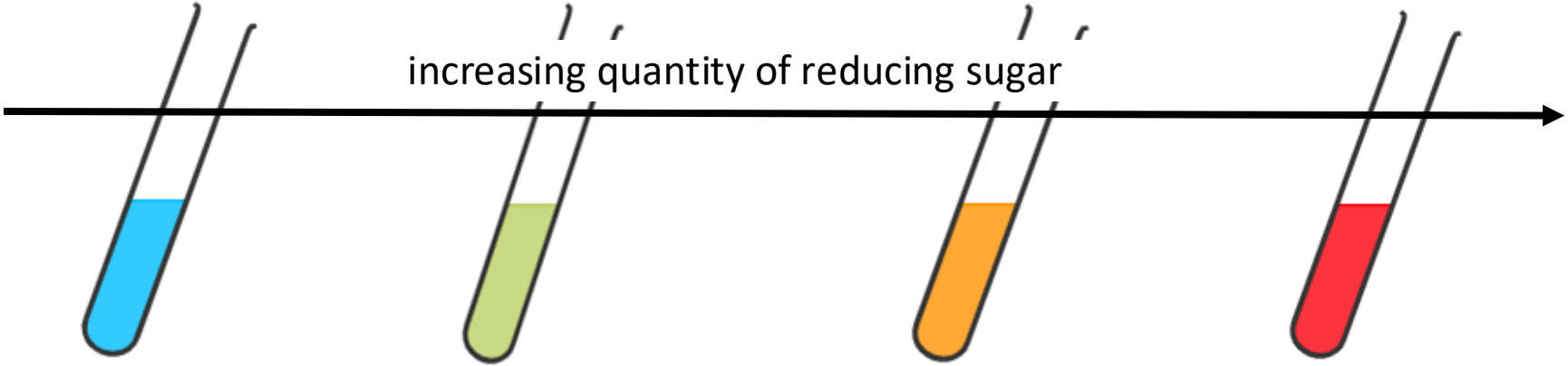


Testing for sugar

Explanation

Benedict's solution is blue.

If it…



stays blue = no reducing sugars

turns green/yellow = traces of reducing sugars

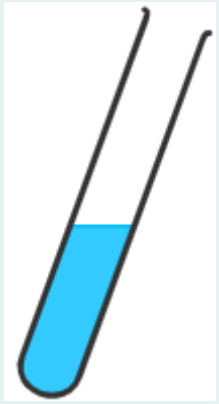
turns orange = moderate quantity of reducing sugars

turns brick red = large quantity of reducing sugars

Testing for sugar

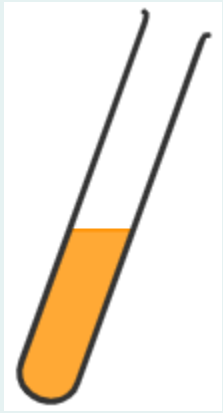
Check

Which colour does Benedict's solution turn if there is a large quantity of reducing sugar present?



blue

a



orange

b

brick red

c

Testing for sugar

Explanation

We are going to test three foods for the presence of reducing sugars.

glucose

apple

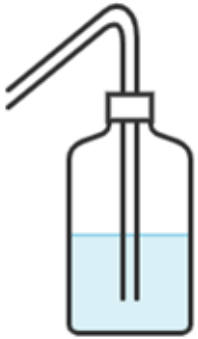
milk

Testing for sugar

Explanation

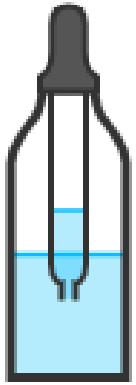
To test for reducing sugar, you will need:

pestle and mortar



distilled water

boiling tube



Benedict's solution

water bath

Caution: Benedict's solution is an irritant.
Wear safety goggles.

Testing for sugar

Explanation

Watch the video clip which shows the method for testing a food sample for the presence of sugar.

Watch ▶

Testing for sugar

Explanation

Method

To test for the presence of reducing sugars:

1. Grind the food into small pieces using a pestle and mortar.
2. Add a few drops of distilled water to the sample to create a suspension.
3. Transfer the suspension into a boiling tube.
4. Add an equal volume of Benedict's solution to the boiling tube.
5. Mix thoroughly, then place in a warm water bath (approx. $60^{O}C$) and leave for 5 minutes until the colour has matured.

Caution: Benedict's solution is an irritant.
Wear safety goggles.

Testing for sugar

Check

Which of the following steps is specific for testing reducing sugars with Benedict's solution?

a Grind food sample with pestle and mortar.

b Add water to create a suspension.

c Place boiling tube in a water bath and leave for 5 minutes. ✓

Task B Testing for sugar

Practice

1) Follow the method to test glucose, apple and milk for reducing sugar.

2) Write a conclusion: approximately how much reducing sugar does each food contain? How can you tell?

Task B Testing for sugar

Feedback

1) These images show the results you should have got.

glucose

apple

milk

2) Write a conclusion: approximately how much reducing sugar does each food contain? How can you tell?

You might have written:

- Glucose contains the most reducing sugar and turned brick red.
- Apple contains traces/moderate amount of reducing sugar because it turned green/orange.
- Milk contains no reducing sugar because Benedict's solution remained blue.

Lesson outline

Food tests: practical

- Testing for starch
- Testing for sugar
- Qualitative and quantitative measurements

Qualitative and quantitative measurements

Explanation

Both iodine and Benedict's solution give **qualitative** results.

Iodine solution

no starch starch

This means that they give an indication of the presence or absence of the molecule but cannot give a precise measure of quantity.

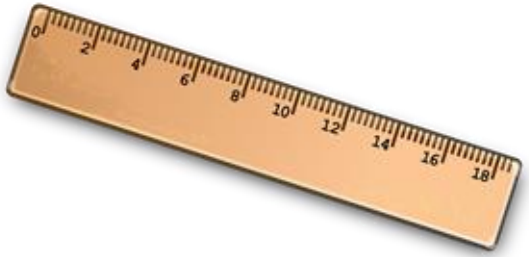
Benedict's solution

no sugar → lots of sugar

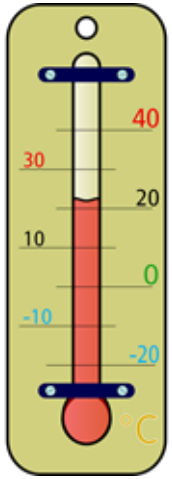
Qualitative and quantitative measurements

Explanation

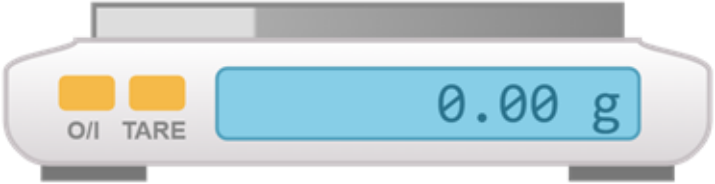
A **quantitative** test is one where exact numbers are given, for instance:



the distance travelled



the temperature change



the mass gained

Check

True or false?

Benedict's solution is a qualitative test.

T **True** ✓ F **False**

Justify your answer

a The results are numerical values.

b The results indicate an approximate range. ✓

Task C Qualitative and quantitative measurements

Practice

1) Complete the table to show the expected colour of Benedict's solution for the various food tests.

Food type	Quantity of reducing sugar	Expected colour of Benedict's solution
lucozade drink	high	
orange juice		orange
tea without milk	none	
tea with milk	trace	
pineapple juice		brick red
cranberry juice	moderate	

Qualitative and quantitative measurements

1) Complete the table to show the expected colour of Benedict's solution for the various food tests.

Food type	Quantity of reducing sugar	Expected colour of Benedict's solution
lucozade drink	high	brick red
orange juice	moderate	orange
tea without milk	none	blue
tea with milk	trace	green/yellow
pineapple juice	high	brick red
cranberry juice	moderate	orange

- The **reagent** iodine can be used to test for the presence of starch. It turns blue/black if starch is present.
- Benedict's solution can be used to test for the presence of sugars. It turns from blue to green/yellow, orange and brick red as the concentration of reducing sugars increases.
- These are examples of **qualitative** tests.