UNIVERSITY OF ABERDEEN

FoodLab

Rowett Institute of Nutrition and Health

Experiment Sheet

Sourcing Sugars

Did you know?

Glucose is our body's main source of energy.

Glucose is produced when carbohydrates in our food are digested

The pancreas reduces the levels of glucose in the bloodstream by releasing the hormone insulin.

Aim: To find out which foods and drinks contain glucose.

You'll need:

- *Small bottle containing Benedict's reagent (Caution, wear gloves when handling)*
- *Protective gloves*
- *Test tube rack*
- *Screw-top tubes*
- *A hot plate*
- *Droppers*
- *A large beaker*
- *Food and drink samples: such as:*
  - *water;*
  - *lemon juice;*
  - *Irn Bru;*
  - *Capri-sun;*
  - *lucosade;*
  - *diet coke;*
  - *10% glucose solution;*
  - *orange squash;*
  - *10% sucrose solution*

What to do:

Put on your lab coat/ protective clothing and safety spectacles.
Make sure your hair is tied back.

1) Label each of the test tubes with one of the sample liquids you are going to test.
2) Place approximately 1 ml of each of the test liquids into a separate test tube, using a new dropper each time, and place into the test tube rack.
3) Note the colour of the samples in the table provided.
4) Add 1 ml of the Benedict's solution to each of the test tubes and record the colour in each of the test tubes now.
5) Place all of the test tubes into a large beaker which contains hot water, and place onto the hotplate for 5 minutes.
6) After 5 minutes, carefully remove the test tubes and place them back into the test tube rack.
7) Note the colour change that has occurred in each of the test tubes.

Results:

Test Tube number	Sample	Colour before Benedict's	Colour after Benedict's solution added	Colour after heating for 5 minutes
1				
2				
3				
4				
5				
6				
7				
8				
9				

Conclusion:

Why did some tubes stay the same and some change colour after you took the test tubes out of the water bath?

_____

_____

_____

What colour would you expect the following to turn?

a) Strawberries _____

b) Spinach _____

c) Chocolate _____

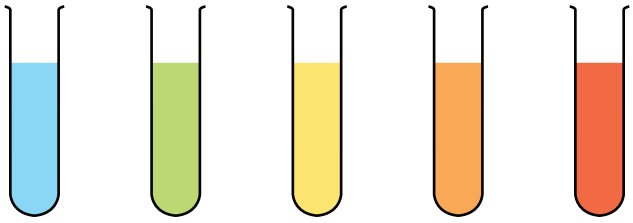
Exploring the science:

Benedict's reagent is a **chemical compound** made up of copper (II) sulphate, sodium carbonate and sodium citrate which can detect the presence of **glucose** or fructose.

All **monosaccharides** and most **disaccharides** (with the exception of sucrose) reduce copper (II) sulphate producing a precipitate of copper (I) oxide on heating; for this reason they are classed as **reducing sugars**.

The original pale blue colour of the Benedict's solution demonstrates that no reducing sugars are present; if a substance treated with Benedict's reagent turns green/yellow it means that there is very little or possibly no glucose or fructose present.

If reducing sugars are present a brick red colour forms in addition to a copper precipitate at the bottom of the test tube. The amount to which a precipitate is present can show the exact glucose or fructose present in the sample.



The human body ideally wants blood glucose (blood sugar) levels to be maintained in a very narrow range in order to promote a healthy metabolism; two hormones, insulin and glucagon, have the important job of maintaining this balance. Both insulin and glucagon are secreted from the pancreas, and are therefore referred to as pancreatic endocrine hormones.

- Insulin is secreted when levels of glucose in the blood are too high
- Glucagon is secreted when levels of glucose in the blood are too low

In the past, the Benedict's test was carried out using a sample of an individual's urine in order to assess whether the individual suffered from diabetes or not. High levels of glucose present in the blood stream over a sustained period of time may end up damaging the blood vessels.