# Detecting saccharides & proteins in foods

## Background

Proteins are essential molecules of all organisms. Their main body consists of a peptide chain made up of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ bonded together by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

carboxyl

amine

amino acids

peptide bonds

Amino acids are organic acids with at least one \_\_\_\_\_\_\_\_\_\_\_\_ group and \_\_\_\_\_\_\_\_\_\_\_\_\_ group.

monosaccharide units

Saccharide molecules are made up of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_and are present in all organisms. Water-soluble monosaccharides and oligosaccharides have sweet taste and are called \_\_\_\_\_\_\_\_\_\_\_\_.

sugars

Hemiacetal

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ bond can be generated between the carbonyl carbon and the hydroxyl group on the 4th or 5th carbon atom in aqueous environment.

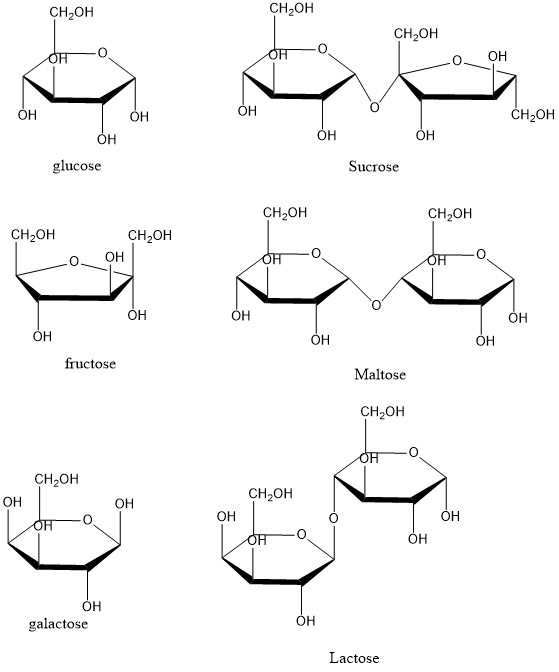
Biuret

\_\_\_\_\_\_\_\_\_\_\_ test is used to detect proteins. If the test is positive, the sample colour is changed to purple. The colour change arises due to complexes being formed between \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_.

copper ions

free

peptide bonds

Saccharides can be oxidised by copper or silver ions if they have a \_\_\_\_\_\_ hemiacetal hydroxyls.

Circle free hemiacetal hydroxyls:

The ions undergo reduction during the reaction and so we call these types of saccharides reducing. Examples of reducing sugars include\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(name at least 3). To determine if samples contain reducing sugars, it is necessary to heat the samples in Fehling’ solution over a flame. If they change their colour to \_\_\_\_\_\_\_\_\_\_\_\_\_\_ or \_\_\_\_\_\_\_\_\_\_\_\_ the test is positive. The colour change arises from copper ions being reduced:

orange

red

maltose, lactose, all monosaccharides

2+

1+

**Cu → Cu**

## The experiment

Firstly prepare your samples. If you are working with liquid samples (e.g. some drinks), you can pour those into beakers straight away (don’t forget to mark your beakers!). If you are working with solid samples (e.g. sausage) use blender, add distilled water and filter through strainer before pouring it into beakers.

Add a bit of your samples into test tubes (about 2 cm). Add 2 ml Fehling’s B and then 2 ml Fehling’s A to your samples in test tubes and shake them carefully. Make also a blank test – add both Fehling’s into a test tube containing only distilled water. You can use the blank test for comparing colours. Write down your findings into the required section of the worksheet.

One by one, heat the test tubes over a burner. Be careful as overheating could lead to the sample spraying out of the test tube. **Make sure you point the test tube away from yourself and anyone around you!** Fill in the required section in the worksheet.

*Heating a sample*

## Results

Fill in the table with your findings.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Sample NO.** | **Food** | **Protein** | | **Saccharide (reducing sugar)** | |
| **✓/X** | **Colour** | **✓/X** | **Colour** |
| 1 |  |  |  |  |  |
| 2 |  |  |  |  |  |
| 3 |  |  |  |  |  |
| 4 |  |  |  |  |  |
| 5 |  |  |  |  |  |
| 6 |  |  |  |  |  |
| 7 |  |  |  |  |  |
| 8 |  |  |  |  |  |

**Conclusions**

Sum up your findings in a few sentences.