## ****Food test 1 - Starch test****

The brown **Iodine** solution reacts with **starch** and changes it to a **blue-black**color. This test helps you to find out if a food contains starch.

**Process**

* add **Iodine**solution to a solution or directly onto materials such as bread, potato, crackers...
* a **BLUE-BLACK COLOR** is a positive result: **starch** is present



**Explanation**

Starch can be separated into two fractions- **amylose and amylopectin**.



Amylose in starch is responsible for the formation of a **deep blue color** in the presence of **iodine**. The iodine molecule slips inside of the amylose coil to give a special color.

## ****Food test 2 - Benedict's test for Reducing Sugars****

All simple sugars (e.g.glucose) are **reducing sugars**. They will react with a **blue**liquid called **Benedict's solution**to give a **brick red**color. We can use this reaction to find out if a food or other substance contains a reducing sugar.

**Process**

* add a few drops of **Benedict's solution**
* **heat** the mixture for 2-3 minutes in boiling water bath
* a **BRICK RED/ORANGE COLOR** is a positive result: **glucose** is present
* The closer the color is to brick red, the more reducing sugar is present.



**Explanation**

* Reducing Sugars are sugars that contain **aldehyde** groups, that are oxidised to **carboxylic acids**(R-COOH).
* They are classified as reducing sugars since they **reduce** the **blue** **Cu2+**(copper II ions) to to **Cu+** (copper I ions). These are precipitated in form of **red Cu2O** (copper oxide), insoluble in water.

## ****Food test 3 - Emulsion (ethanol) test for Fats****

This test is done to show the presence of **lipids** in a substance. The substance is first dissolved in **ethanol**. This solution is then dissolved in **water**. If lipids are present in the mixture, it will precipitates and forms an **emulsion**.

**Process**

* Add the food sample to 2 cm3 of **ethanol**, shake well.
* Allow to settle in a test tube rack for 2 minutes for food to dissolve in ethanol.
* Empty any clear liquid into a test tube containing 2 cm3 of distilled **H2O**.
* A **MILKY-WHITE EMULSION** is a positive result: **lipid** is present.
* If the mixture remains clear, there are no fats present in the sample

**Explanation**

* **Lipids** are insoluble in water and **soluble**in **ethanol** (an alcohol).
* After lipids have been dissolved in ethanol and then added to **H2O,** they will form tiny dispersed **droplets** in the water. This is called an **emulsion**.
* These droplets scatter light as it passes through the water so it appears white and **cloudy**.

**Illustration**



## ****Food test 4 - Biuret test for Proteins****

The Biuret Test is done to show the presence of **peptide bonds**, which are the basis for the formation of **proteins**. These bonds will make the **blue** Biuret reagent turn **purple**.
**Process**

* add an equal amount of **NaOH**to a solution of the food, mix carefully.
* add a few drops of 1% **CuSO4,** do not shake the mixture.
* a **PURPLE/MAUVE COLOR** is a positive result: **protein** is present.

**Explanation**

* The reagent used in the Biuret Test is a solution of copper sulfate (**CuSO4**) and sodium hydroxide (**NaOH**).
* The NaOH is there to raise the **pH** of the solution to **alkaline** levels; the crucial component is the **copper II**ion (**Cu2+**) from the CuSO4.
* When **peptide bonds** are present in this **alkaline** solution, the **Cu2+**ions will form a coordination **complex** with 4 **nitrogen**atoms from peptide bonds.



* The complex of **Cu2+** ions and nitrogen atoms make the color of CuSO4 solution changes from **blue** to **violet**.
* This color change is dependent on the **number** of **peptide bonds** in the solution, so the more protein, the more intense the change.

