

Types of organic compounds & where they are

Background Information

Chemical indicators are used to determine the presence of specific substances. For example, two indicators, Benedict's Solution and Iodine Solution, are used to determine what types of carbohydrates are present in food. Sudan III Solution is used to determine if lipids are present in food. Biuret Solution is used to determine if proteins are present in food. Foods are rarely composed of just one type of organic compound though; so multiple tests can be done on foods to determine what organic molecules are present. Starch is a polysaccharide, which is a carbohydrate with many sugar units. A monosaccharide is a carbohydrate with one sugar unit. Lipids are large molecules, but they are not polymers. Proteins are polymers composed of amino acid monomers.

Research Question

When multiple indicator tests are done on three unknown foods, what organic molecules are present in each unknown food?

Results

(a) Data Collection & Presentation

“The type of organic compounds in some foods”

Starch Test (Iodine Solution):

Type of Food	Color
Known – Potato	Black
Unknown 1 – Tofu	No Change; White
Unknown 2 – Egg Solution	No Change; Yellow
Unknown 3 – Milk	No Change; White

Monosaccharide Test (Benedict's Solution):

Type of Food	Color
Known – Glucose Solution	Dark Orange
Unknown 1 – Tofu	Grey/Light Blue
Unknown 2 – Egg Solution	Grey/Light Purple
Unknown 3 – Milk	Dark Yellow/Brown

Lipid Test (Sudan III solution):

Type of Food	Observations/Color
Known – Vegetable Oil	Thin, transparent, orange upper layer Thick, transparent, light-pink lower layer

Unknown 1 – Tofu	Thin, transparent, orange upper layer Thick, transparent, light-pink lower layer
Unknown 2 – Egg Solution	No separation; light-orange
Unknown 3 – Milk	No separation; light-pink

Protein Test (Biuret Solution):

Type of Food	Color
Known – Egg White Solution	Purple
Unknown 1 – Tofu	Pink/Purple
Unknown 2 – Egg Solution	Light-Purple
Unknown 3 – Milk	Yellow

(b) Data Processing & Presentation

“The type of organic compound present in each unknown food”				
Type of Food	Starch	Monosaccharide	Lipid	Protein
Tofu	No	No	Yes	Yes
Egg Solution	No	No	No	Yes
Milk	No	Yes	No	No

Conclusion

There was no hypothesis. There were no changes in the question or hypothesis sections.

The potato, a known food with starch, turns black after the use of iodine solution.

According to the processed data, tofu does not contain starch because it remains the same color after the use of iodine solution. Egg solution does not contain starch because it remains the same color after the use of iodine solution. Milk does not contain starch because it remains the same color after the use of iodine solution. A source of error is that tofu contains starch.

Glucose solution, a known food with monosaccharides, turns dark orange after using Benedict’s solution. According to the processed data, milk contains monosaccharides because it turns dark yellow/brown after using Benedict’s solution. Tofu does not contain monosaccharides because it remains the same color after using Benedict’s solution. Egg solution does not contain monosaccharides because it remains the same color after using Benedict’s solution. The limitation is that there is some doubt as to whether milk actually contains monosaccharides or not. Egg solution should contain monosaccharides.

Vegetable oil, a known food with lipids, has a thin, transparent, orange color upper layer and a thick, transparent, light-pink color lower layer after using Sudan III solution. According to the processed data, tofu contains lipids because it changes color and form after using Sudan III solution. It has a thin, transparent, orange color upper layer and a thick, transparent, light-pink color lower layer. Egg solution does not contain lipids because it does not separate into layers after using Sudan III solution. Milk does not contain lipids because it does not separate into layers after using Sudan III solution. A source of error is that milk contains lipids.

Egg white solution, a known food with proteins, turns purple after using biuret solution. According to the processed data, tofu contains proteins because it turns pink/purple after using biuret solution. Egg solution contains proteins because it turns light-purple after using biuret

solution. Milk does not contain proteins because it turns yellow after using biuret solution. A source of error is that milk contains proteins.

Evaluation

The procedure was successful with the fact that the same three unknown foods were tested throughout the lab. Consistency with using the same foods will make the results much easier to analyze. The procedure's weaknesses and limitations are that the test tubes may not have been cleaned out properly between food testing. Also, only one trial was conducted per food for each test.

Modifications to the design of the procedure are cleaning out the test tubes thoroughly each time to avoid the chance of cross contamination and skewing the results. At least three trials should perform per food for each test to achieve a greater validity in the results.