**The Organic Molecule Challenge**

Purpose:

You and your teammates are to choose four different foods that contain four different organic molecules. Teams will be using indicator compounds that react positively by changing color in the presence of specific organic molecules. The required organic molecules and their indicators are listed in the table below:

|  |  |
| --- | --- |
| **Organic Molecule** | **Indicator** |
| Monosaccharides (simple sugars) | Benidict’s solution |
| Polysaccharides (complex sugars/starch) | Iodine |
| Proteins | Buret’s |
| Lipids (fats and oils) | Brown paper translucency |

Requirements:

In order to successfully complete the challenge teams must adhere to the following rules:

1. Your team can only use four simple food items and not four complex meals. For example, using Grandma’s spaghetti with red peppers, onions, noodles, and tomato sauce would not be acceptable as a food item. However, red peppers, noodles, tomatoes, and onions could be used as four food items.
2. Teams cannot use the food items that were used in the demonstrations during lecture
3. Teams must obtain their food items and bring to class prior to the organic molecule challenge day.
4. Processed foods are acceptable (ie Dorritos), but processed meals are NOT ( ie a frozen pizza; see rule 1 above)
5. Teams can only test their food items on challenge day. In other words, if your team gets a negative result you may retest that food item again on that day, but you cannot change food items after negative results on challenge day.
6. Drinks, beverages, and juices are acceptable food items.

Grading

The number of positive tests using the indicators determines the team’s grade. Every member of the team will receive the same grade so choose teams carefully and inform the teacher of any problems prior to the challenge day. The grading scale is indicated in the table below:

|  |  |
| --- | --- |
| **Number of positive tests** | **Grade (%)** |
| 4 | 100 |
| 3 | 90 |
| 2 | 80 |
| 1 | 75 |
| 0 | 70 |

Evaluation:

* Teams will use camera’s/smart phones to document the results of their investigations.
* Teams will take those images and place them into computer generated data tables that will be submitted physically (printed out) for grading. (See below for format.)
* One data table per group is preferred.

Hints

1. A single food item may test positive for multiple organic molecules. The goal is to have four positive tests, NOT four positive foods.
2. Avoid ingredient food items as they will limit the number of positive tests. For example, picking table salt as your food item
3. Color change is how we will identify the presence of organic molecules; think about the color of the food and the ease of observing a color change.
4. Use lecture and the demonstrations as a guide to the protocol as well as choosing correct food items.

|  |  |  |  |
| --- | --- | --- | --- |
| **Test (organic molecule)** | **Images w/labels of food items** | **Results (+/-)** | |
| Monosaccharides |  | Food 1 | + |
| Food 2 | - |
|  |  |  | |

Procedure:

Safety: Put on safety goggles. Handle glassware carefully. Never touch hot glass with your bare hands. Laboratory chemicals can stain clothing and skin please be careful, you may use a laboratory apron if you would like.

Procedures:

Lipid Test: Brown paper towel

1) Place 2 ml (fill the bottom of the test tube) with the appropriate food substance.

2) Get a brown paper towel and make a grid with 4 squares. In each square write down the food substance.

3) In each section rub a small amount of the appropriate food into the square. Try not to allow the food substances to run out of their square. Set aside and let dry for 10-15 minutes.

Protein Test : Biuret

1) Place 2 ml (fill the bottom of the test tube) with the appropriate food substance.

2) Add 5 drops of Biuret solution into each test tube.

3) Observe and record

4) Clean out the test tube

Monosaccharide Test: Benedicts First boil beaker with water.

1) Place 2 ml (fill the bottom of the test tube) with the appropriate food substance.

2) Add 5 drops of Benedict's solution. Place the tube in a beaker of boiling water and boil for five minutes. Use test tube clamps to hold hot test tubes.

3) Observe change and record in Data Table

Starch (Polysaccharides) Test: Iodine

1) Place 2 ml (fill the bottom of the test tube) with the appropriate food substance.

2) Add 3 drops of Lugol's iodine solution.

3) Observe any change and record in Data Table