Sweeteners

Determining how we perceive different sweeteners

Introduction

The United States is the world's largest consumer of sugar and sweeteners. Not only do many foods contain sweeteners, but, many individuals add additional sweeteners to their foods. Americans have become accustomed to presweetened foods as many manufacturers add excess sugars, high fructose corn syrup, and artificial sweeteners to processed foods. This overuse of sugars results in consuming excess calories, beyond daily needs, and can lead to obesity.

Individuals have personal preferences for sweeteners. In this activity, we will look at some of the most common sweeteners and determine which tastes most like sugar and if there are any off-tastes or after-tastes.

Common Sugars and Sugar Substitutes

The sweetnesses are in comparison to sucrose which is assigned a sweetness of 100

Name	Trade name	Sweetness	Food energy (calories/g)	Notes
Aspartame	NutraSweet, Equal	160–200		
Erythritol		0.7	0.2	Sugar alcohol
Fructose		175	11	
Glucose		60-70	4	
Glycerol		0.6	4.3	
Hydrogenated starch hydrolysates		0.4–0.9	0.5×–1.2	
Maltitol		0.9	2.1	Sugar alcohol
Mannitol		0.5	1.6	Sugar alcohol
Saccharin	Sweet'N Low	300		
sodium cyclamate		30		
Sorbitol		0.6	2.6	Sugar alcohol
Stevia	Truvia PureVia	250		
Sucralose	Splenda	600		
Sucrose		100	16	
Xylitol		1.0	2.4	Sugar alcohol

Materials Needed

Chemicals Needed:

Individual packets of:
Sucrose (cane sugar), $C_{12}H_{22}O_{11}$
Fructose (fruit sugar), $C_6H_{12}O_6$
Saccharin (Sweet'N Low), $C_7H_5NO_3S$
Aspartame (NutraSweet), $C_{14}H_{18}N_2O_5$
Splenda (sucralose), $C_{12}H_{19}Cl_3O_8$
Stevia
Agave nectar

Materials Needed:

Paper plates

Safety

Safety glasses or goggles must be worn at all times in the laboratory.

All materials used in this experiment must be reserved for food use only and cannot be used for any other purpose. These materials must be cleaned in an area that is free from any possible contamination from laboratory chemicals. After the experiment, materials must be stored in an area that is free from laboratory chemical contamination.

If this experiment is performed in a chemistry laboratory, all work surfaces must be cleaned and free from laboratory chemicals. After cleaning the work surfaces, it is advised to cover all work areas with aluminum foil or a food-grade paper covering.

If this experiment is performed as a classroom activity, all work surfaces must be cleaned and free from any contamination. After cleaning, it is advised to cover all work areas with aluminum foil or a food-grade paper covering.

There are no safety hazards associated with the materials used in this experiment.

Disposal

All waste materials can be disposed in the trash or poured down the drain with running water.

Procedure

Wash all work surfaces with soapy water and dry them using clean paper towels before starting this experiment.

Cover the work area with aluminum foil or clean food-grade paper.

Obtain a paper plate. Write the names of each of the sweeteners listed in the Materials Section on the paper plate.

Obtain individual packets of each of the sweeteners. If an individual packet is not available, then obtain a teaspoon of the sweetener.

Taste a small amount of each of the sweeteners.

How do the tastes of these sugars compare?

Sweeteners

Data

	Color and appearance	Taste
Sucrose		
Fructose		
Saccharin (Sweet'N Low)		
Aspartame (NutraSweet)		
Splenda (sucralose)		
Stevia		
Agave nectar		

Questions

1. Which sweetener is the sweetest? Explain.

2. Does any of the sweeteners have an aftertaste? Explain.

3. What is your preference for a sweetener?

4. Some sweeteners are recommended for baking. Which ones? Can you find any information on changes that have to be made to a recipe when using an sweetener other than sugar?