Sweeteners

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Sweeteners

- Are substances that impart a sweet taste.

- Except for water and non-sweetened teas and coffees, most popular beverages contain some type of nutritive sweetener, non-nutritive sweetener, or a combination of both.
  - carbonated soft drinks
  - juices
  - juice drinks
  - coffee drinks
  - sweet teas and
  - sports drinks

Sweeteners

- Nutritive sweeteners
  - Substances that imparts a sweet taste and provide calories (energy),
- Non-nutritive sweeteners
  - Any substance that imparts a sweet taste, is not catabolized by the human body, and therefore does not provide calories (energy)

Non-nutritive Sweeteners

- Also sometimes called low-calorie or intense sweeteners because their sweetness is so potent – more than 600 times the sweetness of sucrose,

- This is why sweeteners, such as aspartame and saccharin can taste sweet but contain virtually no calories.

Nutritive Sweeteners

- Sucrose
- D-fructose
- D-glucose (dextrose)
- Syrups (corn syrups, HFCS, maple syrup)
- Honey
- Sugar alcohols
- Maltodextrins,

HFCS

- High-Fructose Corn Syrup
- Derived from corn. It's found in many carbonated soft drinks, juice drinks and sport drinks, as well as other snacks, syrups, jellies and other sweetened products,
- Contain about 4 calories/gram, or 16 calories/teaspoon.

'Corn sugar' is false advertising, FDA warns

- Industry attempts image makeover after scientists linked product to health problems, some scientists linked the product to obesity, diabetes and other health problems

- The FDA has cautioned the corn industry over its ongoing use of the term "corn sugar" to describe high fructose corn syrup, asking them to stop using the proposed new name before it has received regulatory approval.

(http://www.msnbc.msn.com/id/44543271/ns/business-retail/t/corn-sugar-false-advertising-fda-warns/)

Table Sugar

- Table sugar contains equal amounts of the two simple sugars (50% fructose + 50% glucose)
- HFCS predominantly used in beverages contains slightly more fructose (55% fructose + 45% glucose),
- Nutritionally speaking, it's also important to note that HFCS and table sugar contain the same number of calories – 4 calories per gram or 16 calories per teaspoon.

Calorically-Sweetened Beverages

- Calorically-sweetened beverages with high energy density and very small amounts of other nutrients. These include carbonated (fizzy) and non-carbonated drinks.

- Consuming calorically-sweetened soft drinks and ‘juice drinks’ should be sparingly. Caloric sweeteners have been linked to dental problems, increased energy intake, weight gain (obesity), and type 2 Diabetes.

Fig. 16.1 The relative time-dependent sweetness responses of sucrose, D-fructose, and D-glucose

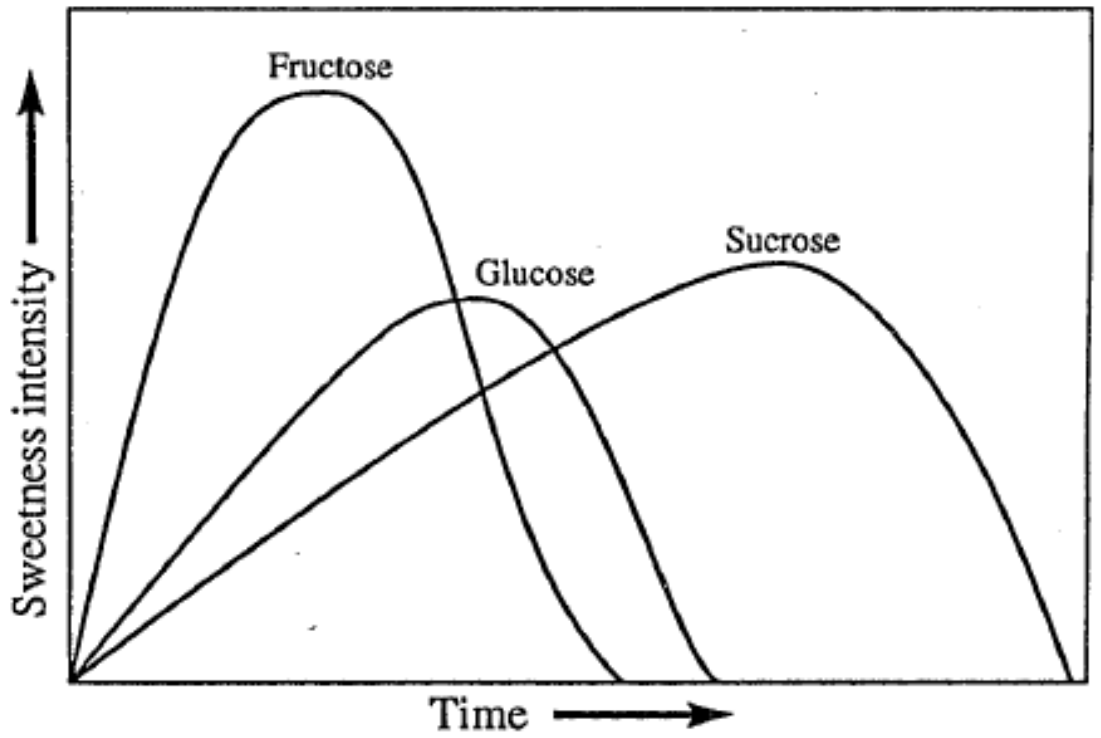


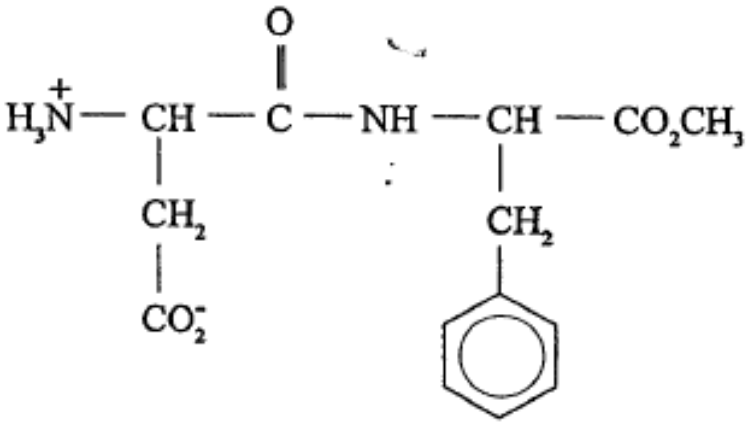
Fig. 16.1. The relative time-dependent sweetness responses of sucrose, D-fructose, and D-glucose

1. Non-nutritive Sweeteners

- Aspartame
- Saccharin
- Stevia

Aspartame

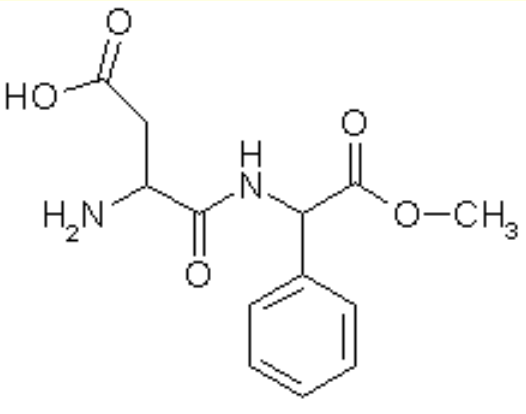
- A low-calorie dipeptide ester made primarily of two amino acids, aspartic acid and phenylalanine



Aspartame

Aspartame

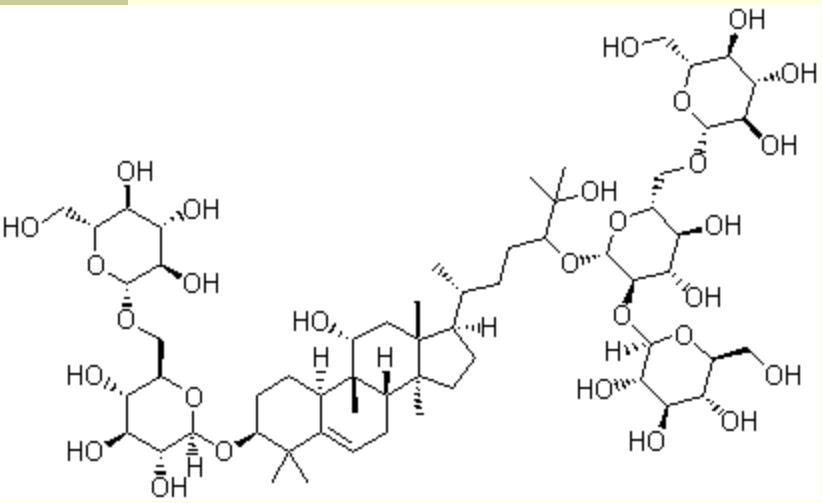
- 200 g of sucrose can be replaced by 1 g of aspartame, it effectively functions as a nonnutritive sweetener.



(www.chm.bris.ac.uk/.../Ludlow/Introduction.htm)

STEVIA

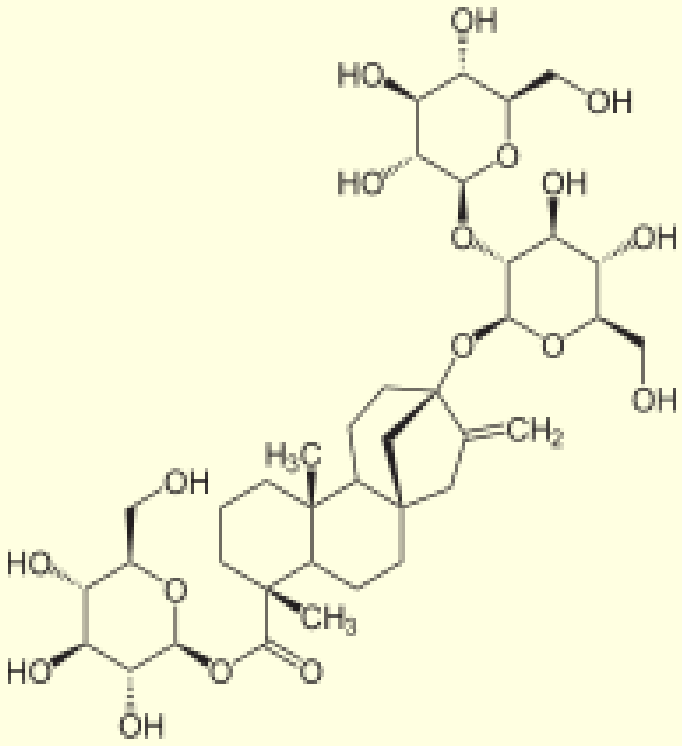
Monk fruit



- Fruit-Sweetness™ is a 100% natural powdered concentrate made from monk fruit. Fruit-Sweetness™ is approximately 150 times sweeter than sugar, and is a unique alternative to sugar and artificial sweeteners. BioVittoria concentrates the sweetest part of the monk fruit to make an ingredient that delivers great-tasting, 100% natural, calorie-free sweetness from pure fruit.
- The unique sweetness of monk fruit concentrate comes from naturally occuring sweet constituents in the fruit called mogrosides. In pure form, mogrosides are up to 300 times sweeter than sugar.

Stevioside

- The one of the predominant glycosides responsible for bulk of the sweetness in the stevia plant is Stevioside.
- Comprises 5-10% of plant tissue by weight
- 250-300 times sweeter than sucrose.



Usage of Stevia

- Used by early tribes in South and Central America
- Since 1970, Japan has been using Stevia glycocides as an alternative to other suspected carcinogenic sweeteners. (Aspartame and Saccharin)
- Japan uses more Stevia based sweeteners than any other country.

Stevia Research

- Early studies were conducted to determine if Stevia would be safe for special populations, such as Diabetes Type II
- Other studies determined that renal and male reproductive problems were caused by Stevia
- In May 2008, Cargill reproduced some of the studies to prove their inconsistency
- They succeeded and submitted a GRAS exemption claim which led to being approved as GRAS.

Cargill

- Cargill performed many studies to determine the stability and adaptability to various food matrices
- Photostability Testing was also conducted,
- Results: Stevia was considered heat stable in many food and beverage applications with minimal degradation products, and not effected by light.

Stevia Benefits

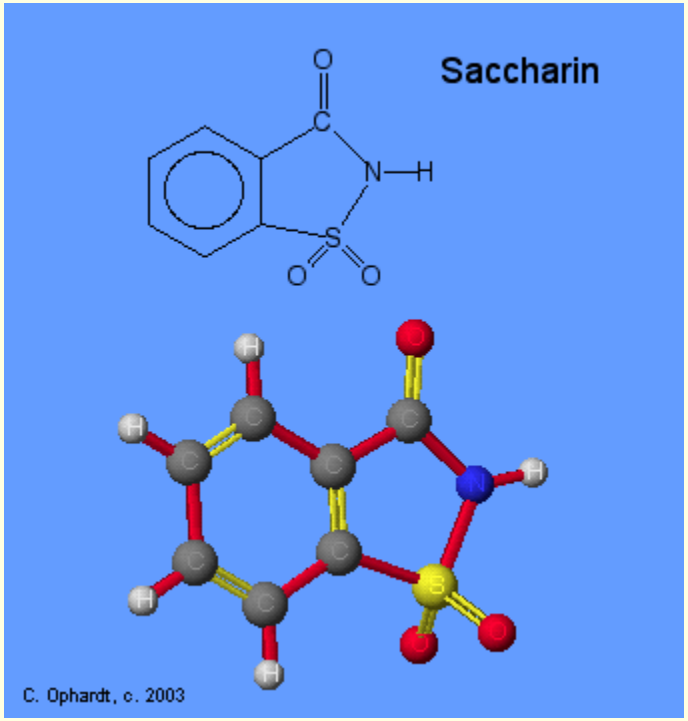
- 100% Natural and can be labeled as such
- Heat Stable to 200^{o}C
- Will not effect blood sugar levels
- Plaque retardant, anti-caries (prevents Cavities).

Stevia and the Market

- In a survey conducted in early 2010 predicts Stevia will capture over 50% of Aspartame and Sucralose's Market Share
- Largest concern is the flavor profile (bitter aftertaste, bulking agent adjustments),
- Stevia sales have reached 500 million dollars since regulatory approval, and could reach more than 10 billion in the next 5 years.

SACCHARIN

Discovery



- Discovered 1879 by Constantine Fahlberg
- It was a lab accident
- Fahlberg was working with the coal tar derivative benzoic sulfimide when he noticed a sweet taste on his hand.
- Traced it back to the chemical later named saccharin

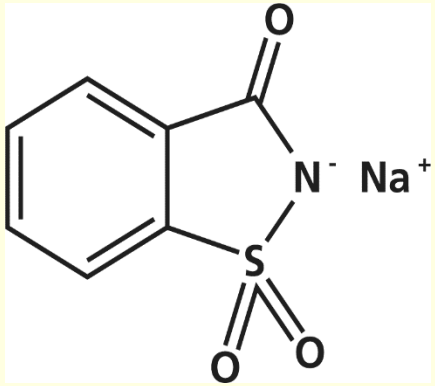
History

- Fahlberg was a lab student of Ira Remsen at John Hopkins University.
- They were working with coal tar derivatives when they both discovered the sweet chemical from *unsanitary conditions*.
- Remsen and Fahlberg jointly published their discovery in 1880.
- 1884 Fahlberg went on to patent and mass-produce saccharin without ever mentioning Remsen.

- It was not until sugar shortages during WWI that saccharin use became widespread.

Composition

- Odorless white crystals or crystalline powder
- Saccharin is acidic and not water soluble
  - When combined with sodium or calcium (as a salt) it becomes very soluble



Production

- The original route of Saccharin began yielding in small quantities
- Improved synthesis was developed at a Chemical Company in Toledo, Ohio, USA.

Taste

- 300 to 500 times as sweet tasting as sugar
- Has an unpleasant bitter or metallic aftertaste
- The bitterness you taste is caused by pronounced sweetness
- This is what people who drink regular soda complain about after drinking a diet soda.

Bans

- Research showed that it caused bladder cancer in rats
- In 1977 it was proposed to be banned in the U.S.
- In the same year, it was banned in Canada and still is today
- In the U.S. congress required a warning label stating that it may be carcinogenic
- As of 2000 no longer have warning label

Consumption

Benefits

- Saccharin goes directly through the digestive system without being digested.
  - it does not affect blood insulin levels
  - no calorie intake

Problems

- Bulk replacement
- Bitter aftertaste
- Causing Allergic reaction

Advantages

- Stable when heated
  - Even in presence of acid
- Does not react chemically with other food ingredients
- Stores well
- A fraction of the cost of sugar and high fructose corn syrup
- Good marketability with diabetics and rising obesity.

Soft drinks

- The first sugar free soft drink in 1953 was a ginger ale called No-Cal
  - Despite the name it was marketed towards diabetics
- In 1963 Coca Cola produced a sugar free soda called TaB
  - Afraid to put company name on it
  - Sweetened with saccharin

Packaging

- One packet of sweetener contains
  - Nutritive dextrose
  - Soluble saccharin
  - Cream of tartar
  - Calcium silicate
  - Fewer than four calories
- These things are added to give preferred flavor, to add bulk, and prevent caking
- In packaging. Only a couple granules inside the packet are actually saccharin

Conclusion

- Reasonably safe
- Diabetic friendly
- Easily substituted in recipes
- Cheap
- Readily available


Thank you
Do not stop running
toward your dream!