

Low Calorie/Non-Nutritive Sweeteners as Sugar Substitutes



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- Foods and beverages that are sweet offer pleasurable addition to our daily meals or snacks
 - ❖ many of us are guilty of indulging in sweet foods and beverages
- Hence, many of us simply do not realise just how much hidden sugar we are consuming daily
- Sugar contributes additional calories and no nutrients to our diet
 - ❖ excessive sugar intake attributed to be one of the major contributors to the increase of obesity worldwide
 - ❖ especially sugar-sweetened beverages in some communities
- Rising trend of obesity leads to increase in diet-related health problems such as diabetes, coronary heart disease and cancers
- Over consumption of sugar also causes dental caries

Sugary foods and beverages – hidden sugars



- Realising this, many dietary guidelines in Asia have recommend the consumer to reduce intake of sugar from the diet
 - ❖ The World Health Organisation has recommended that free sugars intake should be <10% of total energy intake
- In order to maintain a palatable sweet taste, minus the calories, food manufacturers have developed a range of foods and beverages with sugar substitutes, to produce a variety of “sugar-free” or “diet” products
- The more health conscious individuals are opting for such foods and beverages as they contain less or no total sugars and therefore of lower calorie
- This presentation discusses how low-calorie or non nutritive sweeteners can be helpful for those who need the sweet taste without the calories

This presentation

- Provides an introduction to terminologies
- Outlines various types and classification of sugar substitutes
- Summarises their uses in a range of foods and beverages
- Summarises overall benefits of using low calorie or non-nutritive sweeteners
- Addresses consumer concerns regarding safety of these sugar substitutes
- Concluding thoughts – appropriate use of sweeteners

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Introduction to sugar substitutes

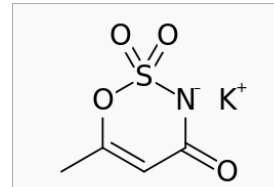
- Sugar substitutes are any sweetener that are **used instead of regular table sugar** (sucrose)
 - ❖ some have little or no calories
- Many types of sugar substitutes have been used
- Known by various names such as
 - ❖ “**low or non-caloric sweeteners**” - LNCS
 - ❖ “**non-nutritive sweeteners**” - NNS
 - ❖ “artificial sweeteners” or
 - ❖ “sweeteners”
- Need to understand use of terminology
 - ❖ terminology open to interpretation
 - ❖ various terms/groupings used

- Artificial sweeteners are **synthetic sugar substitutes** but may be derived from naturally occurring substances, including herbs or sugar itself
- Artificial sweeteners are **also known as intense sweeteners** because they are many times sweeter than regular sugar
 - ❖ ace-K and aspartame are 200 times sweeter than sugar
 - ❖ hence only small amounts are required to bring about the desired sweetness
- They therefore **contribute very little or almost no calories** to the diet
- Low calorie or non-nutritive sweeteners may be used to **maintain sweetness in food and beverages without the calories**

- They have a **long history of safe use** in a variety of foods and beverages
 - ❖ some of the most studied and reviewed food ingredients in the world today
 - ❖ **passed rigorous safety assessments**
- Regulatory agencies in many countries have evaluated the safety and **approved the use of various artificial sweeteners or low-calorie or non-nutritive sweeteners**
- Also approved by Ministry of Health Malaysia
 - ❖ Food Regulations Malaysia 1985, **Regulation 118A, 132A, 133, 134**
- <http://fsq.moh.gov.my/v4/index.php/perundangan2/food-regulations-1985>

- **Artificial sweeteners/non-nutritive sweeteners approved for use in Malaysia**
 - ❖ acesulfame potassium (ace-K)
 - ❖ Aspartame
 - ❖ neotame
 - ❖ saccharin
 - ❖ stevia
- **Sugar alcohols, eg**
 - ❖ glycerol, isomalt, maltitol, mannitol, sorbitol, sucralose, erythritol, xylitol
- **Malaysian Food Regulations has proposed an amendment to group sweeteners under “food additives”**
 - ❖ to harmonise with General Standard for Food Additives (GSFA)

Acesulfame potassium

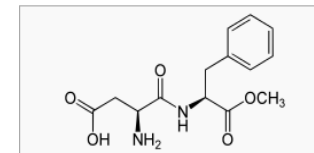


Names

IUPAC name

potassium 6-methyl-2,2-dioxo-2H-1,2λ⁶,3-oxathiazin-4-olate

Aspartame



Names

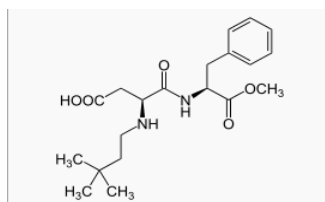
IUPAC name

Methyl L-α-aspartyl-L-phenylalaninate

Other names

N-(L-α-Aspartyl)-L-phenylalanine, 1-methyl ester

Neotame



Names

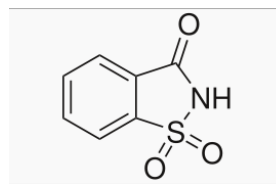
IUPAC name

(3S)-3-(3,3-Dimethylbutylamino)-4-[[[(2S)-1-methoxy-1-oxo-3-phenylpropan-2-yl]amino]-4-oxobutanoic acid

Other names

E961; N-(N-(3,3-Dimethylbutyl)-L-α-aspartyl)-L-phenylalanine 1-methyl ester

Saccharin



Names

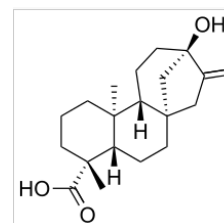
IUPAC name

2H-1λ⁶,2-benzothiazol-1,1,3-trione

Other names

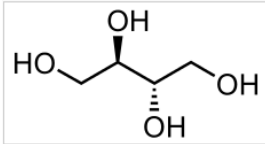
Benzoic sulfimide

Stevia



Stevia is a sweetener and sugar substitute extracted from the leaves of the plant species *Stevia rebaudiana*. The active compounds of stevia are steviol glycoside which have up to 150 times the sweetness of sugar.

Sugar alcohols



Sugar alcohols are a class of polyols, also called polyhydric alcohol, polyalcohol, alditol or glycitol. They are carbohydrates that occur naturally in certain fruits and vegetables; but they can also be manufactured. They are not as sweet as sucrose and they have less energy than sucrose.

Uses of low calorie/non-nutritive sweeteners

- **Widely used in broad range of processed foods and drinks**
 - ❖ including baked goods, soft drinks, powdered drink mixes, candy, puddings, canned foods, jams and jellies, dairy products, and scores of other foods and beverages
- **Also popular for home use, eg**
 - ❖ baking or cooking
 - ❖ certain recipes may need modification because artificial sweeteners provide no bulk or volume, as does sugar

Overall benefits of using low calorie or non-nutritive sweeteners

..... and addressing consumer concerns

- Low calorie or non-nutritive sweeteners (NNS) give consumers a choice to **satisfy their innate desire for sweet taste without adding calories**
- Studies have shown that replacement of sugar with low calorie or non-nutritive **sweeteners may help to reduce calorie intake** in weight management
- Hence, recommending the **use of a sugar substitutes** in beverages versus just a dietary restriction of all sweet beverages is **more likely to increase dietary compliance** in patients
 - ❖ as they can continue to enjoy sweet taste minus the sugars and calories

- Individuals consuming low-calorie sweeteners **may feel more satisfied with their eating plans**
 - ❖ because they are not deprived of “sweet foods”
 - ❖ thereby helping them to lose weight and keep it off
- Substituting for sugars these **sweeteners may help in blood sugar control**
- The American Diabetes Association advises that these sweeteners may help people with diabetes in their diet management by cutting down their calorie intake
 - ❖ persons with Type 2 Diabetes have **greater flexibility with meeting dietary goals with low calorie sweeteners**

- However many people do not understand what low and no-calorie sweeteners really are and their purposes
- **Important to educate consumers about the different types of sugar substitutes**
 - ❖ in what foods or beverages can they be found
 - ❖ how to identify these sweeteners
 - ❖ role of sugar substitutes in the diet, and
 - ❖ how sugar substitutes can be used in cooking
- Consumers should be informed that low or no calorie **sweeteners are not only for diabetic patients or obese people**
 - ❖ they can be used **for anyone who wishes to reduce sugar intake from their foods and beverages**

- Consumers are also **concerned if sugar substitutes are safe** to consume in long term
- Should be emphasized to the consumers that low or no-calorie sweeteners **have a long history of safe use** in a variety of foods and beverages
 - ❖ some of the most studied and reviewed food ingredients
 - ❖ **have passed rigorous safety assessments**
- Several of these sweeteners have been approved for use for all age groups by many regulatory agencies around the world

Concluding thoughts

- Low calorie or non-nutritive sweeteners may help in weight management, blood sugar control and other conditions
 - ❖ but they are not magic bullets
- They should only be used in moderation and with a healthy balanced diet
 - ❖ and a regular exercise programme
- Use of sugar substitutes must be combined with reduced carbohydrate from sugary/ starchy foods and fat
 - ❖ to effectively control blood sugar level or energy intake

- Education on understanding food and nutrition labels should be carried out
 - ❖ to help consumers identify products with low or no calorie as substitutes
 - ❖ such products should be made available to consumers at affordable prices
- Consumers should spend some time skimming the ingredient list
 - ❖ particularly if the product is of the "diet" or "light" variety
 - ❖ look for names of specific sweeteners
 - ❖ use of artificial sweeteners not always disclosed on the front label of the product



Thank you!