

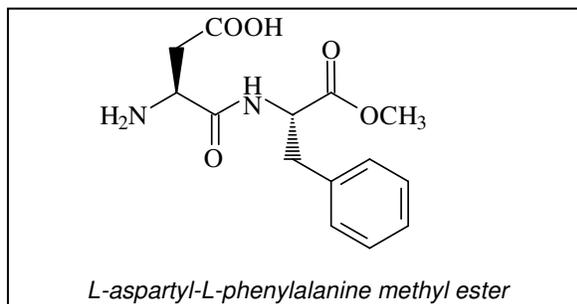


INTRODUCTION

A clean, sweet taste is essential to a good sweetening ingredient. NutraSweet® brand sweetener delivers that taste, as well as attributes that can satisfy the demands of today's health-conscious consumers. NutraSweet is a sweetener that is non-cariogenic and contributes virtually no calories.

The taste benefit of NutraSweet has been observed in over 100 taste tests in which the majority of consumers expressed their liking for products sweetened with NutraSweet® brand sweetener as equal to their liking for products sweetened with sugar. The acceptability of NutraSweet is evidenced by its use in more than 5,000 products that are enjoyed by approximately 250 million people worldwide.

FIGURE 1: ASPARTAME FORMULA



NutraSweet brand sweetener, generically known as aspartame, is a high-potency sweetener manufactured and marketed by The NutraSweet Company. Aspartame is the methyl ester of the dipeptide L-aspartyl-L-phenylalanine (see Figure 1).

Its components are identical to those that occur naturally in many common foods. NutraSweet® brand sweetener consistently meets or exceeds Food Chemical Codex (current edition) and USP/NF Standards for aspartame. The foundation for the high quality of NutraSweet lies in the many years of experience that The NutraSweet Company has in aspartame production. With this experience come technical expertise and ample production capacity to

ensure customers a steady supply of high-quality product at competitive prices.

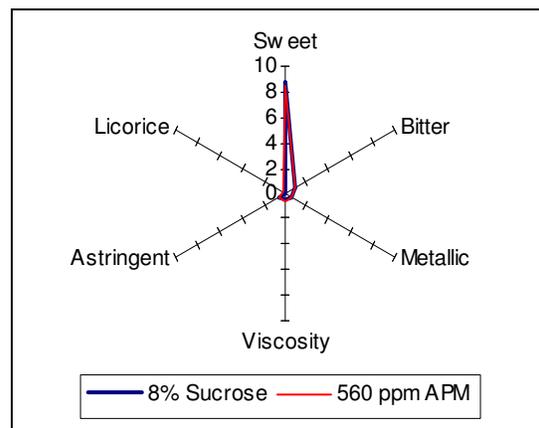
The NutraSweet Company is committed to their customers and will continue to be a leader in the sweetener industry.

PROPERTIES

Sweetness Profile

NutraSweet® brand sweetener has a clean, sweet taste. The flavor characteristics of NutraSweet in many product applications have been extensively studied by industry and independent research organizations. A variety of accepted sensory evaluation techniques have been used to conduct studies with both trained panels and untrained panels of adults and children. Descriptive analysis studies of NutraSweet and sugar at 8% sucrose equivalency substantiate that the flavor and taste profile of NutraSweet is comparable to sugar (see Figure 2).

FIGURE 2: DESCRIPTIVE ANALYSIS OF NUTRASWEET® BRAND SWEETENER AND SUCROSE AT 8% SUCROSE EQUIVALENCY

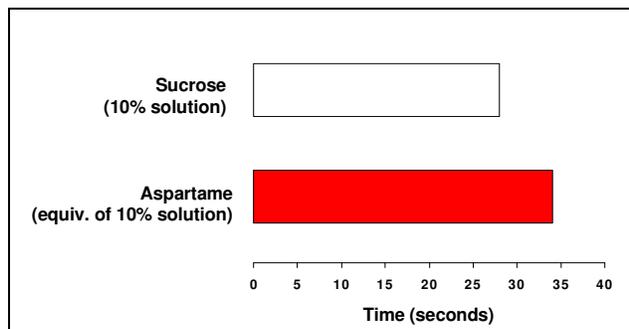


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Flavor Enhancement

NutraSweet does more than sweeten food and beverages. It complements many flavors and has been shown to extend fruit flavors (see Figure 3).

Potency



Potency is often defined as “how many times sweeter” a sweetener is relative to sugar. The amount of NutraSweet® needed to sweeten a product is determined by many factors. NutraSweet is more potent at lower use levels and at room temperature rather than chilled. Other ingredients and product characteristics, including pH and flavor, also influence perceived sweetness. An evaluation of the total food system and expected use conditions is essential to establish the amount of NutraSweet needed in specific formulations.

FIGURE 3: SENSORY COMPARISON OF FRUIT FLAVOR DURATION

Solubility/Dissolution

The solubility characteristics of NutraSweet® brand sweetener allow it to dissolve in food systems at its typical use levels (less than 1%). NutraSweet exhibits 1% solubility in water (neutral pH at 25 °C/77 °F) and 0.37% solubility in ethanol, and is essentially insoluble in oil. Solubility increases with increasing temperature and lower pH. For example, when dissolving NutraSweet, the rate of dissolution is improved by increasing the temperature of the water (50° to 70 °F) or by first dissolving a food acid (citric, malic, etc.) in the system and then adding NutraSweet. Actual mixing times can be varied by selection of the form of NutraSweet, mixing equipment, and mixing vessel size.

Rate of dissolution will vary with the pH and temperature of the water solution. Dissolution will also be governed by the form of NutraSweet and the type of agitation used. For example, NutraSweet® Granular™ consists of larger, denser particles than powder and thus may require a slightly longer time to dissolve. Custom Granular 60™ and Custom Granular 100™ have dissolution rates that improve mixing times in liquid and high moisture systems.

Stability

It is well-known that the stability of aspartame is affected by moisture, pH, and temperature. These factors are interrelated and can be moderated by the presence of other ingredients and processing conditions. Practical experience in formulating products with NutraSweet® has demonstrated a great range of stability. Many products in which NutraSweet would appear to be impractical are already successfully marketed in many areas of the world.

Very Low Moisture Foods/Systems

As a dry ingredient, NutraSweet (4.5% maximum moisture) has excellent stability when stored at low relative humidity. During manufacture of dry products, operations should be conducted with minimum exposure of aspartame to high humidity, as with any other powder or dry material. In finished dry products, such as powdered soft drinks and dessert mixes, the stability of NutraSweet is unchanged.

Intermediate and High Moisture Systems

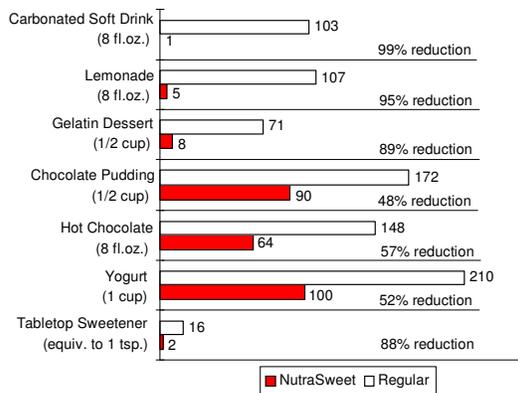
In systems where moisture is present, the stability of NutraSweet® brand sweetener is a function of pH, temperature, and time. In these systems, conversion of aspartame usually follows simple first order kinetics. The maximum stability is observed at approximately pH 4.3, regardless of temperature. Commercialized products with NutraSweet have pH values from 2.9 to 7.0.

Beverages with pH levels ranging from 2.9 to 4.5 are currently manufactured with NutraSweet. When these products are properly handled and stored, the stability of NutraSweet® brand sweetener is adequate for normal shelf life. Normal turnover for beverages is three months. Beverages consumed within four to five months after manufacturing exhibit acceptable sweetness. Maximum product quality is maintained when finished product exposure to high temperatures and sunlight is minimized.

Batch, tunnel, High Temperature Short Time (HTST) pasteurization, and aseptic processes do not significantly lower the concentration of NutraSweet in the finished products. Studies show that 92-100% of the NutraSweet remains, resulting in good, sweet product.

NUTRITION/HEALTH ASPECTS

In the presence of moisture, some degradation of aspartame is inevitable. None of the conversion products are sweet nor do they have any flavor, thus their presence has not affect on product acceptability to consumers.



Aspartame can be considered a nutritive sweetener. Normal digestive processes convert aspartame to phenylalanine, aspartic acid, and methanol. These components, which are widely present in our food supply, follow normal metabolic pathways and yield 4 kilocalories/gram – the same as provided by any protein.

FIGURE 4: CALORIC COMPARISON IN FOODS SWEETENED WITH NUTRASWEET® BRAND SWEETENER AND FOODS SWEETENED WITH SUGAR

Since the discovery of aspartame in 1965, numerous studies have been conducted to assess its use by the general public and special populations. The data generated by these studies have led experts around the world to conclude that NutraSweet is an acceptable sweetener for use by the general public. Individuals with phenylketonuria who are on a phenylalanine-restricted diet need to be aware of the presence of aspartame in a product so they may make appropriate dietary choices. Therefore, in the U.S., all products containing aspartame are labeled with the phrase “Phenylketonurics: Contains phenylalanine.”

Dental research has confirmed the non-cariogenicity of NutraSweet. Formulating products with NutraSweet® brand sweetener gives manufacturers the opportunity to market great-tasting, sweet products that do not promote plaque formation or dental caries.

Products containing NutraSweet provide variety and choice to those with special diet concerns. Studies have shown that NutraSweet does not interfere with the control of blood glucose concentrations in either insulin-dependent or non-insulin-dependent diabetics. Research also

indicates that NutraSweet facilitates weight loss and weight maintenance among obese individuals.

Only small amounts of NutraSweet® brand sweetener are needed to sweeten food and beverage products, resulting in essentially no caloric contribution. Thus, foods and beverages sweetened with NutraSweet can be significantly reduced in calories. (See Figure 4.) Many products made with NutraSweet can qualify for sugar-free or no sugar added label claims, depending on product formulation. It is best to consult with a regulatory or legal consultant to determine the appropriate claims and final labeling requirements for your products.

PRODUCT INFORMATION

Shelf Life/Storage

NutraSweet® brand sweetener in powder and granular forms has excellent storage and shelf-life properties and withstands normal warehouse conditions. As with any dry ingredient, it should be stored in a cool, dry area (15-30°C, 35-65%RH) to maintain quality. Shelf life is five years when the container is kept tightly closed with inner bag sealed and stored to avoid high heat and/or humidity. Product should be re-evaluated after this period.

Currently, NutraSweet® brand sweetener is available in several forms.

NutraSweet® Powder

NutraSweet® brand sweetener is an odorless, crystalline powder that is suitable for use in a variety of products. It may be dried with other ingredients, dry-blended, granulated, milled, and heat processed without loss of sweetness. It is widely used in product applications such as dry mixes, refrigerated and frozen products, beverages, and chewable tablets.

NutraSweet® Granular™

NutraSweet® Granular™ is a product enhancement with distinct advantages in manufacturing processes that utilize agitation. Although chemically identical to NutraSweet powder, the particles in NutraSweet Granular are ten times larger (between 20 and 80 mesh). This reduces dusting significantly. NutraSweet Granular also flows more smoothly and is twice as dense as NutraSweet powder. NutraSweet® Granular™ can be used in applications such as fruit preparations and liquid beverages.

NutraSweet® Custom Granular 60™ and 100™

Two additional granular products provide other options for the manufacturer. NutraSweet® Custom Granular 60™ dissolves quickly, making it ideal for most low pH wet beverage applications. It can also be used in fruit preparations, dry powder drink and ready-to-eat desserts. Its average particle size is between 60 and 100 mesh.

NutraSweet® Custom Granular 100™, with an average particle size between 100 and 325 mesh, works well in dry beverages and dessert mixes, ice cream, and yogurt. Its reduced dusting qualities are especially appropriate for dry mixes.

MORE INFORMATION IS AVAILABLE TO YOU

In 1984, the NutraSweet Consumer Center (1-800-321-7254) was established to inform consumers and health care professionals about NutraSweet® brand sweetener and to answer health-related questions.



This bulletin is intended to be general in nature. We are eager to work with you in the development of new products and processes. For additional information about our products, please call

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