

FACTS ABOUT FRUCTOSE



History

Carbohydrates are an essential part of the human diet, and sugars like fructose are a common source of carbohydrate. Fructose is a natural sugar found in fruits, vegetables, honey, agave nectar, fruit juices, and fruit juice concentrates. It is the sweetest of the naturally occurring sugars and has many unique properties.

Pure crystalline fructose was first made available for food and beverage use 30 years ago, having been marketed previously primarily as a health supplement. It is important to note that crystalline fructose is a different product than high fructose corn syrup (HFCS). Crystalline fructose products are typically almost 100% pure fructose whereas HFCS contains approximately equal proportions of glucose and fructose, similar to sucrose (table sugar). Pure crystalline fructose has had a negligible effect on the carbohydrate composition of the diet because of the small volume of this sugar produced relative to all other naturally occurring and added starches, syrups and sweeteners.

Because pure crystalline fructose is so much sweeter than sugar, less of it is used in products to achieve the same level of sweetness. Thus, pure crystalline fructose can be used in making lower-sugar and lower-calorie foods. Food scientists favor pure crystalline fructose because it possesses other properties beyond sweetness, which makes it very useful in foods and beverages.

Benefits

Sweetness

Fructose is the sweetest of all nutritive sweeteners. It has roughly 1.2 times the sweetness of sucrose in most food applications.

Flavor Enhancement

Its sweetness perception peaks and falls earlier than glucose and sucrose, "unmasking" fruit and spice flavors.

Ingredient Synergy

The interaction of fructose with other sweeteners and starches results in a synergy that boosts the sweetness, cake height (baked goods) and viscosity of foods and beverages.

Glycemic Index/Insulin Release

Glycemic index is often used to assess the compatibility of foods with individuals having special dietary needs such as diabetics. Fructose has a low glycemic index and results in moderate release of insulin to the bloodstream relative to glucose and sucrose.

Dental Caries

The only proven health risk of nutritive sweeteners at typical consumption levels is dental caries (also known as tooth decay). However, when compared to other nutritive sugars, fructose is among the least cariogenic.

Meeting Consumer Demand

Calorie Control Council consumer research shows that more than 187 million adult Americans are incorporating low calorie, sugar-free foods and beverages into their meal plan as part of a healthy lifestyle. People will continue to demand a greater variety of low calorie products as they strive to make healthier food choices. Fructose can help meet this demand because of its unique sweetness and functionality.

Fructose is being used in new foods and beverages, such as shelf-stable nutrition bars, soft moist cookies, pourable frozen juice concentrates and energy-reduced products.

Some are even suggesting the application of fructose for those with special dietary or nutritional needs, like endurance athletes.

Production

Pure crystalline fructose is produced from corn or sugar and purified. The crystalline product is brilliant white and very high purity.

Primary Uses

Primary applications for crystalline fructose include dry mix beverages, low calorie products, enhanced or flavored water, still and carbonated beverages, sports and energy drinks, chocolate milk, breakfast cereals, baked goods, yogurt, fruit packs and confections.



Crystalline Fructose and HFCS Are Not the Same

People often use the terms “high fructose corn syrup (HFCS)” and fructose interchangeably; however they are not the same. While pure crystalline fructose contains fructose alone, HFCS contains nearly equal amounts of glucose and fructose, similar to sucrose (table sugar).

Safety

Sucrose and HFCS have long been considered Generally Recognized As Safe (GRAS). As a significant component of these two sweeteners, the safety of fructose has been thoroughly documented in several scientific reviews performed by the Food and Drug Administration (FDA) and other expert panels.

The FDA concluded, “High fructose corn syrup is as safe for use in food as sucrose, corn syrup and invert sugar.” An International Life Sciences Institute (ILSI) Expert Panel concluded, “Fructose is a valuable, traditional source of food energy, and there is no basis for recommending increases or decreases in its use in the general food supply or in special dietary use products.”

Contrary to contemporary reports, the introduction of HFCS (isoglucose) in the latter quarter of the 20th century did very little to change the ratio of simple sugars to starch, or the ratio of glucose to fructose. Why? Because HFCS and sucrose have nearly the same composition and HFCS simply replaced sucrose in many applications on a one-for-one basis.

A Joint Consultation of the World Health Organization and the United Nations Food and Agriculture Organization found that consumption of sugars is not a causative factor in any disease, including obesity.



Fructose Does Not Lead to Health Concerns

Fructose is not responsible for the obesity epidemic or any other health issues the U.S. is facing. Obesity, diabetes, and other chronic health conditions are multi-faceted, brought on by many different factors, not just one. Allegations that fructose causes increased fat production or increased appetite and weight gain are based on poorly crafted experiments which often test extremely high levels of fructose, much higher than the levels found in a typical human diet. These studies are also generally carried out in animals that are poor models for human metabolism. Consequently, the findings from these studies are extreme, and not applicable to real-life situations.

Summary

Fructose and HFCS are not the same. Fructose is sweeter than sucrose so less is needed to achieve the same sweetness, offering calorie savings. Fructose has a low glycemic index and does not cause surges and dips in blood glucose levels. Pure crystalline fructose offers many functional benefits when added to a wide range of foods and beverages, improving product palatability and stability.

References

- Dolan LC, Potter SM, Burdock GA. Evidence-Based Review on the Effect of Normal Dietary Consumption of Fructose on Blood Lipids and Body Weight of Overweight and Obese Individuals. *Critical Reviews in Food Science and Nutrition*. 2010. 50(10):889–918.
- Dolan LC, Potter SM, Burdock GA. Evidence-based review on the effect of normal dietary consumption of fructose on development of hyperlipidemia and obesity in healthy, normal weight individuals. *Critical Reviews in Food Science and Nutrition*. 2010. 50(1):53-84.
- Forbes AL, Bowman BA, Filer LJ, Glinsmann WH, White JS. Health effects of dietary fructose. *American Journal of Clinical Nutrition*. 1993. 58(5):7215-8235.
- Glinsmann WH, Irausquin H, Park YK. Evaluation of health aspects of sugars contained in carbohydrate sweeteners. Report of Sugars Task Force. *Journal of Nutrition*. 1986. 116(11S):S1-216.
- Glinsmann WH, Bowman BA. The public health significance of crystalline fructose. *American Journal of Clinical Nutrition*. 1993. 58(5S):820S-823S.
- Ha et al. Effect of Fructose on Blood Pressure—A Systematic Review and Meta-Analysis of Controlled Feeding Trials. *Hypertension*. 2012. 59(4):787-795.
- Joint FAO/WHO Expert Consultation. Carbohydrates in Human Nutrition (FAO Food and Nutrition Paper – 66). Chapter 3 – Dietary Carbohydrate & Disease. *Report of a Joint FAO/WHO Expert Consultation*, Rome, April 14-18, 1997.
- Lowndes et al. The effects of four hypocaloric diets containing different levels of sucrose or high fructose corn syrup on weight loss and related parameters. *Nutrition Journal*. 2012. 11:55.
- Murphy S. The state of the science on dietary sweeteners containing fructose. *Journal of Nutrition*. 2009. 139(6):1269S-12.
- Sievenpiper et al. Effect of Fructose on Body Weight in Controlled Feeding Trials—A Systematic Review and Meta-analysis. *Annals of Internal Medicine*. 2012. 156(4):291-304.
- Sievenpiper et al. ‘Catalytic’ doses of fructose may benefit glycaemic control without harming cardiometabolic risk factors: a small meta-analysis of randomised controlled feeding trials. *British Journal of Nutrition*. 2012. 108(3):418-23.
- Song et al. Is obesity development associated with dietary sugar intake in the U.S.? *Nutrition*. 2012. 28(11-12):1137–1141.
- Sun SZ, Anderson HG, Flickinger BD, Williamson-Hughes PS, Empie MW. Fructose and non-fructose sugar intakes in the US population and their associations with indicators of metabolic syndrome. *Food and Chemical Toxicology*. 2011. 49(11):2875–2882.
- US Government Printing Office. High fructose corn syrup. Code of Federal Regulations (21CFR 184.1866). *Federal Register*. 1996. 61(165):43447.
- US Government Printing Office. *Federal Register*. 1983. 48(27):5715.
- Wang et al. The Effects of Fructose Intake on Serum Uric Acid Vary Among Controlled Dietary Trials. *Journal of Nutrition*. 2012. 142(5):916-29.

