

# KRYSTAR<sup>®</sup> Crystalline Fructose

New: January 12, 2010

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# What is KRYSTAR® Crystalline Fructose?

- A nutritive sweetener made from corn
- A functional ingredient in food systems (>99.5% fructose)
- Meets Food Chemicals Codex specifications for fructose



# Intense Sweetness

## The Sweetest Nutritive Sweetener

### Relative sweetness of **KRYSTAR®**

Product	Sweetness
KRYSTAR® Crystalline Fructose	117
Sucrose	100
HFCS-55	99
HFCS-42	92
Dextrose	67

### Sweetness synergy of **KRYSTAR®** and other sweeteners

Product	Sweetness
KRYSTAR® & Sucrose 50/50 Blend	128
KRYSTAR® Crystalline Fructose	117
HFCS-90	106
Sucrose	100
HFCS-55	99
HFCS-42	92
Dextrose	67

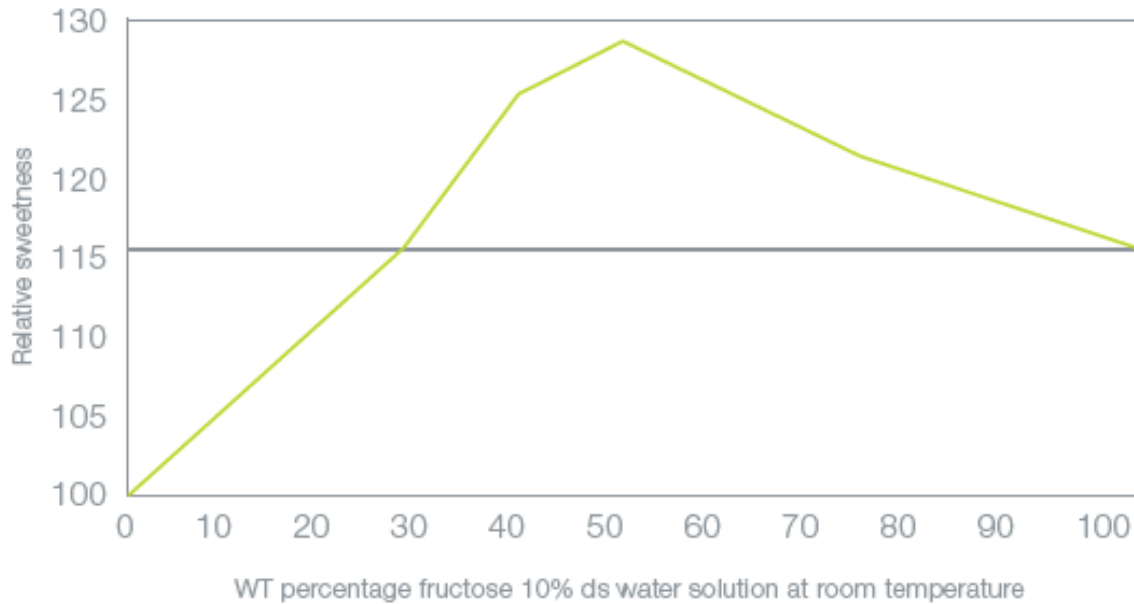
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# Intense Sweetness

## Sweetener and Calorie Reduction

Opportunity for a 25-28% reduction in sweetener and calories without a reduction in sweetness perception when using a 50/50 KRYSTAR®/sucrose blend.

Relative Sweetness of KRYSTAR®/Sucrose Blends



# Synergy with Other Sweeteners

## KRYSTAR®/SPLENDA® Sucralose Sweetness Synergy

- High quality and stable sweetener system
- Reduction in overall sweetener levels
- Similar synergies are found with other high intensity sweeteners

Sweetness Contribution Ratio	Fructose (%)	SPLENDA® Sucralose (ppm)
100:00	8.54	0.00
75:25	5.49	46.40
67:33	4.82	60.24
50:50	3.27	83.02
33:67	2.35	120.96
25:75	1.74	132.50

In an equisweet to 10 Brix sucrose solution.

KRYSTAR® can also mask the undesirable bitter aftertaste that sometimes occurs with some other high intensity sweeteners and flavors.

- Its humectancy, high solubility and low tendency to re-crystallize provides new opportunities in the formulation of intermediate moisture foods such as granola bars, icings, fruit pieces for cereal, fruit leathers and fruit bars.
- KRYSTAR<sup>®</sup> is one of the most effective monosaccharides for binding moisture



# Pumping Up Starch Performance

You'll see the difference in your formulations:

- Shorter starch set times
- Reduced cook-up starch pasting temperatures
- Improved flavor profiles
- Decreased overall starch load
- Ability to use less expensive starch
- Enhanced texture



- KRYSTAR® enhances or intensifies flavors and certain acids
  - Fruit
  - Spice
  - Chocolate
  - Caramel
  - And other sweet flavors







- KRYSTAR<sup>®</sup> is more soluble in water at all temperatures than is sucrose or dextrose
- Formulas high in sweetener solids can use KRYSTAR<sup>®</sup> without undue danger of sweetener recrystallization
  - This allows for successful formulation of products such as soft cookies, granola bars, icings, brownies and other intermediate moisture foods (IMF).

- Humectancy
  - Higher solubility, much less crystallization, greater water retention
- Lower Water Activity
  - Highly soluble smaller molecule; Allows higher solids formulas
  - Sucrose inversion alters moisture balance
- Microbial Stability
  - Reduces  $A_w$  (less water available to microbes)
- Sweetness Stability
  - No inversion, sweetener balance remains constant



- Can be used in products with natural claims
- Opportunity for reduced calories and/or reduced sugar claims
- May be labeled as fructose
- Higher ratio of complex carbohydrates
- No artificial sweetener declarations



## KRYSTAR<sup>®</sup> COST SAVINGS CALCULATOR

### SUCROSE ONLY

Annual Sugar Usage (lbs.)	<input type="text" value="3,000,000"/>	Price/Cwt.	<input type="text" value="\$35.00"/>	Annual \$	\$1,050,000
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### 50/50 BLEND OF KRYSTAR / SUCROSE

Krystar Usage at 50% (lbs.)	1,125,000	Price/Cwt.	<input type="text" value="\$46.00"/>	Annual \$	\$517,500
Sugar Usage at 50% (lbs.)	1,125,000		<input type="text" value="\$35.00"/>		\$393,750
Total Sweetener Usage (lbs.)	2,250,000				\$911,250

Sweetener Reduction

**Annual Savings on Sweeteners:  13%**

*Does not include savings on acidulant and flavor reduction or shipping costs.*



- KRYSTAR® 300 Crystalline Fructose
  - Allows for replacement of sugar without impacting texture
- KRYSTAR® 300 USP Crystalline Fructose
  - Pharma Grade
- KRYSTAR® 450 Crystalline Fructose
  - Allows for replacement of baker's granulated sugar without impacting texture
- Powdered KRYSTAR® Crystalline Fructose
- KRYSTAR® Liquid Fructose

--Insert a note on capacity/availability here.--

# Fructose Scientific Studies:

## What You Need to Know

- Fructose is a sugar that is present in nature and has been consumed throughout history. It is the primary sweetening agent in honey and is present in fruits, vegetables, and juices.
- The metabolism of fructose has been studied for decades and is well understood.
- Consumption of fructose in the context of a normal diet does not create health concerns.

- Recent media attention has surrounded the potential increase in blood triglyceride levels after consuming fructose under an unrealistic setting. Studies specifically looking at the effects of daily unreasonably high levels of fructose consumption and/or acutely unreasonable high levels of fructose consumption have found that there could be increases in triglycerides, however the amount observed is not clinically significant and is transient in nature.
- A recent meta analysis of 42 studies concluded that there is good reason to believe that typical intake of fructose is not detrimental.

# KRYSTAR® Crystalline Fructose

## For Use in Natural Products

FDA recently provided guidance to industry on their interpretation of the term "natural" on labels of products containing high fructose corn syrup. FDA stated that the term could be used if certain conditions were met. A copy of this letter is available upon request.

**Using the guidance that FDA provided in this letter we have reviewed our other products and concluded that KRYSTAR® Crystalline Fructose conforms to these requirements.**

These considerations apply to foods and beverages that are subject to labeling regulations of the Food and Drug Administration. Foods such as processed meat and poultry products are subject to labeling regulations of the USDA Food Safety and Inspection Service, which has issued definitions for use of the term "natural." FSIS regulations require case-by-case approval for use of a "natural" label on products containing ingredients that have undergone more than "minimal" processing.

As with all decisions concerning food labeling, manufacturers should consult with their own regulatory and legal advisors prior to making labeling decisions. Users should also check applicable foreign regulations in the case of products that may be exported

TATE & LYLE AMERICAS, INC



# What is Fructose?

- Fructose is:
  - Produced by nature
  - Sweetest of all naturally occurring sugars
  - One of the original carbohydrate sweeteners consumed
  - A monosaccharide and a reducing sugar capable of reacting with amino acids to form the desirable flavors and colors required in a variety of processed food products including baked goods and confections



Fruit	Fructose (as % of total sugars)
Blueberries	50
Cherries	42
Bananas	40
Grapes/ White Grape Juice Concentrate	52.5
Honey	50

