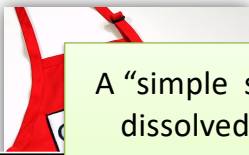




## Lactose and Other Sugars



### The composition and relative sweetness of sugars and syrups

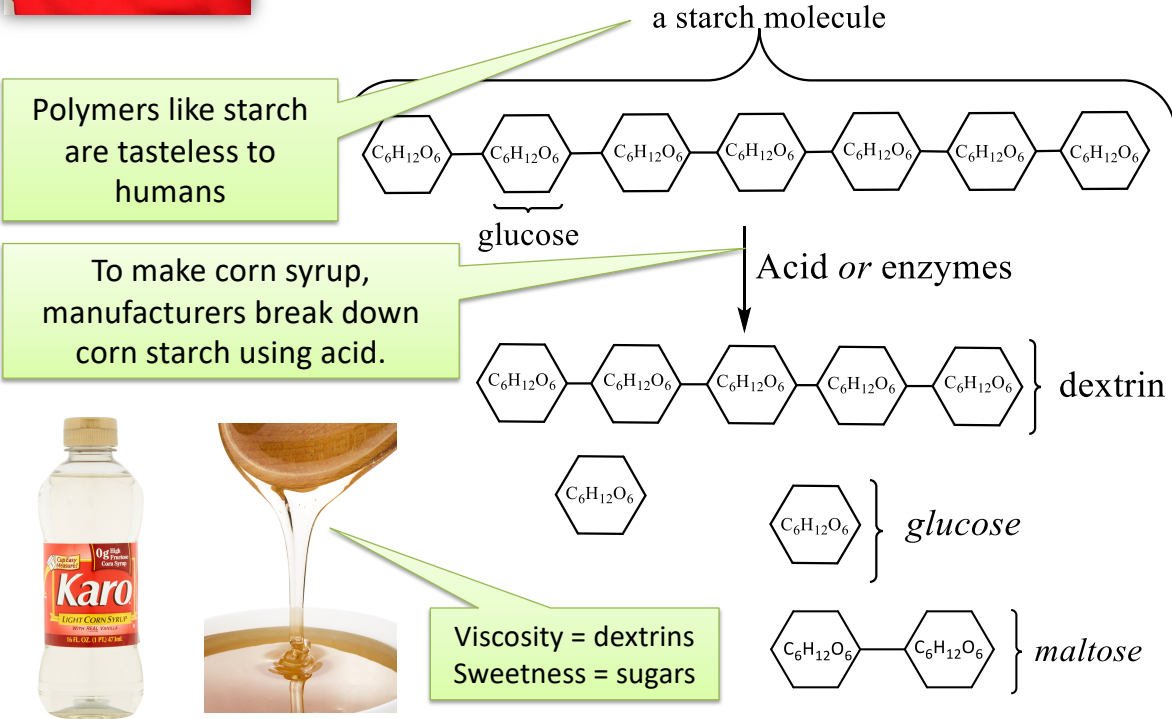
A "simple syrup" is sucrose dissolved in water (1:1)

Sucrose (table sugar) has been assigned the arbitrary value of 100 – so all the sweetness measurements are simply a comparison to sucrose

Sugar	Relative name	Composition	Relative sweetness
Fructose	Levulose	Pure fructose	120
Glucose	Dextrose	Pure glucose	70
Sucrose	Table sugar	Dimer of glucose and fructose	100
Lactose	Milk sugar	Dimer of galactose and glucose	40
<b>Maltose</b>		Dimer of glucose	45
<b>Corn syrup</b>		Mixture of glucose and maltose, and longer glucose chains	30-50
<b>High fructose corn syrup</b>		Mixture of fructose and maltose, and longer glucose chains. Higher fructose concentration.	80-90
<b>Invert sugar syrup</b>		Mixture of fructose, glucose and sucrose	95
<b>Honey</b>		Mixture of fructose (38%), glucose (31%), sucrose (1.5%), other disaccharides, acids and minerals (~7%)	~97
<b>Maple syrup</b>		Mixture of sucrose (62%), glucose and fructose (3%) with trace amino acids, minerals and malic acid	~100



## Corn syrup is made from breaking down corn starch



## The composition and relative sweetness of different sugars and syrups

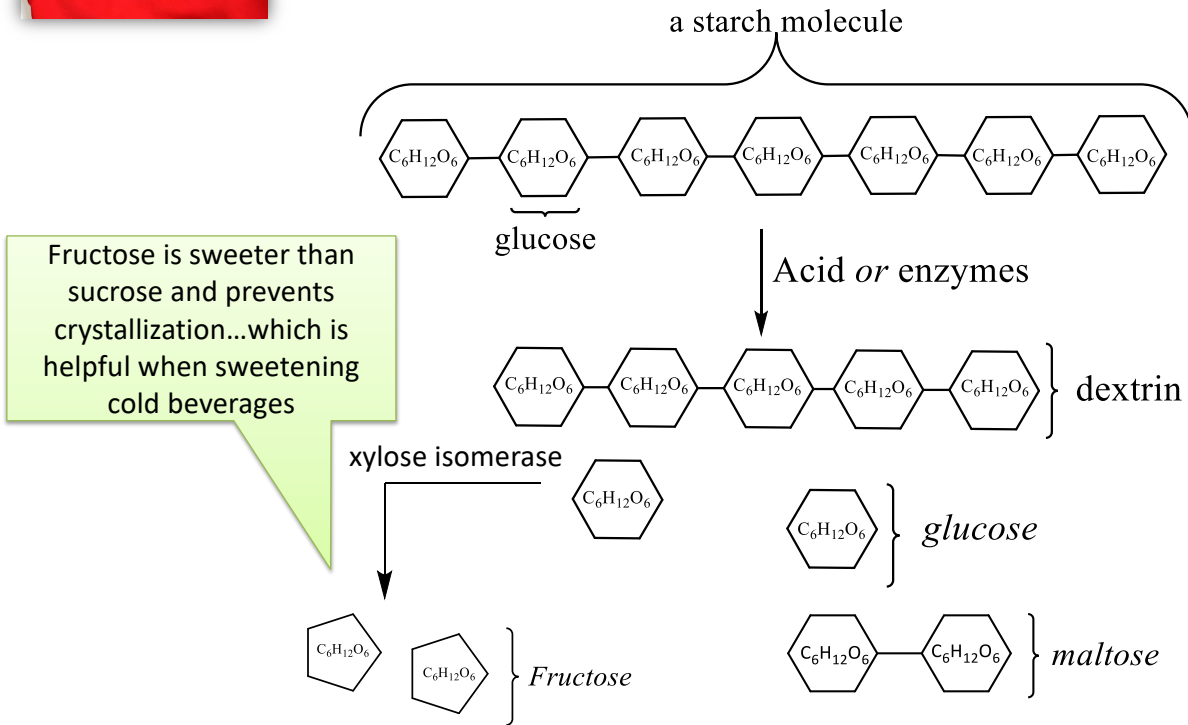
Why is HFCS sweeter?

How are corn syrup and HFCS different?

Syrup	Composition of mono- and disaccharides	Relative sweetness
Corn syrup	Mixture of glucose and maltose, and longer glucose chains	30-50
High fructose corn syrup	Mixture of fructose and maltose, and longer glucose chains. Higher fructose concentration.	80-90
Invert sugar syrup	Mixture of fructose, glucose and sucrose	95
Honey	Mixture of fructose (38%), glucose (31%), sucrose (1.5%), other disaccharides, acids and minerals (~7%)	~97
Maple syrup	Mixture of sucrose (62%), glucose and fructose (3%) with trace amino acids, minerals and malic acid	~100



## High fructose corn syrup is made from corn syrup

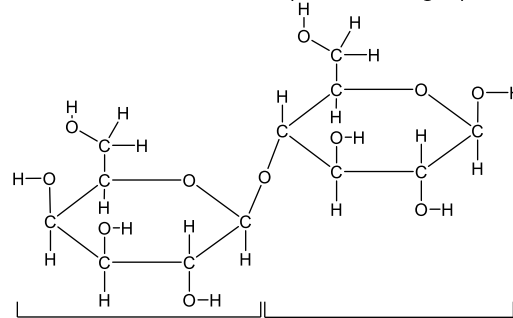


## Composition of milk: Liquid phase

### Lactose

- **Disaccharide** - glucose and galactose
- Nearly half of the calories from milk
- Ability to digest (metabolize or "break down") lactose requires a special enzyme – **lactase**
  - Lactase is produced in gut by children but levels decrease in adults.

A dimer molecule of lactose (i.e. milk sugar)



This half of lactose is made of the simple sugar monomer **GALACTOSE**

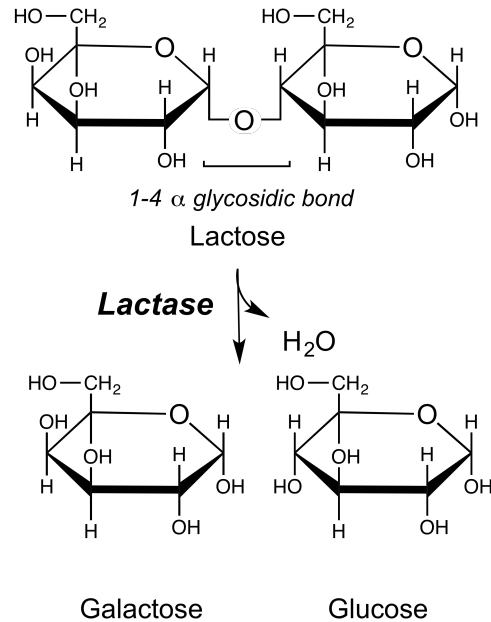
This half of lactose is made of the simple sugar monomer **GLUCOSE**



## Actions of Lactase

The enzyme **lactase** hydrolyzes lactose producing **galactose** and **glucose**.

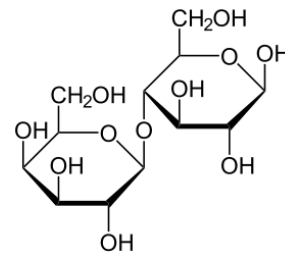
- Animals and humans use glucose as main sugar source.
- Galactose is used for neural tissue development—important in early development of mammals



## Composition of milk: Liquid phase

### •Lactose

- If the sugar isn't hydrolyzed, sugar is transported to the gut where two things happen:
  1. Water rushes into the intestine from the belly – osmosis
  2. Bacteria will start to metabolize the sugar to CO<sub>2</sub>(g) and CH<sub>4</sub>(g)
    - Result – cramps, gas and diarrhea...diarrhea..

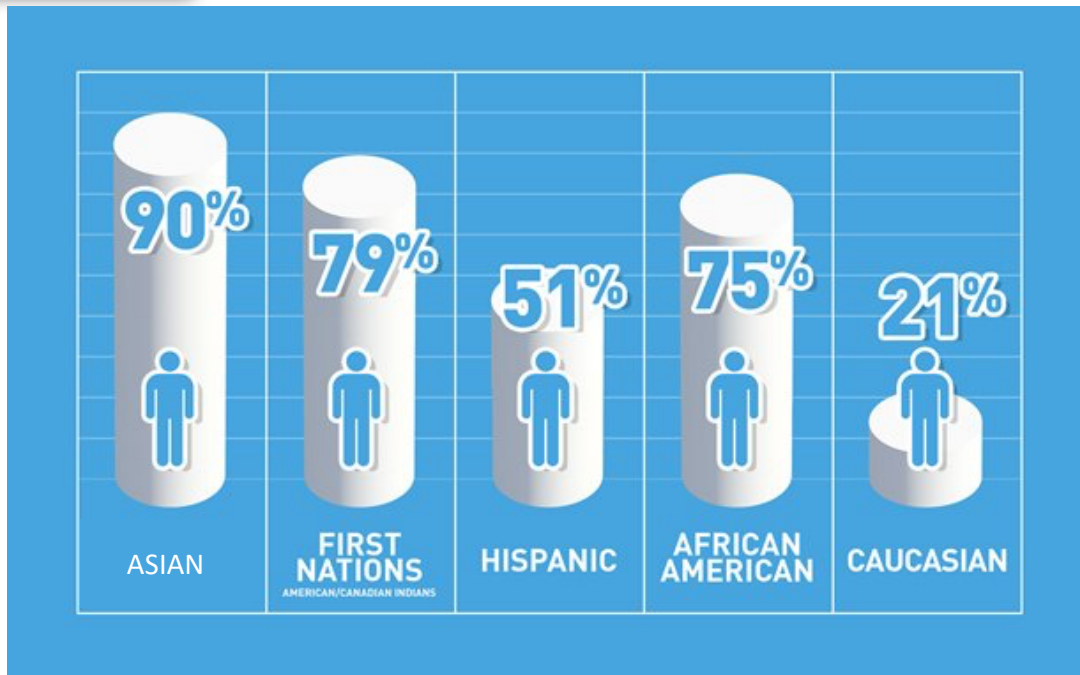


Called Lactose intolerance





## Lactose Intolerance (US and Canada)



## Time to Check-In

Join with this CODE at [join.nearpod.com](https://join.nearpod.com) or in the app

CSX

<https://share.nearpod.com/vsph/21079ySYLuGV>