**1.Production of glucose from sweet potato**

Modern technology for production of glucose syrup from sweet potato actually is to produce the glucose from sweet potato starch, because the sweet potato contains more protein and fiber than rice and corn, so we can't use the sweet potato directly for the production of glucose syrup. Below is the syrup production process, enzyme method is adopted, which is the most advanced and easily controlled technology all over the world.

① **Sweet potato starch mixing with water**:

add certainly water into mixing tank, in the mixing container add starch to adjust its concentration to about 40%, then add hydrochloric acid to adjust the liquid PH value of 18, and wait for the starch reaction.

② **Saccharification:**

after the starch slurry is adjusted, pump it into [saccharification tank](https://www.starchprojectsolution.com/syrup_processing_plant/Saccharifying_system_640.html), then open steam valve lift the pressure to 2.8kg per square meter, keep this pressure 3-5 mins. Then, use 20% iodine solution to check the saccharification performance. When the liquid is red, it can be neutralized. By the way, this section is most important for production of glucose syrup from sweet potato starch, it decides the syrup products taste, also the quality.



Saccharification tank

③ **Saccharification liquid neutralize**:

To neutralize gradually add 10% sodium carbonate solution, when the ph value is 4.6-4.8, open the discharge valve, the pump will filter out the clear liquid syrup and then cooled to 60℃, after cooling, liquid syrup can be sent for decolorization process.

④ **Decolorization**:

put the syrup solution into the decolorizing tank, add the activated carbon and mix them. The time of decoloring and stirring should not be less than 5 minutes, then it can be sent to the filter press, and the filtrate colourless syrup solution should be placed in the storage tank for reserve. This decolorization process for the producction of glucose syrup from sweet potato usually adopted the plate and frame filter press machine.

⑤ **Ion exchange:** this [ion exchange system](https://www.starchprojectsolution.com/syrup_processing_plant/Ion_Exchange_system_649.html) adopt ion exchange resin for sweet potato glucose syrup pure process, remove all acids by this system. After this, we can get high purity glucose syrup, this also an important section for the production of glucose syrup from sweet potato.

⑥ **Evaporate**:

this section used to remove the excess moisture from the glucose syrup solution. Usually suggest you adopt three-effect evaporator which is the most suitable type, of course, we also can adjust the evaporator type as the production requests.



Doing Company manufacturered syrup equipments

**2.Production of glucose from Corns**

Depending on the method used to hydrolyse the starch and on the extent to which the hydrolysis reaction has been allowed to proceed, different grades of glucose syrup are produced, which have different characteristics and uses. The syrups are broadly categorised according to their [dextrose equivalent](https://en.wikipedia.org/wiki/Dextrose_equivalent) (DE). The further the hydrolysis process proceeds, the more [reducing sugars](https://en.wikipedia.org/wiki/Reducing_sugar) are produced, and the higher the DE. Depending on the process used, glucose syrups with different compositions, and hence different technical properties, can have the same DE.

**Confectioner's syrup**

The original glucose syrups were manufactured by [acid hydrolysis](https://en.wikipedia.org/wiki/Acid_hydrolysis) of corn starch at high temperature and pressure. The typical product had a DE of 42, but quality was variable due to the difficulty of controlling the reaction. Higher DE syrups made by acid hydrolysis tend to have a [bitter](https://en.wikipedia.org/wiki/Bitter_(taste)) taste and a dark colour, due to the production of [hydroxymethylfurfural](https://en.wikipedia.org/wiki/Hydroxymethylfurfural" \o "Hydroxymethylfurfural) and other byproducts.[[1]](https://en.wikipedia.org/wiki/Glucose_syrup#cite_note-isbn1-4051-7556-7-1)p. 26 This type of product is now manufactured using a continuous converting process[[6]](https://en.wikipedia.org/wiki/Glucose_syrup#cite_note-Norman-6) and is still widely used due to the low cost of acid hydrolysis. The sugar profile of a confectioner's syrup can also be mimicked by [enzymatic hydrolysis](https://en.wikipedia.org/wiki/Enzymatic_hydrolysis).[[6]](https://en.wikipedia.org/wiki/Glucose_syrup#cite_note-Norman-6) A typical confectioner's syrup contains 19% glucose, 14% maltose, 11% [maltotriose](https://en.wikipedia.org/wiki/Maltotriose" \o "Maltotriose) and 56% higher [molecular mass](https://en.wikipedia.org/wiki/Molecular_mass) [carbohydrates](https://en.wikipedia.org/wiki/Carbohydrate).[[7]](https://en.wikipedia.org/wiki/Glucose_syrup#cite_note-isbn3-527-31345-1-7)p. 464 A typical 42 DE syrup has about half the sweetness of sugar,[[1]](https://en.wikipedia.org/wiki/Glucose_syrup#cite_note-isbn1-4051-7556-7-1)p. 71 and increasing DE leads to increased sweetness, with a 63 DE syrup being about 70%, and pure dextrose (100 DE) about 80% as sweet as sugar.[[1]](https://en.wikipedia.org/wiki/Glucose_syrup#cite_note-isbn1-4051-7556-7-1)p. 71

**High-maltose glucose syrups**

By using [β-amylase](https://en.wikipedia.org/wiki/%CE%92-amylase) or fungal [α-amylase](https://en.wikipedia.org/wiki/%CE%91-amylase), glucose syrups containing over 50% maltose, or even over 70% maltose (extra-high-maltose syrup) can be produced.[[7]](https://en.wikipedia.org/wiki/Glucose_syrup#cite_note-isbn3-527-31345-1-7)p. 465 This is possible because these enzymes remove two glucose units (i.e. one maltose molecule) at a time from the end of the starch molecule. High-maltose glucose syrup has a great advantage in the production of [hard candy](https://en.wikipedia.org/wiki/Hard_candy): at a given moisture level and temperature, a maltose solution has a lower [viscosity](https://en.wikipedia.org/wiki/Viscosity) than a glucose solution, but will still set to a hard product. Maltose is also less [humectant](https://en.wikipedia.org/wiki/Humectant" \o "Humectant) than glucose, so candy produced with high-maltose syrup will not become sticky as easily as candy produced with a standard glucose syrup.[[1]](https://en.wikipedia.org/wiki/Glucose_syrup#cite_note-isbn1-4051-7556-7-1)p. 81

Commercial preparation

Irrespective of the feedstock or the method used for hydrolysis, certain steps are common to the production of glucose syrup:

**Preparation**

Before conversion of starch to glucose can begin, the starch must be separated from the plant material. This includes removing fibre and protein (which can be valuable by-products, for example wheat or maize [gluten](https://en.wikipedia.org/wiki/Gluten)[[1]](https://en.wikipedia.org/wiki/Glucose_syrup#cite_note-isbn1-4051-7556-7-1)p. 22). Protein produces [off-flavours](https://en.wikipedia.org/wiki/Off-flavours) and colours due to the [Maillard reaction](https://en.wikipedia.org/wiki/Maillard_reaction" \o "Maillard reaction), and fibre is insoluble and has to be removed to allow the starch to become hydrated. The plant material also needs to be ground as part of this process to expose the starch to the water.

1. **Soaking**[[edit](https://en.wikipedia.org/w/index.php?title=Glucose_syrup&action=edit&section=6)]

The starch needs to be swelled to allow the enzymes or acid to act upon it. When grain is used, [sulfur dioxide](https://en.wikipedia.org/wiki/Sulfur_dioxide) is added to prevent spoilage.

1. **Gelatinization**[[edit](https://en.wikipedia.org/w/index.php?title=Glucose_syrup&action=edit&section=7)]

By heating the ground, cleaned feedstock, [starch gelatinization](https://en.wikipedia.org/wiki/Starch_gelatinization) takes place: the intermolecular bonds of the [starch](https://en.wikipedia.org/wiki/Starch) molecules are broken down, allowing the [hydrogen bonding](https://en.wikipedia.org/wiki/Hydrogen_bond) sites to engage more water. This irreversibly dissolves the starch [granule](https://en.wikipedia.org/wiki/Granule_(cell_biology)), so the chains begin to separate into an [amorphous](https://en.wikipedia.org/wiki/Amorphous) form. This prepares the starch for hydrolysis.

1. **Hydrolysis**[[edit](https://en.wikipedia.org/w/index.php?title=Glucose_syrup&action=edit&section=8)]

Glucose syrup can be produced by [acid hydrolysis](https://en.wikipedia.org/wiki/Acid_hydrolysis), enzyme hydrolysis, or a combination of the two. Currently, however, a variety of options are available.

Formerly, glucose syrup was only produced by combining corn starch with dilute [hydrochloric acid](https://en.wikipedia.org/wiki/Hydrochloric_acid), and then heating the mixture under pressure. Currently, glucose syrup is mainly produced by first adding the [enzyme](https://en.wikipedia.org/wiki/Enzyme) α-[amylase](https://en.wikipedia.org/wiki/Amylase) to a mixture of corn starch and water. α-amylase is secreted by various species of the [bacterium](https://en.wikipedia.org/wiki/Bacteria) [*Bacillus*](https://en.wikipedia.org/wiki/Bacillus); the enzyme is isolated from the liquid in which the bacteria are grown. The enzyme breaks the starch into [oligosaccharides](https://en.wikipedia.org/wiki/Oligosaccharide), which are then broken into glucose molecules by adding the enzyme [glucoamylase](https://en.wikipedia.org/wiki/Glucoamylase" \o "Glucoamylase), known also as "γ-amylase". Glucoamylase is secreted by various species of the [fungus](https://en.wikipedia.org/wiki/Fungus) *[Aspergillus](https://en.wikipedia.org/wiki/Aspergillus" \o "Aspergillus)*; the enzyme is isolated from the liquid in which the fungus is grown. The glucose can then be transformed into fructose by passing the glucose through a column that is loaded with the enzyme [D-xylose isomerase](https://en.wikipedia.org/wiki/Xylose_isomerase), an enzyme that is isolated from the growth medium of any of several bacteria.

1. **Clarification**

After hydrolysis, the dilute syrup can be passed through columns[to remove impurities, improving its colour and stability.

1. **Evaporation**

The dilute glucose syrup is finally evaporated under vacuum to raise the solids concentration.

Uses

Its major uses in commercially prepared food products are as a thickener, sweetener, and [humectant](https://en.wikipedia.org/wiki/Humectant" \o "Humectant) (an ingredient that retains moisture and thus maintains a food's freshness) Glucose syrup is also widely used in the manufacture of a variety of candy products.

In the United States, domestically produced corn syrup and high-fructose corn syrup (HFCS) are often used in American-made processed and mass-produced foods, candies, soft drinks and fruit drinks to increase profit margins.

Glucose syrup was the primary corn sweetener in the United States prior to the expanded use of HFCS production. HFCS is a variant in which other enzymes are used to convert some of the glucose into fructose. The resulting syrup is sweeter and more soluble. Corn syrup is also available as a retail product.

Glucose syrup is often used as part of the mixture that goes into creating fake blood for films and television. Blood mixtures that contain glucose syrup are very popular among independent films and film makers, as it is cheap and easy to obtain.