

# STARCH

MA II (SEM)

**PAPER NAME: FOOD SCIENCE AND EXPERIMENTAL FOODS**

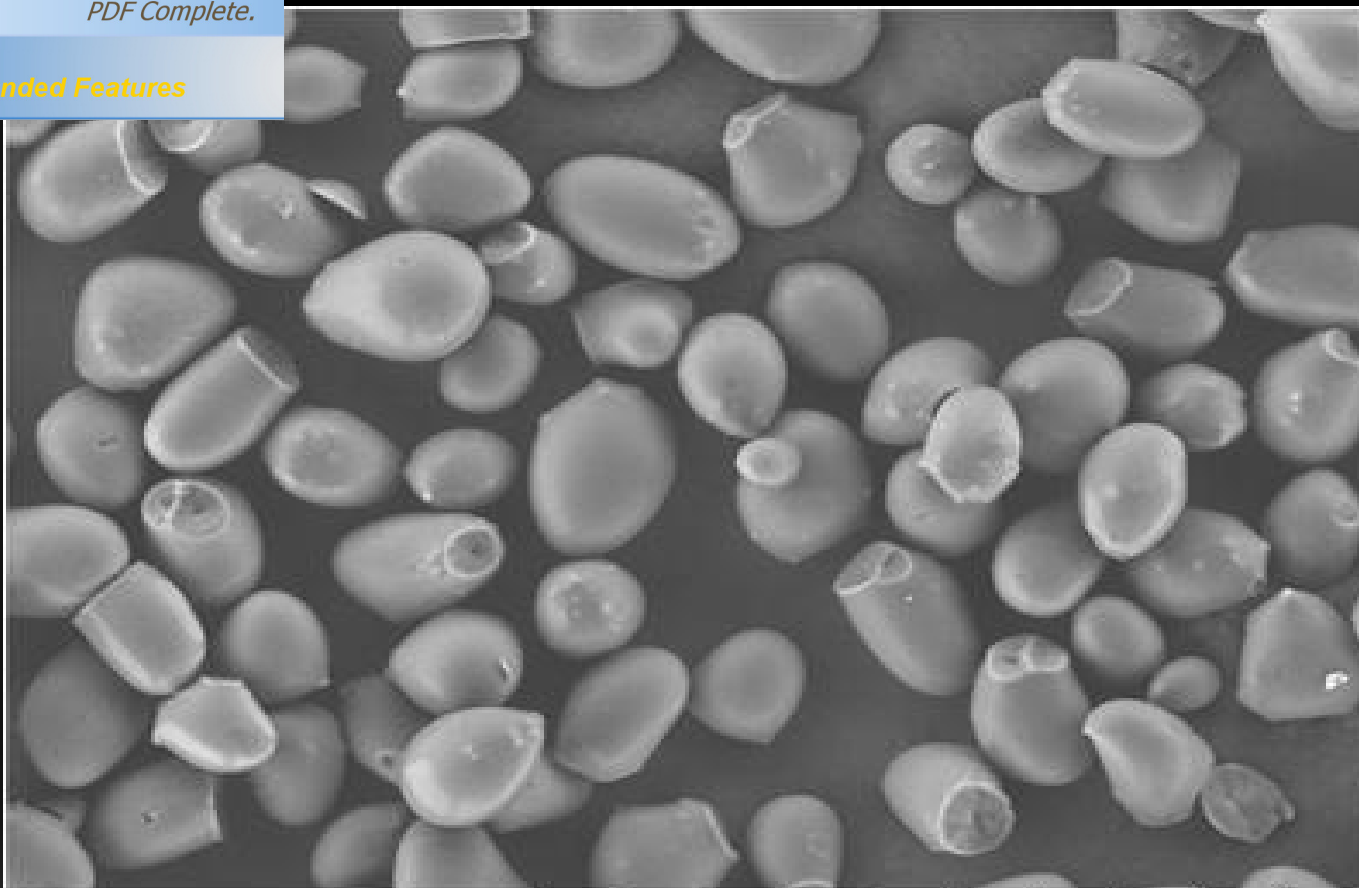
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**plant polysaccharide stored in roots and seeds of plants and is in the endosperm of a grain kernel.**

**It is hydrolyzed to glucose, supplying the glucose that is necessary for brain and central nervous system functioning.**

**It provides humans with energy (4 cal per gram)**



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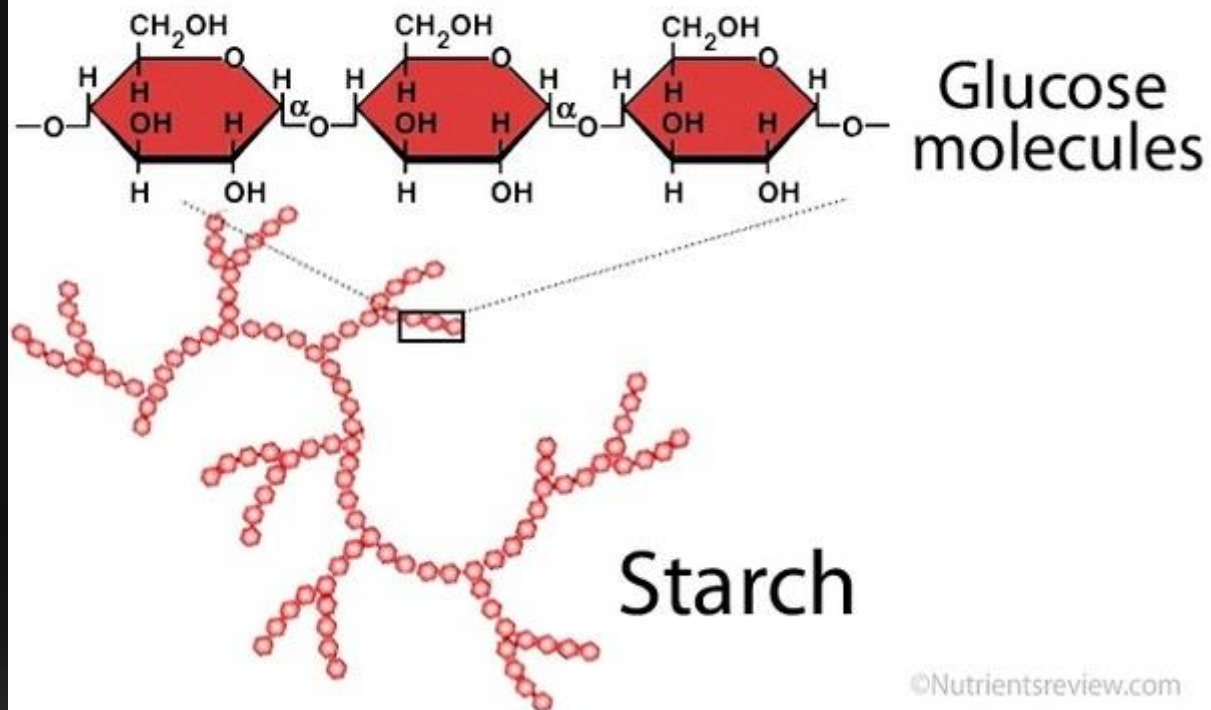
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## CRYSTALLINE STRUCTURE OF SAGO STARCH

Source : <https://www.google.com/search?q=food+starch+crystals>

# Starch



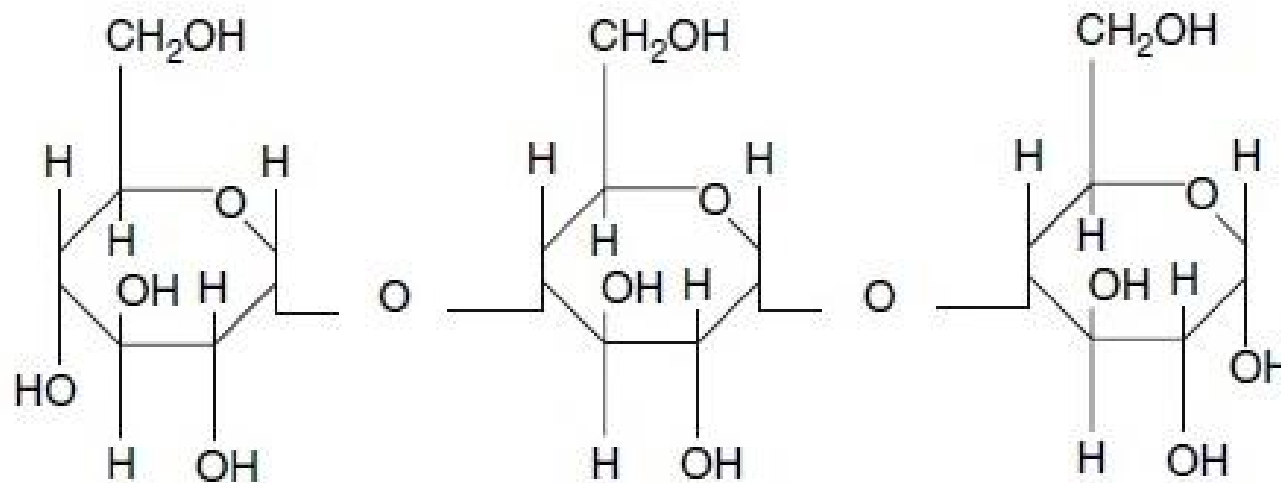
## CHEMICAL STRUCTURE OF STARCH

Source : <https://www.google.com/search?q=food+starch+crystals>

It contains two types of molecules known as amylose and amylopectin.

Both are long chains of glucose molecules joined by  $-1,4$ -glycosidic bonds.

Amylose is a linear chain in which glucose molecules are joined by  $-1,4$ -glycosidic bonds.

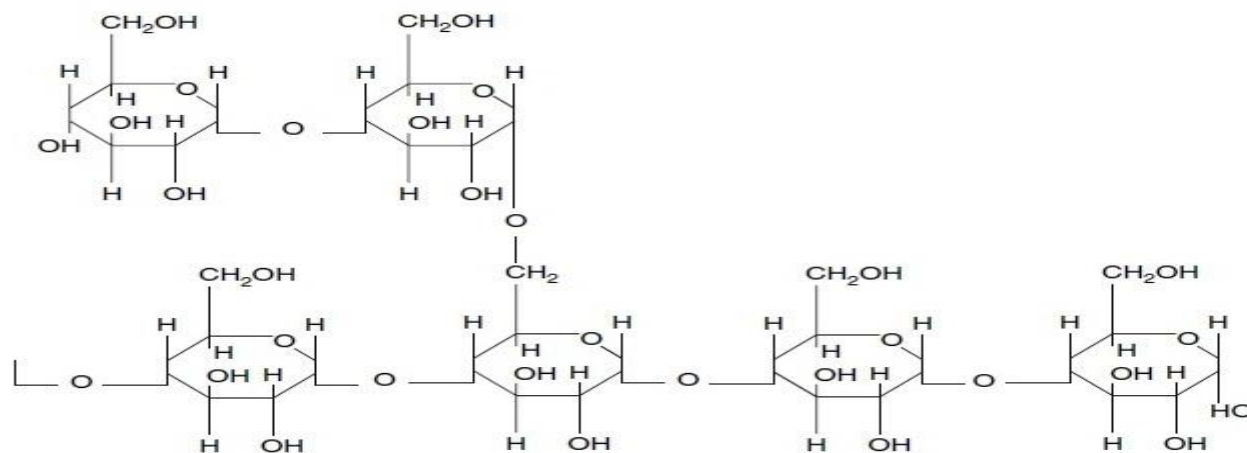


$\alpha$  1-4 glycosidic linkages of amylose

# AMYLOSE

contains branches and for every 15–30 glucose residues there is a branch, joined to the main chain by an  $\alpha$ -1, 6-glycosidic link.

The branches make amylopectin less soluble in water than amylose.



$\alpha$  1-6 branching of amylopectin

# AMYLOPECTIN

## Sources of Starch

Starch sources are numerous, with common ones derived from **cereal grains such as wheat, corn or rice.**

Wheat starch yields a cloudy, thick mixture, while cornstarch produces more clear mixtures such as gravies or sauces.

**Vegetables, roots and tubers, including the root of cassava, and potatoes** are good sources of starch.



Source of starch is **legumes** such as  
soybeans.

**Sago** is a powdery starch obtained from the stems and trunks of the sago palm in tropical Asia. It may be used a food thickener and fabric stiffener.

**Fruits** also may be sources of starch. An example is **banana**.

Thus, starch may come from a variety of sources. Depending on the source, starch also may have different crystalline structures.

## Starch Uses in Food Systems

Starches are introduced into foods primarily because of their **thickening ability**. For example, cooked or instant potatoes or pureed cooked rice may be useful as thickeners.

Starch also may be useful as a **water binder** and **gelling agent**.

One new food application of starch granules is their use as **flavor carriers**.

Another use of starch is as a **fat replacer** in food systems.

*Molecularly*, the amylose chains form helical or spherical shapes, holding water and providing bulk.

This confers the satisfying “mouthfeel” attributes on starch.

Maltodextrins, *formed* from the hydrolysis of starches, simulate the viscosity and mouthfeel of fats/oils and are used to reduce the fat content of some foods.

**With the use of ordinary cross-breeding procedures, new starches are being discovered that have various applications in food systems.**

**Food starches are commercially manufactured and available for use in products such as baked food, beverages, canned, frozen and glassed foods, confections, dairy products, dry goods, meat products, and snack foods.**

# Properties of Starches

- “ They are not sweet.
- “ They are not readily soluble in cold water.
- “ They form pastes and gels in hot water.
- “ They provide a reserve energy source in plants and supply energy.
- “ They occur in seeds and tubers as characteristic starch granules.

**Gelatinization** : In its uncooked stage, starch is insoluble in water. Upon heating, it undergoes gelatinization.

When a suspension of starch granules in water is heated, the granules swell due to water uptake and gelatinize; this increases the viscosity of the suspension and, finally, a paste is formed which, on cooling, can form a gel.

Because of their viscosity, starch pastes are used to thicken foods, and starch gels, which can be modified by sugar or acid, are used in puddings.



## **STARCH GEL**

Source : <https://www.google.com/search?q=food+starch+gel>

- “ **Retrogradation** : Both pastes and gels can revert or retrograde back to the insoluble form on freezing or ageing, causing changes in food texture.
  
- “ Partial breakdown of starches yields dextrans, which are intermediate in chain length between starches and sugars and exhibit other properties  
Intermediate between these two classes of compounds.





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