# Properties, characteristics, preparation and application of pre gelatinized starch

Natural starch has microcrystalline micelle structure, which is insoluble in cold water and is not sensitive to amylase.

Pregelatinized starch, also known as alpha-starch, is a physically modified starch. It is a kind of starch which is heated in the presence of a certain amount of water. Starch particles swell into a paste, the regular arrangement of micelle structure is destroyed, the hydrogen bond between molecules is broken, and the water molecules enter it. At this time, the loss of birefringence is observed under polarizing microscope. The principle of producing pre-gelatinized starch is that the starch emulsion is dried rapidly after being fully gelatinized on the surface of the hot drum, or the starch is ejected from the fine nozzle by high temperature and pressure in the extrusion equipment, and the pressure drops suddenly, and the starch granule is instantly expanded by the original beta-knot. Turn to alpha structure.

Microwave mechanical drying technology is a relatively new technology. Starch is gelatinized

and dried by microwave, and then crushed to get finished products, basically eliminating the influence of shear force.

1. the properties of pre gelatinized starch

Natural starch has a microcrystalline structure, insoluble in cold water, non-swelling, and is not sensitive to amylase. Heating natural starch with a certain amount of water can destroy the regular colloidal structure, break the hydrogen bond between molecules, water molecules enter into its interior, the crystalline structure disappears, loss of birefringence phenomenon and susceptible to enzyme action. The process is gelatinization of starch.

Fully gelatinized starch is dried and dehydrated rapidly at high temperature. The starch granules with hydrogen bond still broken, porous and no obvious crystallization will be obtained, that is, pre-gelatinized starch.

Because the properties of pre gelatinized starch are different, their application fields are also different. Their properties can be measured by gelatinization (alpha degree), rehydration, viscosity, particle size, whiteness, pH value, gel strength and elasticity.

(1) gelatinization degree (alpha degree)

It refers to the proportion of pre-gelatinized starch in a certain number of products. Alpha degree directly affects the quality of products. The determination of alpha degree mainly uses birefringence method and enzyme analysis method.

The starch should be gelatinized completely during the pre-gelatinization process, and the higher the gelatinization ratio, the better the performance of the pre-gelatinized starch. However, a small amount of ungelatinized starch is still retained in the pre-gelatinized starch produced industrially, so the polarized cross can still be found under the polarizing microscope, which is caused by the starch not completely gelatinized.

The starch gelatinization process must go through three stages: reversible water absorption stage, irreversible water absorption stage and particle disintegration stage.

(2) rehydration

Rehydration of pre-gelatinized starch is an important property affecting starch properties.Fine-grained products are soluble in Water-Formed paste with high cold viscosity, low thermal viscosity and good surface gloss. This kind of clot is difficult. The paste has low viscosity and high thermal viscosity.

(3) viscosity

The properties of pre-gelatinized starch are different because of different production methods. Chiang et al reported that the pre-gelatinized starch produced by extrusion method degraded starch macromolecule seriously due to the strong shearing force of extruder, so the viscosity,

water absorption index, solubility index and viscoelasticity of the paste are lower than those produced by roller method. For example, the viscoelasticity and stability of pre-gelatinized potato starch are better than those of other pre-gelatinized starches, so it is more suitable for eel feed as a binder. Viscosity is usually measured by Braberder viscometer and Engles viscometer.