Pregelatinized Starch Method

Scope

- Test the properties of pregelatinized starch.
- Monitor consistency of ingredients between production batches.
- Trouble-shooting.
- Quality control of starch used in food manufacture.

Rapid Visco Analyser

The Rapid Visco Analyser (RVA) is a cooking stirring viscometer with ramped temperature and variable shear profiles optimized for testing viscous properties. The instrument includes international standard methods as well as full flexibility for customer tailor-made profiles. Combining speed, precision, flexibility and automation, the RVA is a unique tool for product development, quality and process control and quality assurance.

Description

Starches are commonly modified to enhance their performance in specific industrial or food applications. Modifications include physical, chemical, and enzymatic alterations, and a combination of these. Modifications made to starches need to be monitored and characterized. Pregelatinized starch is an example of a modified starch. As the starch has been pregelatinized, it easily takes up water and swells at room temperature. Hence pregelatinized starch is useful in thickening instant desserts, allowing the food to thicken with the addition of cold water. Other applications include cold prepared food products such as dairy products, beverages, including reduced sugar varieties, confectionery, cold mixes such as fruit and cream fillings, glazes, frostings and icing for bakery and snacks, instant foods, soups, sauces, dressings and as a binder and texturizer in meat products. There are also industrial and pharmaceutical applications for pregelatinized starches.

Rapid and uneven swelling of pregelatinized starch can cause dispersion problems (clumping) during testing. This procedure uses a cold initial temperature and cold solvent (distilled water) to slow the rate of water uptake by the starch, as well as to differentiate samples with different degrees of precook. Superfine (castor) sugar is used as a dispersion aid without significantly affecting the curve shape. The better dispersal is due to even distribution of small water-absorbing sugar granules between sample particles.

Raw starch pasting curves have a typical low initial (cold) viscosity, followed by a viscosity peak caused by swelling of the raw starch granules, and a relatively high setback viscosity. Processing by thermal and mechanical inputs will progressively reduce peak and setback viscosities. Cold viscosities will increase through a pre-gelatinization effect, and then eventually decrease through granule rupture and dextrinization, as the prior degree of cook increases. The RVA can therefore be used to assess how cooked a product is, with applications for system characterization, at-line process control, product development, scale-up, transfer, troubleshooting and assessment of competitive products.

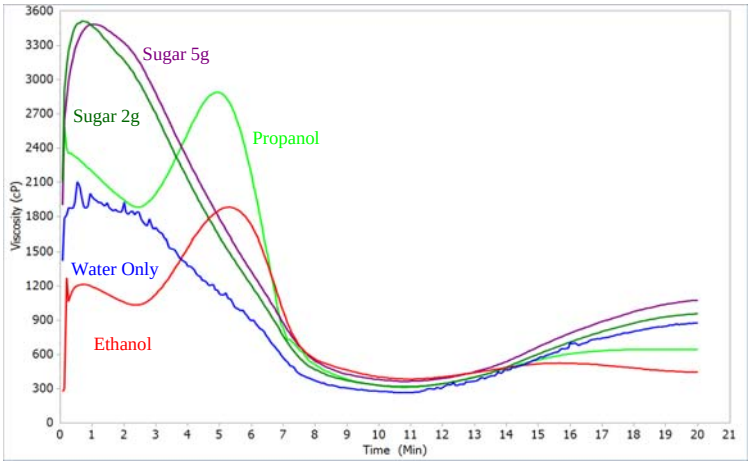

Fig. 1. Effect of addition of dispersion aid on RVA pasting curves of pregelatinized starch. Using only water resulted in unstable curves, making analyses difficult. Alcohols tended to change the shape of the curve, resulting in improper curve interpretation. Sugar improved the dispersion of the sample, without affecting curve shape. The higher overall viscosity when sugar was added indicates that the sugar was successful in dispersing the sample throughout the water.

Method

Twenty-minute profile, with a lowered initial idle temperature to differentiate between samples. Castor sugar is used as a dispersion aid.

Sample Preparation

5.00 ± 0.01 g sample at 14% moisture, 2.00 ± 0.01 g superfine (castor) sugar, and 25.0 ml cold (15°C) distilled water.

Profile

Time	Type	Value
00:00:00	Temp	15°C
00:00:00	Speed	960 rpm
00:00:10	Speed	160 rpm
00:02:00	Temp	15°C
00:07:43	Temp	95°C
00:10:00	Temp	95°C
00:15:00	Temp	25°C
00:20:00	End	
Idle Temperature: 15 ± 1°C Time Between Readings: 4 s		

Measure

CP: Cold peak (peak prior to heating) (cP)
HP: Hot peak (peak after commencement of heating) (cP)
FV: Final viscosity (cP)
TV: Trough/minimum viscosity (cP)

The FV is the RVA Pregel Starch Index. A higher value indicates a lower degree of cook. The CP is the RVA Cold Swelling Index. The peak viscosity after commencement of heating and prior to cooling and holding viscosity may also be recorded

See also RVA Method 13: Extrusion Method.