

Viscosity of Cook-up Waxy Food Starches Method

-Developed by A.E. Staley Manufacturing Co., Decatur, IL 62525, USA.

Scope

- Assess cooked viscosity of unmodified/modified waxy starch.
- Differentiate starches with different degrees of modification.
- Quality control of the starch modification process.
- Quality control of starch used in food manufacture.

Rapid Visco Analyser

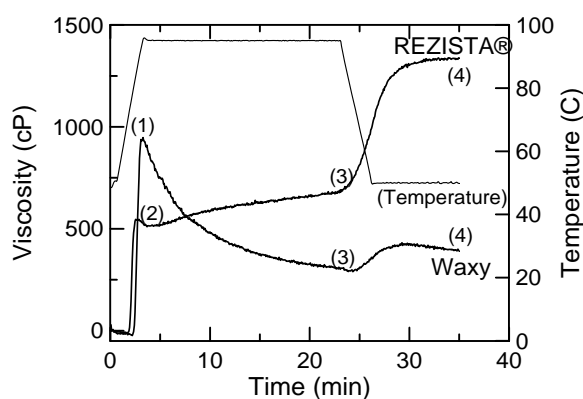
The Rapid Visco Analyser (RVA) is a cooking stirring viscometer with ramped temperature and variable shear profiles optimized for testing viscous properties. The instrument includes international standard methods as well as full flexibility for customer tailor-made profiles. Combining speed, precision,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



Description

This method is applicable to unmodified, substituted (acetyl or hydroxypropyl), crosslinked, and both substituted and crosslinked waxy corn starch. These cook-up food starches are used widely as thickeners and stabilizers in products such as gravies, sauces, soups, pie fillings, dairy foods, puddings and retorted products. An extended hold time at 95°C (203°F) is used to assist in swelling the crosslinked starches and to better differentiate these products.

Example



Analysis	Starch Type	
	Unmodified	Modified
(1) Peak viscosity (cP)*	✓	
(2) Viscosity at 3.00 min. (cP)*		✓
(3) Viscosity at 23.00 min. (cP)*	✓	✓
(4) Viscosity at end of test (cP)*	✓	✓
(5) Delta (cP) [(3)-(2)]		✓

*Subtract viscosity at 0.50 minutes from value to give final result.

Fig. 1. Pasting curve of modified and unmodified waxy corn starches using the ST-01 Method, showing the commonly measured parameters.

Method

Thirty-five-minute pasting profile.

Sample Preparation

Select starch concentration (in pH 6.5 buffer) based on starch viscosity from the relative viscosity table below, to give an end viscosity of 800-1500 cP.

Relative Viscosity	Starch Concentration (dry solids, % w/w)	Example of Starch
Unmodified	5.0	Waxy 1
Modified High Viscosity	4.5	CONSISTA [®]
Modified Medium Viscosity	5.0	PERMA-FLO [®]
Modified Medium-Low Viscosity	5.5	REZISTA [®]
Modified Low Viscosity	6.0	THIN-N-THIK [®]

Preparation of Buffer

Add 0.8 g methyl p-hydroxybenzoate and 0.2 g propyl p-hydroxybenzoate to 150 ml distilled water. Heat to boiling to dissolve solids, and make up to 1 liter with distilled water. Add 10.0 g anhydrous dibasic sodium phosphate, 2.0 g sodium benzoate, and 2.7 g granular citric acid (C₆H₈O₇·H₂O). When solids are all dissolved, adjust pH to 6.5 using citric acid or dibasic sodium phosphate.

Profile

Time	Type	Value
00:00:00	Temp	50°C
00:00:00	Speed	960 rpm
00:00:10	Speed	160 rpm
00:00:30	Temp	50°C
00:03:00	Temp	95°C
00:23:00	Temp	95°C
00:26:00	Temp	50°C
00:35:00	End	
Idle Temperature: 50 ± 1°C Time Between Readings: 4 s		

Measure

Unmodified Starch

PV: Peak viscosity (cP)*

V23: Viscosity at 23 minutes (cP)*

FV: Final viscosity (cP)*

Modified Starch

V3: Viscosity at 3 minutes (cP)*

V23: Viscosity at 23 minutes (cP)*

FV: Final viscosity (cP)*

Delta: V23 – V3 (cP)

*Subtract viscosity at 0.50 minutes from value to give final result.