APPLICATION BRIEF

Physical Testing - Food

Author

Jennifer M.C. Dang

Mark L. Bason

PerkinElmer, Inc.
Sydney, Australia

Martin Hallin

PerkinElmer, Inc.
Stockholm, Sweden

RVA Method 13.04
Extrusion Method

Scope

- Monitor behavior of ingredients in process.
- Product development.
- Monitor consistency of ingredients between production batches.
- Trouble-shooting.
- Examine competitive products

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.

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Description

Extrusion and other cooking processes of foodstuffs such as breakfast cereals, snack foods and animal feeds have marked effects on the starch in the sample. The degree of cook can be assessed by re-cooking the product in the RVA to measure the original degree of transformation in the starch.

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 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.

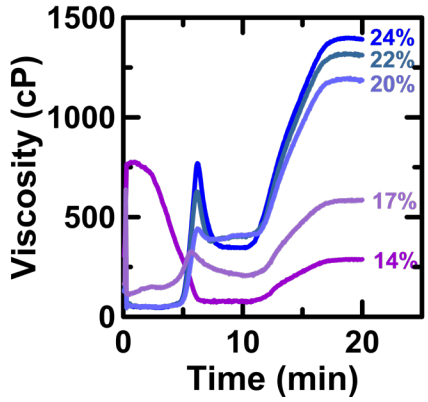

Figure 1. Effect of amount of water added during extrusion on RVA pasting curves of corn-based extrudates. Samples with lower water additions show pasting profiles reflecting a higher degree of cooking of the starch.

Method

Twenty-minute profile, with a lowered initial idle temperature to differentiate between samples. Ethanol or propanol may be used as a dispersant.

Profile1: No alcohol added to sample.

Profile2: Alcohol added to sample.

Sample Preparation

X g sample at 14% moisture, (1.0 g ethanol or propanol), and 25.0 ml distilled water. The amount of sample to use depends on the nature of the material, with typical range from 3.00 to 8.00 g db.

Profile

Profile1

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

Profile2

Time	Type	Value
00:00:00	Temp	25°C
00:00:00	Speed	960 rpm
00:00:10	Speed	160 rpm
00:02:00	Temp	25°C
00:07:00	Temp	90°C
00:10:00	Temp	90°C
00:15:00	Temp	25°C
00:20:00	End	
Idle Temperature: 25 ± 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 Extrusion Index. A higher value indicates a lower degree of cook. The CP is the RVA Cold Extrusion Index. This value will increase with prior gelatinization of the sample, and then decrease where the starch granules have been ruptured and the starch depolymerized during prior cooking. The peak viscosity after commencement of heating and prior to cooling and holding viscosity may also be recorded

PerkinElmer, Inc.
940 Winter Street
Waltham, MA 02451 USA
P: (800) 762-4000 or
(+1) 203-925-4602
www.perkinelmer.com

PerkinElmer®

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