BRABENDER VISCOSITY

PRINCIPLE

The consistency of a starch slurry is continuously measured and recorded through a controlled-temperature cooking program in the Brabender VISCO/amylo/GRAPH instrument.

SCOPE

The procedure described here applies specifically to unmodified regular and waxy corn starch. The method can be applied to modified and derivatized starches by using appropriate concentrations of starch and/or different sensitivity cartridges, but essentially the same temperature program. The method is not applicable to unmodified high amylose starches.

SPECIAL APPARATUS

Viscometer: The Brabender VISCO/amylo/GRAPH, complete with zero suppression, solenoid controlled sample cooling probe, water cooled sample bowl cover, and interchangeable sensitivity cartridges, is recommended. The electronic model, which includes automated temperature programming, can be substituted with equivalent results.

PROCEDURE

Instrument Preparation (manual model only): Set the thermoregulator at 25 °C and place the temperature control lever (transport) in the "UP" position. The 700 cmg cartridge should be placed on the instrument and adjusted so that the indicator pen rests on zero on the chart. Set the timer for 45 mins. Place the double-pole toggle switch marked "COOLING" in the center or "OFF" position and the solenoid controlled sample cooling probe in the "DOWN" position. The water cooled sample cover is made inoperative by placing a clamp on the cover's input hose. No weights are added to the zero suppression pulley.

Standardization: Weigh 40 ± 0.003 g (as is) of calibration starch (Note 1) and transfer to a 600 mL beaker. Weigh 420 ± 0.5 g of purified water. Pour about half of the water into the beaker containing the starch, mix well to suspend the starch completely and transfer to the VISCO/amylo/GRAPH bowl. Rinse the beaker with the remaining water and add the washings to the VISCO/amylo/GRAPH bowl. Turn the instrument on.

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At the end of the 45 min. heating period (92.5 °C) switch the temperature control lever (transport) to its center or "NEUTRAL" position and reset the timer for 15 mins. The 15 min. (hold) period completes the standardization procedure.

The maximum viscosity of the heating portion of the curve should agree within ± 20 chart units of the peak on the calibration curve. To correct for a wider difference, loosen the two Allen screws attached to the center shaft. Then the chuck attached to the center shaft should be loosened. The chucks should be raised/lowered respectively to increase/decrease the indicated viscosity. Retighten the chucks and rerun the calibration starch. Repeat this process until the maximum viscosities of the instrument and standard curve agree to within ± 20 chart units.

The time at which the maximum viscosity is reached using the calibration starch should agree to within ± 1½ mins. to that of the standard curve or the thermoregulator is not reliable. The following check on the reliability of the thermoregulator may be carried out: Pour 500 mL of purified water into the VISCO/amylo/GRAPH bowl, set the thermoregulator for 50 °C, and allow the instrument to run until the red pilot light goes off. Turn the instrument off, raise the measuring head and take the temperature of the water. The temperature should be 50 ± 2 °C. Repeat this test at 70 and 90 °C. If the test(s) fails, replace the thermoregulator.

Sample Analysis: Determine the moisture content of the starch by an approved method. Weigh the equivalent of 36.8 g dry basis (8%) regular corn starch or 23.0 g dry basis (5%) waxy maize starch. Transfer to a 600 mL beaker. Add sufficient purified water to bring the total slurry weight to 460 g. Pour about half of the water into the beaker containing the starch, mix well to suspend the starch completely and transfer to the VISCO/amylo/GRAPH bowl. Rinse the beaker with the remaining water and add the washings to the VISCO/amylo/GRAPH bowl. Set the bowl in the instrument, check instrument settings and turn the instrument on.

At the end of the 45 min. heating period (92.5 °C) switch the temperature control lever (transport) to its center or "NEUTRAL" position and reset the timer for 20 mins.

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RESULTS

Obtained amylograms are compared with standards or references. The points of interest (maximum viscosity, end of 20 min. hold) of any amylogram are noted by indicating the chart reading followed by the sensitivity cartridge used.

Peak Viscosity = 620 Brabender units (700 cmg cartridge)

NOTES AND PRECAUTIONS

1. The C. W. Brabender Instrument Company (50 East Wesley Street, South Hackensack, New Jersey) sells a standardization kit for calibrating instruments. The kit includes a calibration starch sample, instructions for running the test, and an amylogram of the sample run on its standard instrument.

METHOD HISTORY

Corn Starch (Unmodified) (B-9), Date of Accepance 5-27-1968, Revised 4-11-1994.