Application Note

Temperature dependence of viscosity of starch

Industry	:	Food & beverage
Instrument	:	Viscometer
Measurement method	:	Electro Magnetically Spinning Method
Standards	:	

1. Scope

Starch is a polysaccharide composed of two kinds of macromolecules, amylose and amylopectin, which are linked by glucose produced by photosynthesis by plants.
As a food industry, starch is used as a thickener, a water retention material, a texture improving and dispersing agent. And it is used in the pharmaceutical industry as an excipient for pharmaceutical tablets, as a fermentation medium raw material for antibiotics, and as an adhesive for industrial applications in various fields.
Example of measuring the temperature dependence of the dynamic viscosity of starches using an EMS viscometer that can be measured by sealing, sterilization and non-contact were shown below.

2. Precautions

None.

3. Post-measurement procedure

The sample container and the sample are discarded appropriately.

4. Apparatus

- EMS Viscometer
- Control Laptop PC

5. Reagents

- Sample : Potato starch, Corn starch, Wheat starch
- Ion exchanged water (diluent)

6. Procedure

1) Enter the following conditions in measurement condition of the sequence mode of control software.

- ✧ Measurement mode : Sequence mode
- ✧ Measurement temperature : (ⅰ) Heating at 50 ℃for 5 minutes as Pretreatment.
  (ⅱ) Heating from 50 ℃ to 95 ℃ (2 ℃ / min)
  (ⅲ)Keep at 95 ℃ for 30 min
  (ⅳ)Cooling from 95 ℃ to 50℃ (2 ℃ / min)
- ✧ Motor rotation speed : 1,000 rpm
- ✧ Measurement time : I (1 second)~IV(30 seconds)
- ✧ Repeat count : 1 time
  (Continuously measure the rise / fall temperature process)
- ✧ Measurement interval : 0 second
- ✧ Waiting time for temperature stability : 0 minute

2) Place an aluminum spherical probe of φ 4.7 mm and a sample of 700 µL in a container, cover with a cap and packing, set the sample container in the EMS Viscometer, and click the measurement button.

3) Measure another samples on the same condition after the measurement of the first sample is completed.

7. Example

The viscosity measurement results about the temperature dependence, Amylograph, of the Potato starch, Corn starch, and Wheat starch were shown in Figure 1.
The temperature dependence of the viscosity was confirmed for all starches.
We were able to measure the gelatinization / disintegration process of starches (to make amylograph).
For your information, it took about 90 minutes to measure the temperature dependence of the viscosity of one kind of starches, therefore 3 kinds of all starches could be measured within about 4 and half hours.

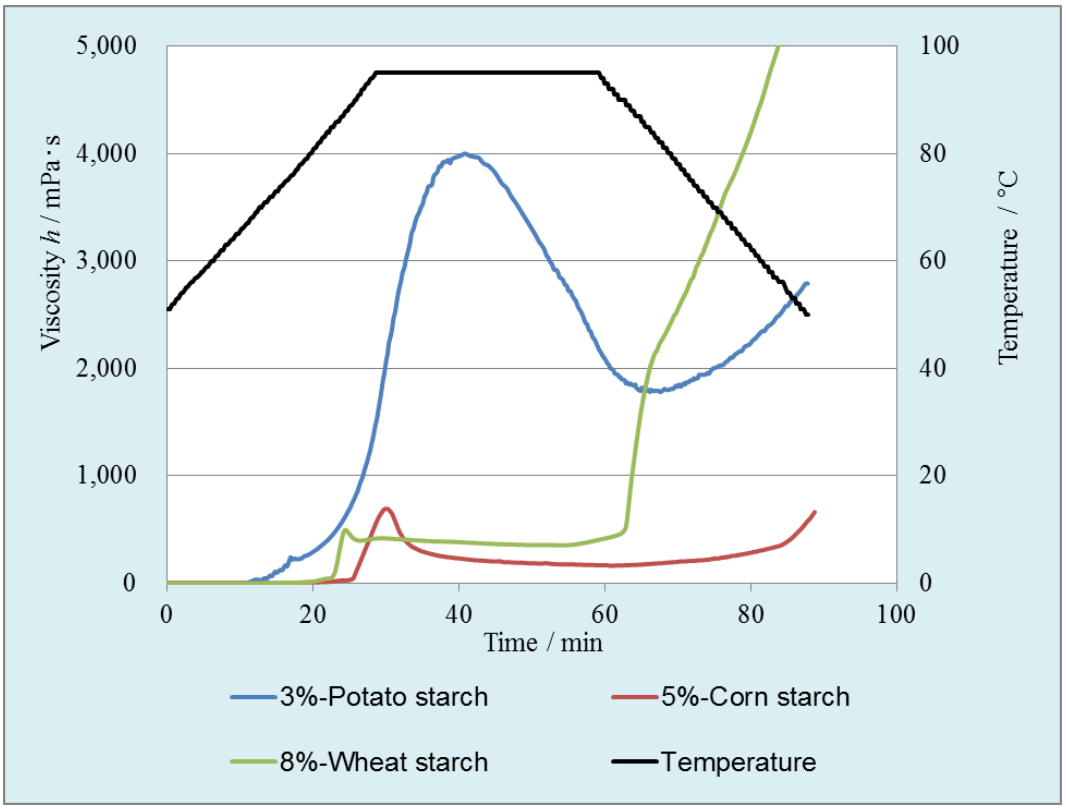

Figure 1. Measurement result about the temperature dependence of the viscosity of starches

8. Summary

The Using an EMS viscometer, it was possible to prepare amylograph of various starch using only 700 µL of each sample solution.

9. References

None.