Quality control of fruit juice

How can viscosity testing help in the production and quality control of fruit juices? This application report shows some typical measurements that are very useful during and even after production of fruit juices with the ViscoQC™ 100.

1 Introduction

Many important parameters for the production control of fruit juices are directly related to the product‘s viscosity. In nearly all production stages the viscosity of food and beverage samples has a great impact e.g. in the mixing process and while pumping the liquid through pipes. Also incoming liquid raw materials have to be controlled by checking their viscosity. The customers’ “mouth feeling” of a fruit juice depends on the thickness of the product and influences the taste. Perfect consistency is guaranteed through quality control checks by ViscoQC™ 100!

1.1 Keywords

Beverage industry, food industry, fruit juice, viscometer, rotational viscometer, viscosity, dynamic viscosity, viscosity beverage, viscometer quality control

2 Experiment

Instrument: ViscoQC™ 100 - L
Spindle: DG26
Speeds: 60 rpm, 80 rpm, 100 rpm
Temperature: 25 °C
Sample: Apple Juice

All measurements were performed with ViscoQC™ 100 - L viscometer from Anton Paar. ViscoQC™ 100 - L is suited for a viscosity range of 1 to 6 000 000 mPa·s. For low-viscosity samples such as apple juice (~1.5 mPa·s), the optional double-gap system DG26 is perfectly suited for measurement.

2.1 Test Procedure

The most common viscosity test is performed at a constant temperature with increasing speed on the sample. With this test the sample‘s viscosity under different speeds can be determined.

2.2 Test Conditions

- 7 ml of the sample was filled into the DG26 and mounted on the ViscoQC™ 100 with the DIN adapter.
- The viscometer was set at the rotational speed of 60 rpm.
- After 30 sec. the measurement mode Stop at Time (@t) automatically stops the measurement and a data point is transferred to V-Collect software.
- The speed was increased step-wise (80 rpm, 100 rpm) and viscosity measurement started again. The dynamic viscosity reading was taken after 30 sec.
- After viscosity determination at the maximum speed, the speed was decreased in steps to the slowest speed.

3 Results and Discussion

The flow behavior of the apple juice is shown in Figure 1. The juice has a so called “Newtonian” behavior. It is an ideal viscous substance. This means that the sample’s viscosity does not change even if a higher speed (higher torque) is applied.

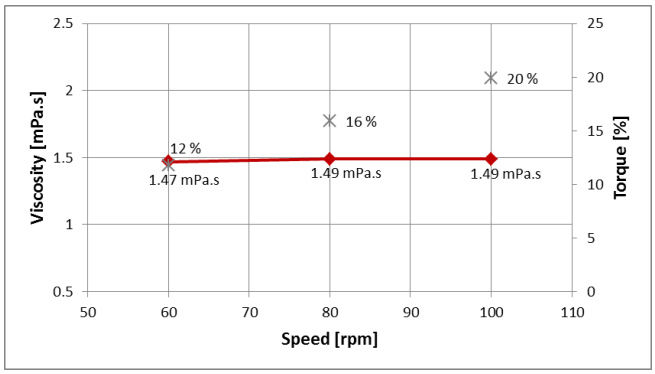

Figure 1: Viscosity of apple juice at different speeds

4 Summary

The viscosity of the fruit juice does not change by increasing the speed. It is a common behavior of clear apple juice instead of nectar because of the different amount of particles in the samples. The viscosity of the juice gives you information about the quality of the juice as well as the customer's satisfaction with the apple juice, e.g. its "mouth feeling.

5 Accessories

For this application several accessories for the ViscoQC™ 100 have been used:

Meas. System DG26	To measure low-viscosity samples such as fruit juices (≥ 1 mPa·s).
DIN Adapter	Used for measurements with DIN spindles like concentric cylinders and the double-gap system.
Pt100 sensor	For monitoring the temperature.
V-Collect Software	Connect ViscoQC™ to a PC with USB interface and export the measurement results directly to the data collection software V-Collect.

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