

Quality control of sauces and dressings

How can viscosity testing help in quality control of sauces and dressings? This application report shows how some simple one-point measurements of food with the ViscoQC™ 100 help to retain steady, perfect consistency of the end product. Dissatisfied customers no longer exist!



1 Introduction

Sauces and dressings mainly consist of oil and water. Additionally, vinegar, spices, and flavorings are added. They can either be spoonable or pourable. When pouring out of the bottle, the sauce has to flow out easily, but afterwards it should stay on the food and should not run off. Furthermore, sauces and dressings must be creamy to create a smooth mouth-feeling. They should also have a slow dissolution rate in the mouth. To control the viscosity of sauces and dressings starch or gum solutions are added. A perfect consistency of the end-product can be guaranteed through quality control checks by the rotational viscometer ViscoQC™ 100.

1.1 Keywords

Food industry, viscosity of vegetable oil, dressing, sauce, viscometer, rotational viscometer, viscosity, dynamic viscosity, viscometer quality control

2 Experiment

Two different samples were measured with different instruments and spindle/speed combinations (Table 1). The salad dressing is water based and the mayonnaise oil based. It was noticeable that the salad dressing contains herbs and vegetable bits.

Sample	Salad dressing	Mayonnaise
Instrument	ViscoQC™ 100 – L	ViscoQC™ 100 – H
Spindle	L1	RH3
Speeds	5, 10, 15 rpm	5, 20, 50 rpm
Guard	L	-
Temperature	ambient conditions	ambient conditions

Table 1: Configuration and measurement conditions during viscosity test of salad dressing and mayonnaise.

All measurements were performed with an Anton Paar rotational viscometer ViscoQC™ 100.

ViscoQC™ 100 – L is suited for low-viscosity substances such as vegetable oils or salad dressings within a viscosity range of 1 to 6M mPa·s (M = million). ViscoQC™ 100 – H is suited for high-viscosity substances such as mayonnaise within a viscosity range of 60 to 320M mPa·s (M = million).

2.1 Test Procedure

The most common viscosity test is performed at a constant temperature with increasing speed applied to the sample. With this test, the sample's viscosity at different speeds can be determined.

Measurements have to be carried out within 10 to 100 % torque. If applicable, measurements should preferably be carried out within 45 to 95 % torque. The highest precision is obtained with highest torque, whereas above 95 % the risk of overshoots exists.

2.2 Test Conditions

- 500 ml of the sample was filled into a 600 ml beaker.
- The viscometer was set at the lowest rotational speed.
- For speeds ≤ 5 rpm the measurement was stopped after 60 sec. For speeds > 5 rpm, the measurement was stopped after 30 sec. The measurement mode "Stop at Time (@t)" automatically stopped the measurement and a data point was transferred to V-Collect software.
- The speed was manually increased step-wise and viscosity measurement started again.

- Measurements were repeated five times for the salad dressing and three times for the mayonnaise.
- Average viscosity values were calculated using the generated data taken from the V-Collect software.

3 Results and Discussion

The viscosity values of the samples at different speeds are shown in Tables 2 and 3. Both samples show a shear thinning flow behavior. This means that the sample's viscosity decreases with increasing speed.

Speed [rpm]	Torque [%]	Viscosity [mPa·s]
5	56	666
10	75	450
15	89	355

Table 2: Averaged viscosity values of salad dressing at different speeds (n = 5)

Speed [rpm]	Torque [%]	Viscosity [mPa·s]
5	49	78 000
20	65	26 000
50	84	13 000

Table 3: Averaged viscosity values of mayonnaise at different speeds (n = 3)

4 Summary

The measurements showed that the ViscoQC™ 100 is perfectly suited to determine the viscosity of dressings and sauces even at different speeds. The shear thinning flow behavior was to be expected due to the particles and ingredients of samples. As opposed to this, olive oil shows a Newtonian behavior. The viscosity of the samples gives you information on the quality of the food. The perfect creamy consistency can be checked with the ViscoQC™ 100 and altered by adding thickening agents if it is too runny.

5 Accessories

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

Flexible cup holder: To exactly center the sample container (600 mL beaker, 1 pint, ½ pint or quart). A different position of the sample vessel is a big risk for erroneous measuring results.

Pt100 sensor: For monitoring the temperature

V-Collect Software: To export measurement results directly to MS Excel via USB interface (PC interface of ViscoQC™ 100)

If you have further questions regarding this application report, please contact your local Anton Paar representative.

Contact Anton Paar GmbH

Tel: +43 316 257-0

support-visco@anton-paar.com

www.anton-paar.com