

Rotational Viscosity Testing of Cough Syrup with ViscoQC Series

How can viscosity testing help in quality control of pharmaceutical liquids? This application report shows how simple viscosity measurements of pharmaceutical liquids with the ViscoQC series help to retain steady, perfect consistency of the medicine.



1 Introduction

The “thickness” of pharmaceutical liquids, like cough syrup, plays a major role in quality control. Liquids with a high viscosity flow more slowly than low-viscosity liquids. Cough syrup needs a high viscosity for several reasons. One reason is that it has to stay on the spoon for medication. Furthermore, cough syrup should flow slowly through the digestive tract to coat the surface of the throat and not flow off. Only cough syrup, which stays long on the affected area in the throat, has a soothing effect by increasing the moisture.

1.1 Keywords

Viscometer pharma, viscometer cough suppressant, viscosity quality control, touch viscometer, rotational viscometer, dynamic viscosity, digital viscometer, determination of viscosity

2 Experiment

The viscosity of two different types of cough syrup was determined. Whereas ViscoQC 100 – R was used for a quick single point check at 60 rpm, with ViscoQC 300 – R a multi-point analysis at 6 speeds has been performed. With both models, the absolute measuring system DG26 was used (Table 1).

Sample	Cough syrup A and B	
Instrument	ViscoQC 100 - R	ViscoQC 300 - R
Measurement type	Single-point	Multi-point
Spindle	DG26	
Speed [rpm]	60	20, 30, 40, 50, 60, 70
Temperature	ambient conditions	

Table 1: Configuration and measurement conditions during viscosity test of cough syrup with ViscoQC series.

ViscoQC series – R is suited for medium-viscosity substances within a viscosity range of 10 to 40M mPa·s (M = million).

2.1 Test Procedure

Single-point viscosity determinations using ViscoQC 100 are perfectly suited for quick quality control checks of pharmaceutical liquids.

For multi-point analysis at different speeds to study the flow behavior, ViscoQC 300 is the best choice.

The measurement mode “Speed Scan (SpS)” of ViscoQC 300 can be used for performing a speed ramp. The speed is automatically increased step-wise from low to high speeds in a linear scale with a defined measurement point number and duration.

2.2 Test Conditions

- 7 mL of the sample was filled into the DG26 using a syringe and mounted on the ViscoQC with the DIN adapter.
- With ViscoQC 100 the viscosity was determined at 60 rpm using the measurement mode “Stop at Time (@t)”. The single-point measurement time was set to 30 sec. With ViscoQC 300 a linear speed ramp from low to high speed with 6 measurement points was performed. The measurement point duration was set to 30 sec for the whole speed range.
- Measurements were repeated five times and average viscosity values were calculated.

- Using ViscoQC 100 the data has to be printed directly after measurements via V-Collect or Dymo® LabelWriter™ as it does not feature a data memory. While performing measurements with ViscoQC 300 the data of the measurements are stored in the data memory of the instrument. For that reason, measurement data can be printed/exported after measurement via V-Collect, Dymo® LabelWriter™, pdf export/csv table, page printer (network/USB) and LIMS. A direct printout during measurement is also possible with V-Collect or Dymo® LabelWriter™ (recommended only for measurements with max. 3 points).

By activating the upgradable software package “V-Curve” on ViscoQC 300, a real time graph is shown on the display of the instrument with the possibility of pdf export afterwards (Figure 2).

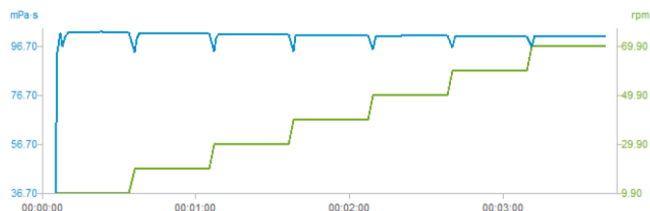


Figure 2: Online graph of one measurement of cough syrup A. Available for ViscoQC 300 with the optional upgradable V-Curve software package.

3 Results and Discussion

The determined single-point viscosity value with ViscoQC 100 is shown in Table 2. The determined viscosity values of the samples at different speeds with ViscoQC 300 are shown in a diagram in Figure 1. In contrast to water and juices for example, the cough syrup samples have a relatively high viscosity. Cough syrup A has a higher viscosity than cough syrup B. Both cough syrups have Newtonian flow behavior. The viscosity does not change with increasing the speed. Slight differences in viscosity over the speed range can be led back by the 1%-accuracy of the instrument.

4 Summary

The measurements showed that the digital viscometer ViscoQC is perfectly suited to determine the viscosity of cough syrup even at different speeds. The viscosity of the samples gives you valuable information on the quality of pharmaceutical liquids. The perfect “thickness” can be easily checked with the ViscoQC 100 at single-points or with the ViscoQC 300 at multiple points with the option of performing an automated speed ramp. The torque model R with the DG26 allows you to monitor the viscosity over a wide speed range. An optional upgradable V-Comply Software Package that includes the Pharma Qualification Package (PQP) is available for ViscoQC 300. Both, V-Comply software as well as the documentation (PQP), fulfill the regulations of 21 CFR Part 11.

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

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	Cough syrup A	Cough syrup B
Speed [rpm]	60	60
Torque [%]	76	31
Viscosity [mPa·s]	94	41

Table 2: Averaged viscosity value at 60 rpm of cough syrup A and B (n = 5). Measurements have been performed with ViscoQC 100 – R.

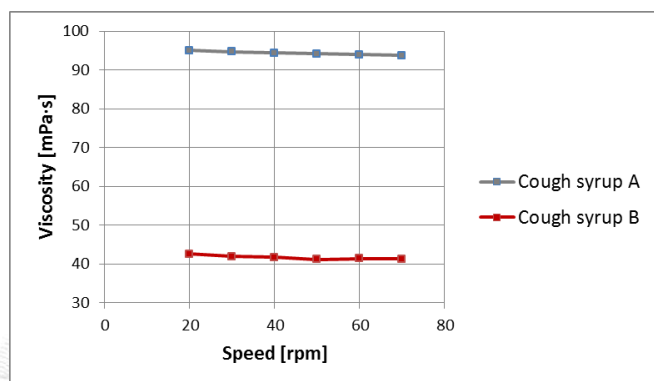


Figure 1: Viscosity of two different cough syrups at certain speeds determined with ViscoQC 300 – R and the measurement mode Speed Scan. (Averaged viscosity values of five measurements at each speed)