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Choose with confidence! – Protein viscosity measurement on *micro*VISC™ and VROC® initium

Key Words: viscosity, protein solution, Bovine Gamma Globulin (BGG), shear rate sweep

Goal: Viscosity data for a concentrated Bovine Gamma Globulin (BGG) formulation was obtained using both the *micro*VISC™ and VROC® initium. Excellent agreement is achievable because the core microfluidic technology is consistent across the entire range of RheoSense products. Whether you need the convenience of a portable instrument with disposable pipettes or a fully automated hands-free system with even lower sample volume, you can expect the same data quality.

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Viscosity Measurement & Data

Everyone should be measuring viscosity, but not everyone has the same circumstances and needs. In this application note, we illustrate the consistency of data obtained on two of the RheoSense viscometers, each designed to provide different advantages to the user. The lower cost *micro*VISC™ is portable with disposable sample pipettes, while the VROC® Initium is fully automated with the option to use even less volume with sample retrieval. Table 1 contains relevant flow channel and instrument details.

	Chip	Max Pressure (kPa)	Channel Depth (μm)	Max Flow Rate (μL/min)	Sample Volume* (μL)	Average Viscosity** (cP)
*micro*VISC™	A05	10	50	450	1000	3.05
VROC® initium	B05	40	50	1000	100	3.04

Table 1: Instrument and flow channel characteristics. (*Total volume used for all shear rates presented in Figure 1. **Viscosity averaged over all shear rates.)

Testing at 25°C was performed on a Bovine Gamma Globulin (BGG) formulation in PBS at a concentration of 112 mg/mL. The overall shear rate range was from 1000 to 20,000 sec^{-1} for this sample. Although there is an overlap region, each instrument had a different shear rate range due to the available chip options and pumping capabilities.

The viscosity versus shear rate data is presented in Figure 1 with each symbol representing an average of 3-5 data points. The viscosity is independent of shear rate, or Newtonian, in the accessible shear rate range. The excellent agreement between instruments is clearly visible, but can also be assessed by comparing the viscosity averaged over all shear rates for each instrument. These average values are 3.05 and 3.04 cP for the *micro*VISC™ and VROC® initium, respectively.

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✓ Measurement Tip

Proteins can stabilize air bubbles due to the presence of hydrophobic groups in some of the amino acids. You can easily handle this situation with the proper measurement procedure and obtain consistent data. First, ensure that there are no bubbles in either the sample vial or pipette. Centrifuge the samples vials and treat the pipettes just as you would a syringe (e.g. tap to move bubbles to tip and force out). Next, prime or fill the flow channel using an adequate volume of fluid at a moderately high shear rate to force any bubbles that might form during this process through the chip. Starting at a low rate may not provide enough force to move the bubbles out of the channel. This step can be incorporated into the measurement protocol with the **VROC® initium** software and while testing with the ***micro*VISC™** by choosing the advanced mode rather than automatic. After the channel is primed and bubble free, testing at various rates will be no problem.

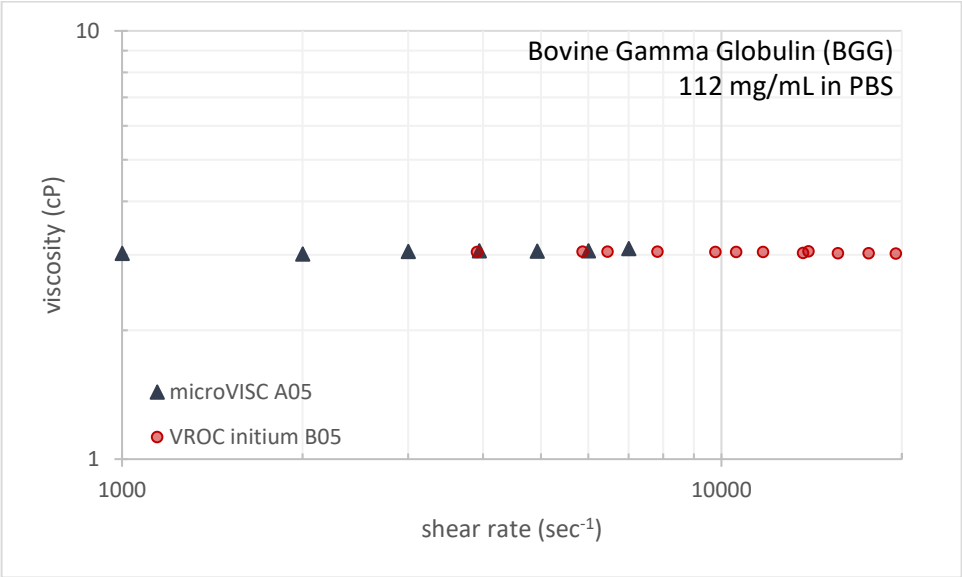

Figure 1: Viscosity versus shear rate for 112 mg/mL Bovine Gamma Globulin in PBS at 25°C.

Concluding Remarks

RheoSense has you covered regardless of your testing needs. The automated **VROC® initium** with sample retrieval is ideal for high throughput R&D testing with minimal volume. If a quick confirmation measurement is required, then the ***micro*VISC™** is portable and simple enough to take anywhere. Either option gives consistent quality data. Choose the instruments you need with confidence!

If this note is helpful, please let us know! If you have questions or need more information about this product or other applications, please contact us:

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