

Upgrade with confidence! – Sample recovery with the VROC® initium

Key Words: viscosity, polymer solutions, eye drops, protein solutions

Goal: The option of recovering your sample after viscosity testing is now available with the **VROC® initium**. Viscosity data is presented on a variety of samples including dilute protein solutions and commercially available eyedrop formulations. A comparison is made between the initial viscosity measurement on the fresh sample and that made after each of three recovery cycles to assess the impact of the process. The change in viscosity was dependent on the specific sample and the number of recovery cycles, but all fell within the range of 0 to 3%. Consistent viscosity data after recovery proves that you can upgrade to the **VROC® initium** and stop sacrificing precious samples!

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Introduction

The newly released recovery feature is distinct from the existing sample retrieval, which allows one volume of sample to be tested repeatedly. Selecting the recovery option instructs the autosampler syringe to return the sample back to the original vial after the measurement protocol is completed. This feature makes the sample available for further analysis which can include different analytical methods or additional viscosity measurement. Sample recovery is ideal for developing aging or stability test methods especially when also utilizing the vial rack temperature control option.

Experiment

The impact of the sample recovery process was assessed for five samples including two over-the-counter eyedrops, two dilute protein solutions (Bovine γ -Globulin and Bovine Serum Albumin), and phosphate buffered saline (PBS). Formulation details are presented in **Table 1**. Viscosity was measured on the **VROC® Initium** using the B05 chip having a flow channel depth of 50 μm and maximum pressure limit of 40 kPa. The vial storage rack temperature was maintained at 20-23°C between measurements performed at 25°C. The flow rate for all samples was 1000 $\mu\text{L}/\text{min}$ (20,000 sec^{-1}) except for the theratears® which was tested at 500 $\mu\text{L}/\text{min}$ (10,000 sec^{-1}). Viscosity was measured on fresh sample and then again after each of three recovery cycles (R1, R2, R3). Reported values are an average of 10-12 measurements.



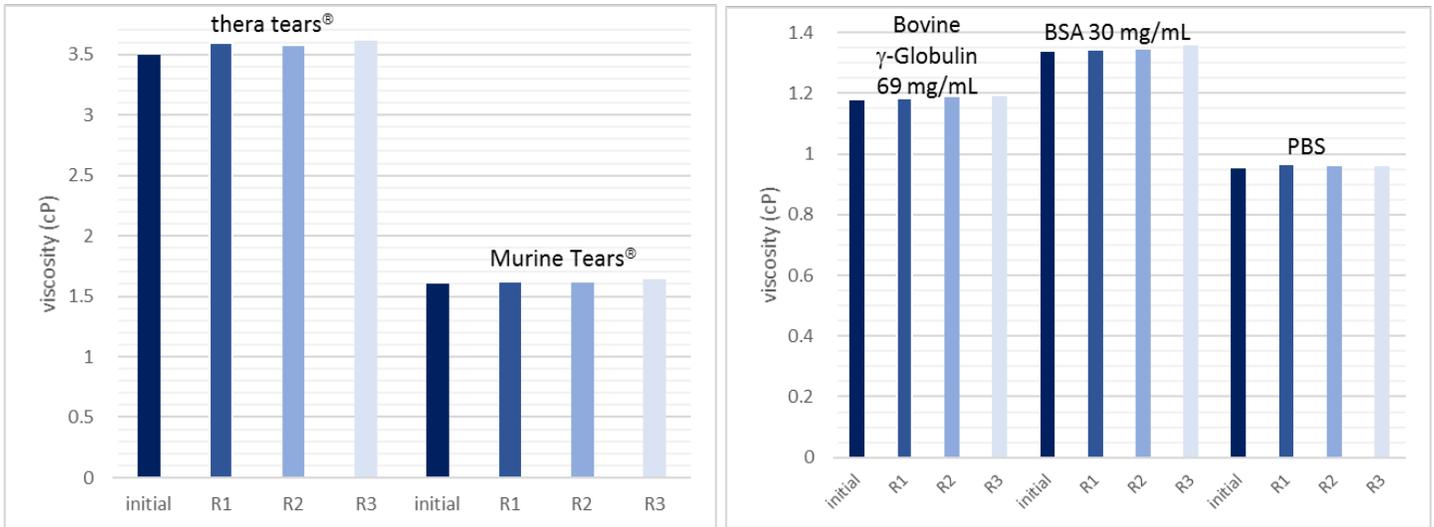


Figure 1: Viscosity at 25°C for the five solutions including the initial measurement on fresh sample and after each of three recovery cycles (R1, R2, and R3).

Sample	Run	Viscosity (cP)	% change
thera tears® (sodium carboxymethyl cellulose)	Initial	3.50	-
	1st recovery (R1)	3.60	2.9
	2 nd recovery (R2)	3.57	2.0
	3 rd recovery (R3)	3.61	3.1
Murine Tears® (polyvinyl alcohol)	Initial	1.60	-
	1st recovery (R1)	1.61	0.6
	2 nd recovery (R2)	1.61	0.6
	3 rd recovery (R3)	1.64	2.5
Bovine γ-Globulin 69 mg/mL in PBS	Initial	1.18	-
	1st recovery (R1)	1.18	0.0
	2 nd recovery (R2)	1.19	0.8
	3 rd recovery (R3)	1.19	0.8
Bovine Serum Albumin (BSA) 30 mg/mL in PBS	Initial	1.34	-
	1st recovery (R1)	1.34	0.0
	2 nd recovery (R2)	1.34	0.0
	3 rd recovery (R3)	1.36	1.5
Phosphate Buffered Saline (PBS)	Initial	0.95	-
	1st recovery (R1)	0.96	1.0
	2 nd recovery (R2)	0.96	1.0
	3 rd recovery (R3)	0.96	1.0

Table 1: Viscosity data for two commercial eyedrop formulations, two dilute protein solutions, and PBS. The reported viscosity is an average of 10 to 12 measurements.

Viscosity Data and Discussion

The viscosity data is presented graphically in **Figure 1** for the five samples. Average viscosity values and the percent change from the initial measurement with each recovery step are also included in **Table 1**. The change in viscosity upon recovery varies slightly from sample to sample ranging from 0 to at most 3%. A potential cause for the minimal change is evaporation that occurs between measurements. The sensitivity would depend on the slope of the viscosity versus concentration curve for the formulation as well as the storage environment and time. Future testing to clarify the changes will include more concentrated samples and stricter environmental control such as reducing the storage rack temperature



to the minimum of 4°C and promptly replacing the cross-cut vial caps after puncture with the autosampler syringe.

Concluding Remarks

The **VROC® Initium** now includes both sample retrieval and recovery. After extensive measurement utilizing the retrieval feature, samples can be recovered for future testing including either alternative analytical methods or additional viscosity measurement. It also provides opportunity to develop more convenient stability or aging test protocols. It is time to upgrade with confidence to the **VROC® Initium** to preserve your precious samples and time!

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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