

## Viscosity + Lumetics LINK™

### INTRODUCTION

LINK is the software solution for automated analytical data import, analysis, and reporting. LINK scans network locations for new measurement files, extracts all useful data, and copies this data directly to a centralized database. The powerful analysis user-interface allows datasets to be aggregated, grouped, and visualized in the form of charts/tables/images. User-customizable analysis templates deliver rapid and error-free data visualization, with the ability to be replicated across many studies and shared within your organization.

All instrument settings and parameters calculated by the instrument software are copied to the LINK database, including full underlying raw data curves. Sample metadata may be easily assigned and incorporated within the analysis to integrate various product/process variables. LINK has been demonstrated to deliver time savings more than 90% and provide a highly affordable fully automated data management and analysis solution.

LINK currently supports VROC Initium and m-VROC Viscometers.

### VISCOSITY DETAILS & APPLICATIONS

Viscosity is the measurement of the viscosity of fluids by observing the relative motion of the fluid and an object. A viscometer is the instrument used to accomplish this measurement. LINK may be utilized to assist directly in the following Viscometer application areas:

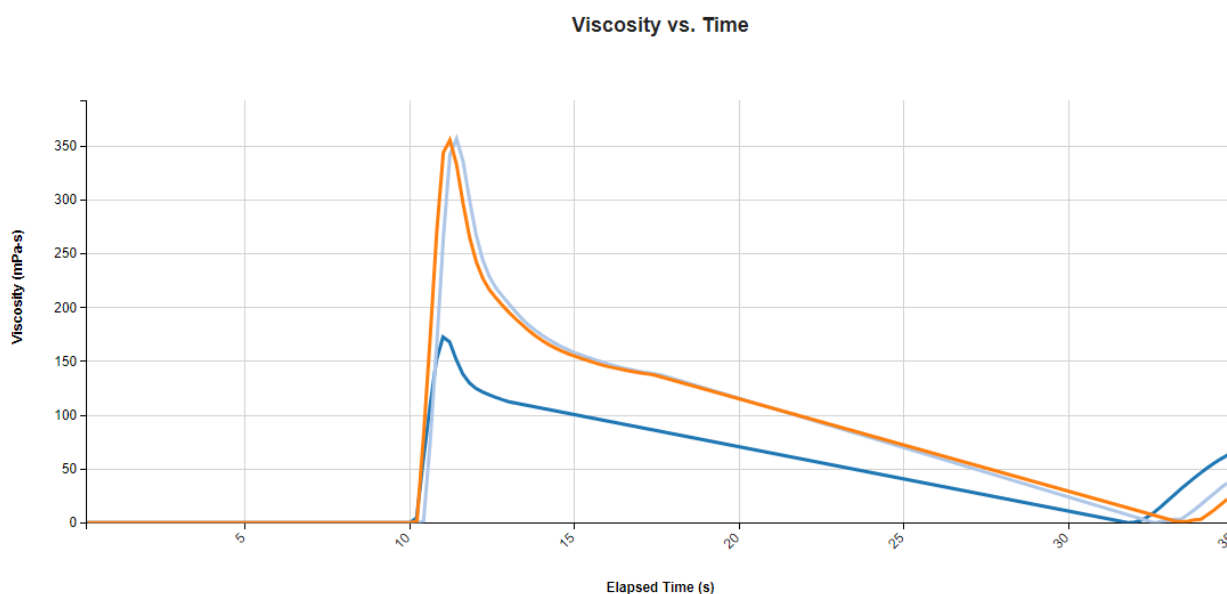
- Viscosity-injectability
- Stability of protein therapeutics
- Enzymatic reaction kinetics
- Molecular weight & size
- Solubility studies

### INSTRUMENT SUPPORT DETAILS – VROC INITIUM

**VROC Initium** from RheoSense applies the standard principles of rheometry and created a dynamic micro-sample viscometer by adding microfluidics while reducing the size of the device with MEMS (micro-electrical mechanical systems) manufacturing. The result was a new platform which offers capabilities that are well beyond the limits of conventional viscometers in not only the sample volumes required, but the measurement range and precision.

LINK supports VROC Initium Viscometer data sets for instrument/analysis settings, parameters, calculations, and raw data curves for Chip Temp (°C), Viscosity, Pressure (S1, S2, S3, S4) vs. Elapsed Time (s)

Fig 1. Line Chart dashboard visualizing VROC raw data curves for Viscosity (mPa-s) vs. Elapsed Time(s)

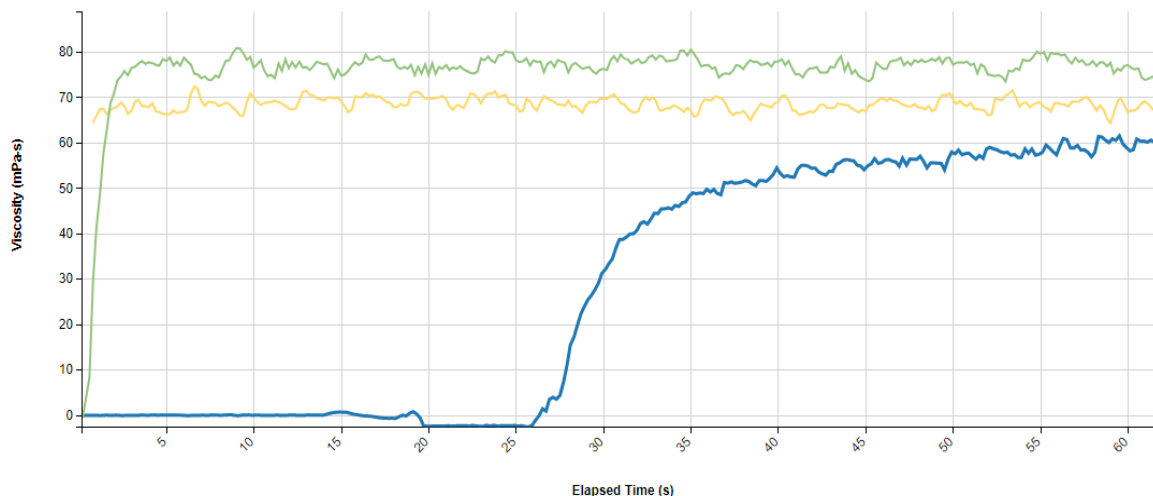


## INSTRUMENT SUPPORT DETAILS – M-VROC

*m-VROC*<sup>™</sup> from RheoSense is an automated, small sample viscometer capable of the most demanding applications including small sample protein therapeutics.

LINK supports VROC Initium Viscometer data sets for instrument/analysis settings, parameters, calculations, and raw data curves for Chip Temp (°C), Viscosity, Pressure (S1, S2, S3, S4) vs. Elapsed Time (s)

**Fig 2. Line Chart dashboard visualizing m-VROC raw data curves for Viscosity (mPa-s) vs. Elapsed Time (s)**  
**Viscosity vs. Time**



## VISUALIZATIONS – LINK ANALYSIS

LINK’s dynamic analytical suite will aggregate data and provide visualization tools to suit your specific needs. Imported Nephelometry Systems measurement data can be analyzed using the LINK platform’s customizable charts, tables, calculations, images etc. User-customized analysis templates deliver rapid and error-free data visualization with the ability to be exported as a word report to share across your organization.

**Fig 3. Critical Quality Attribute vs. Sample Metadata**

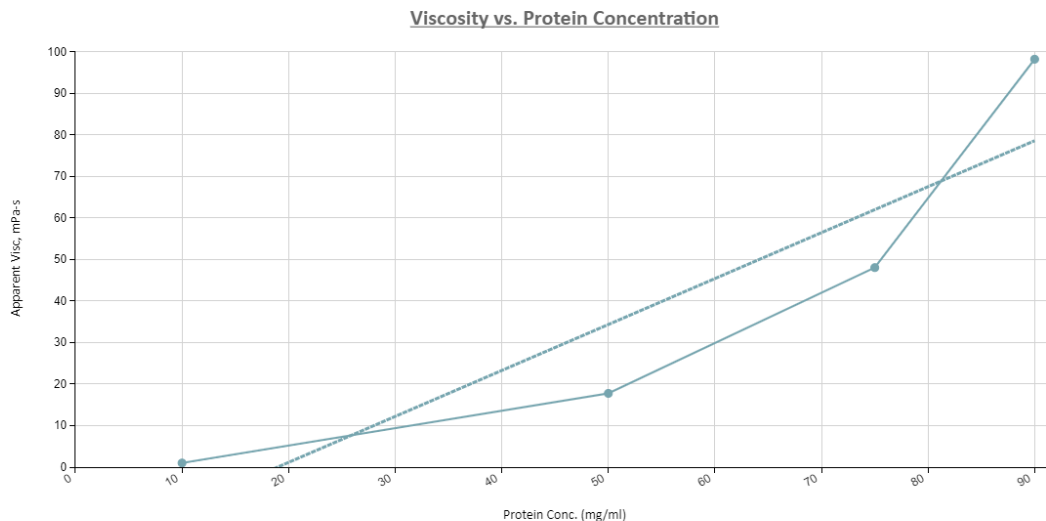


Fig 4. Critical Quality Attribute vs. Sample Name

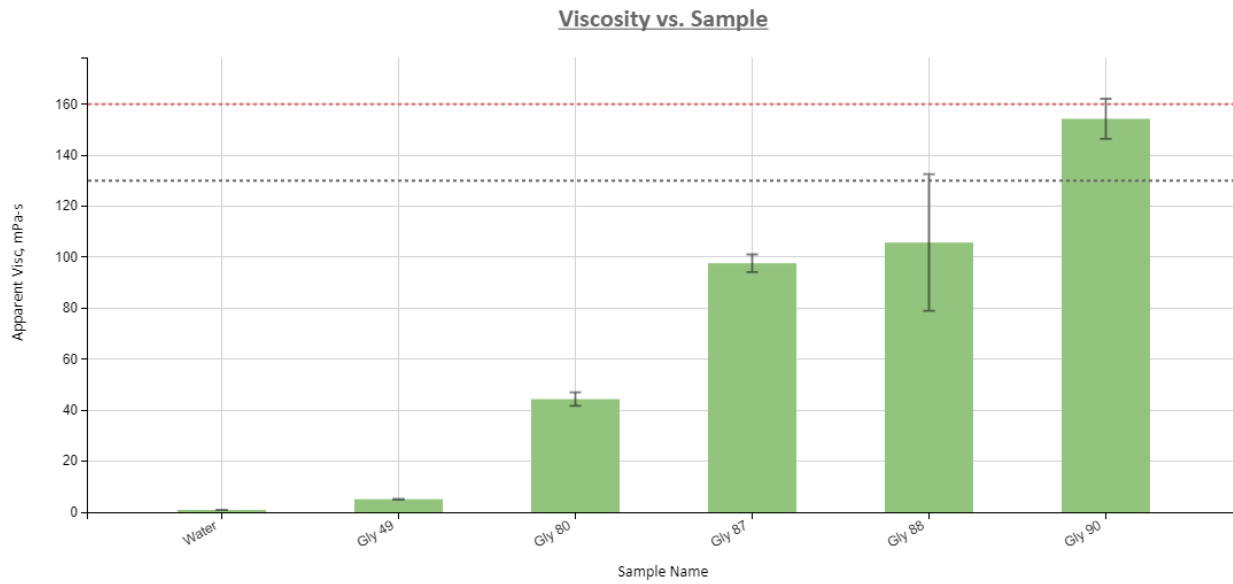


Fig 5. Multiple Critical Quality Attribute Visualization

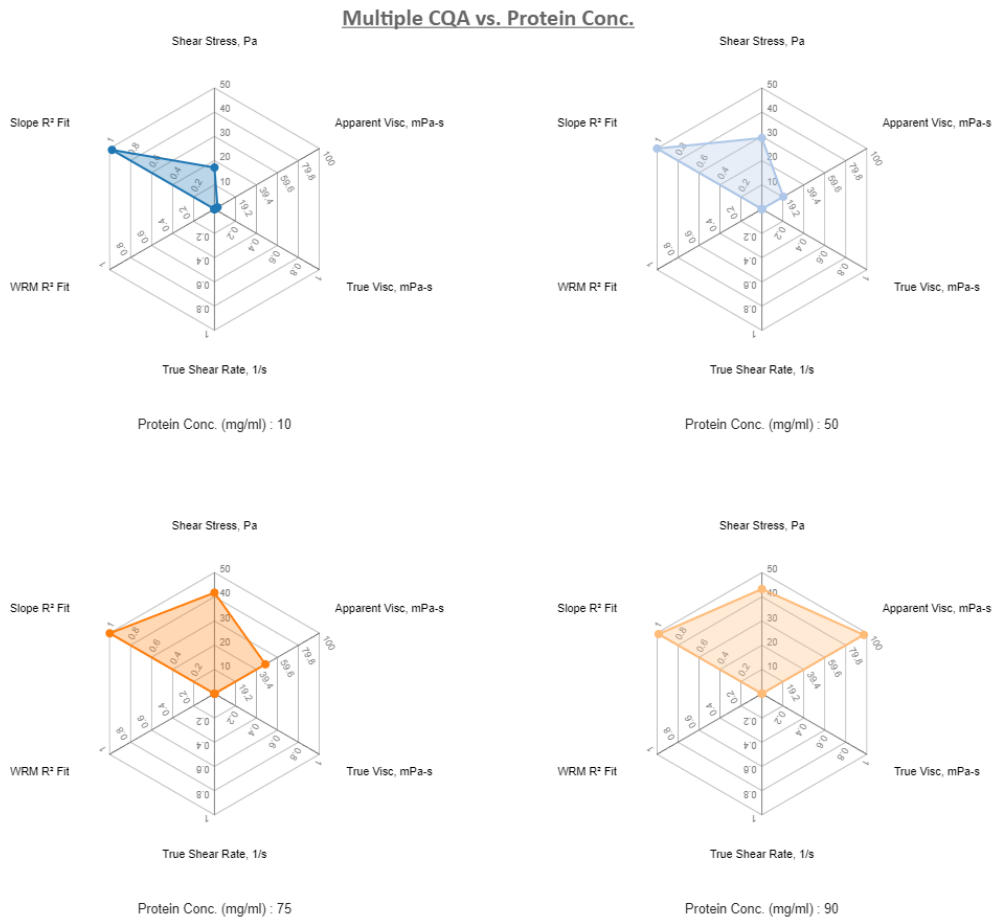


Fig 6. Line Chart dashboard visualizing Viscosity Raw Data measurement data for Pressure vs. Sensor Position

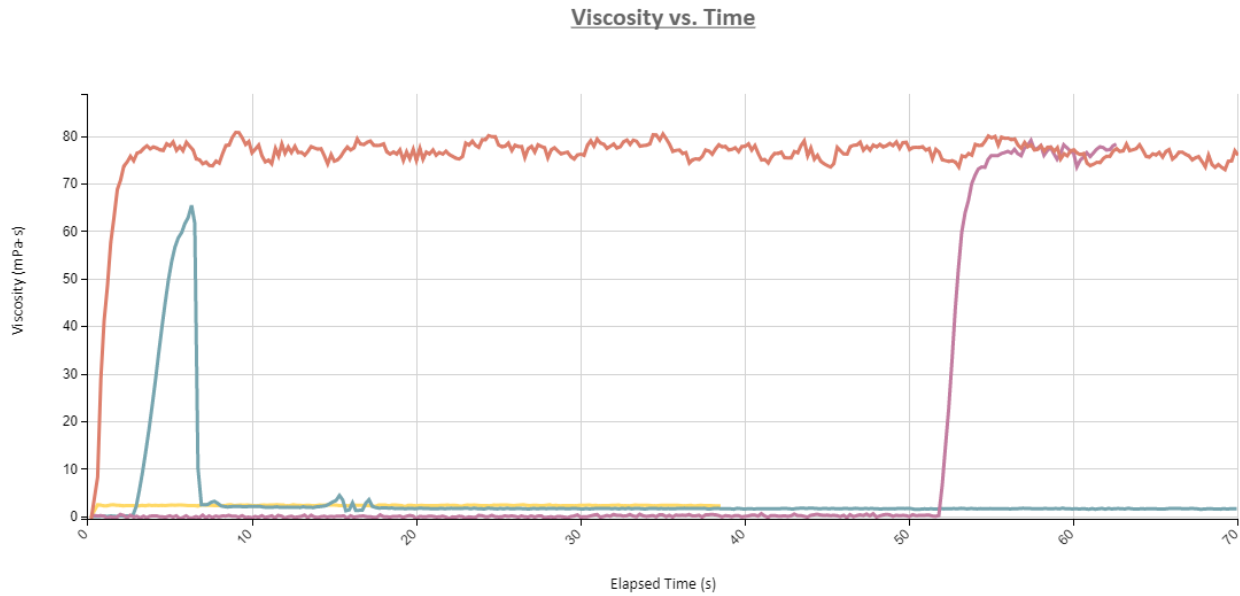


Fig 7. Tabular Summaries

Measurement Summary Table – Measurement Results

Sample Name	Segment - AVG	Appar. Shear Rate, 1/s - AVG	Slope R <sup>2</sup> Fit - AVG	Shear Stress, Pa - AVG	% Full Scale - AVG	Apparent Visc, mPa-s - AVG
	1.00	9525.00	0.53	0.03	0.00	0.00
Gly 49	5.50	3438.75	1.00	17.53	19.98	5.10
Gly 80	5.84	942.71	1.00	41.80	46.19	44.34
Gly 87	5.84	458.63	1.00	44.77	49.33	97.63
Gly 88	6.00	321.95	0.95	35.92	41.40	105.75
Gly 88 (overpressure)	6.00	225.78	0.55	27.30	31.67	66.13
Gly 90	5.84	323.87	1.00	49.96	54.95	154.27
MGVS100	5.87	3115.67	1.00	31.77	35.79	10.23
MGVS60	5.87	2919.80	0.81	18.30	21.13	4.91
MGVS60 (out of sample)	2.50	1905.75	0.50	11.44	13.25	2.50
MGVS60 (temperature)	6.00	3809.91	1.00	23.25	27.44	6.10
Water	6.50	19322.02	1.00	17.16	18.70	0.89

## VISCOSITY DASHBOARDS

LINK contains an extensive built-in dashboard library from LINK version 2.4.0.210401 and later. This function contains specific pre-created dashboards for all instruments and application groups.

## CONTACT LUMETICS

For direct assistance, please contact Lumetics LINK™ Support:

E-mail: [support@lumetics.com](mailto:support@lumetics.com)

Phone: 1.613.614.874

Website: <http://lumetics.com/>

