

# Streamlining Data Analysis: Introducing the Maurice Chromeleon Driver Kit

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## Introduction

The new Maurice Chromeleon Driver Kit gives you direct control of your Maurice™ system with Thermo Scientific™ Chromeleon™ Chromatography Data System (CDS). Whether you need a centralized data management system for your lab or are simply looking for familiar software for your Maurice instrument, you can now collect and analyze imaged icIEF (icIEF) and CE-SDS data using Chromeleon CDS.

To demonstrate the power of the Maurice Chromeleon Driver Software, this application note compares results between Compass for iCE - the Maurice system's default software - and Chromeleon CDS. For both icIEF (also referred to as "cIEF" interchangeably in this document) and CE-SDS, data are presented on the following quantitative aspects:

- Reproducibility
- Linearity
- Limit of detection (LOD)



## Benefits of the Maurice Chromeleon Driver Kit:

- You can now collect and analyze icIEF and CE-SDS data from the Maurice system using Chromeleon CDS.
- Data collected and analyzed on Chromeleon software is comparable to Compass for iCE.
- The Maurice Chromeleon Driver Software offers benefits such as pI recalibration, 21 CFR Part 11 compliance, data integrity, and seamless integration across labs.

## Materials and Methods

Table 1 lists the samples and test kits used in this study. The kits contain the necessary reagents to conduct their respective assays.

**TABLE 1. List of materials and reagents used in this study.**

Material	Vendor	Catalog Number
Research Grade Rituximab Biosimilar Antibody	R&D Systems, a Bio-Techne Brand	MAB9575
Maurice cIEF Cartridge	ProteinSimple, a Bio-Techne Brand	PS-MC02-C
Maurice Turbo CE-SDS Cartridge		PS-MC02-TS, PS-MC01-TS
Maurice CE-SDS PLUS Cartridge		PS-MC02-SP
Maurice cIEF Method Development Kit		PS-MDK01-C
Maurice Turbo CE-SDS Application Kit		PS-MAK01-TS
Maurice CE-SDS PLUS Size Application Kit		PS-MAK03-S
Maurice CE-SDS IgG Standard		046-039
Iodoacetamide (IAM)		Millipore Sigma
$\beta$ -mercaptoethanol ( $\beta$ -ME)	M-3148	

### iCIEF

#### Sample Prep:

The Maurice cIEF System Suitability Test (provided in the cIEF Method Development Kit) was prepared as described in the [product insert](#) and run using the default System Suitability method.

Rituximab was prepared at 0.125mg/mL with pl markers 7.05 and 10.17 in 0.35% methyl cellulose, Pharmalytes 8-10.5 (3.75%) and 5-8 (1.25%), 4M urea, 6.25 mM IDA, and 6.25 mM arginine.

#### Method:

Separate for 1 minute at 1500 V  
Additional 8 minutes at 3000 V

#### Imaging:

Absorbance and native fluorescence (NF)

#### Analysis:

Compass for iCE and Chromeleon CDS

### CE-SDS

#### Sample Prep:

The Maurice CE-SDS IgG Standard was prepared according to the instructions in the [product insert](#) for analysis with Turbo CE-SDS and CE-SDS PLUS cartridges.

#### Method:

- **Turbo CE-SDS method**  
Sample load for 8 seconds at 3500 V  
Separation at 4200 V for  
5.5 minutes (reduced samples)  
8 minutes (non-reduced samples)
- **CE-SDS PLUS method**  
Sample load for 20 seconds at 4600 V  
Separation at 5750 V for  
25 minutes (reduced samples)  
35 minutes (non-reduced samples)

#### Detection:

Absorbance (220 nm)

#### Analysis:

Compass for iCE and Chromeleon CDS.



## Results

This section demonstrates data comparability between Chromeleon CDS and Compass for iCE using three different methods on the Maurice system—iCE, Turbo CE-SDS, and CE-SDS PLUS.

For each method, representative electropherograms are shown on both software interfaces, followed by a comparison of results (apparent pI and percent peak area), method linearity, and LOD.

icIEF



FIGURE 1. Maurice System Suitability Test sample on Chromeleon CDS and Compass for iCE.

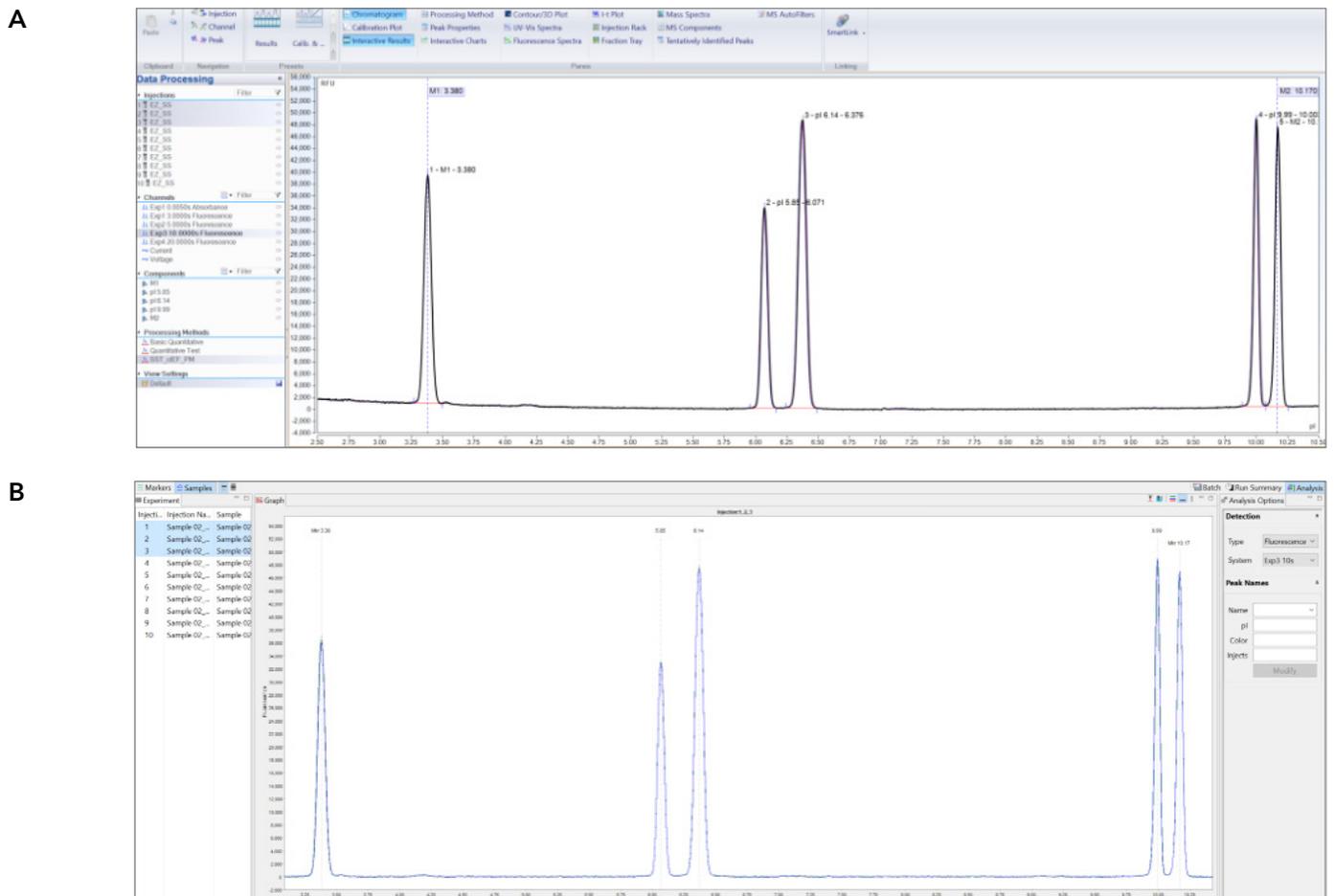


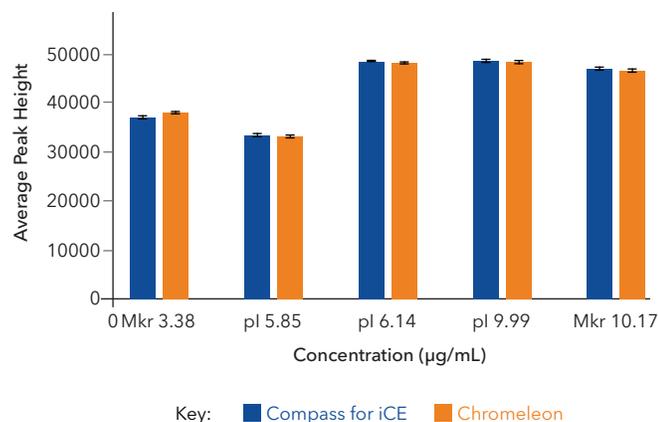
FIGURE 1. Representative electropherograms of the Maurice System Suitability Test sample on Chromeleon CDS and Compass for iCE. A. A typical icIEF electropherogram is displayed on the Chromeleon CDS interface using the Maurice Chromeleon Driver. It further showcases how reproducible the data are with three consecutive plots overlaid. B. A second batch with replicate assay conditions was analyzed with Compass for iCE, where three consecutive plots are overlaid to demonstrate reproducibility.

**TABLE 2. System Suitability pI values on Chromeleon CDS and Compass for iCE.**

Injection Number	Chromeleon CDS			Compass for iCE		
	pI 5.85	pI 6.14	pI 9.99	pI 5.85	pI 6.14	pI 9.99
1	6.07	6.38	10.00	6.07	6.37	9.99
2	6.07	6.37	10.00	6.07	6.37	10.00
3	6.07	6.37	10.00	6.07	6.37	9.99
4	6.07	6.37	10.00	6.07	6.37	9.99
5	6.07	6.36	9.99	6.07	6.37	10.00
6	6.07	6.37	10.00	6.07	6.37	9.99
7	6.07	6.37	10.00	6.07	6.37	10.00
8	6.07	6.37	10.00	6.07	6.37	9.99
9	6.07	6.37	10.00	6.07	6.37	10.00
10	6.07	6.37	10.00	6.07	6.37	9.99
<b>Average</b>	6.07	6.37	10.00	6.07	6.37	9.99
<b>%CV</b>	0.03	0.06	0.02	0.01	0.01	0.01

TABLE 2. A comparison of pI values of the System Suitability sample detected on Chromeleon CDS and Compass for iCE. Average pI values calculated for each of the three pI markers (5.85, 6.14, and 9.99) over 10 injections are shown. Notably, the pI values shown on both software are highly comparable, showing how well Chromeleon CDS works with Maurice. The data also show how reproducible the method is, as denoted by the low coefficient of variation (%CV).

**FIGURE 2. System Suitability peak height on Chromeleon CDS and Compass for iCE.**



**FIGURE 3. Method linearity on Chromeleon CDS and Compass for iCE.**

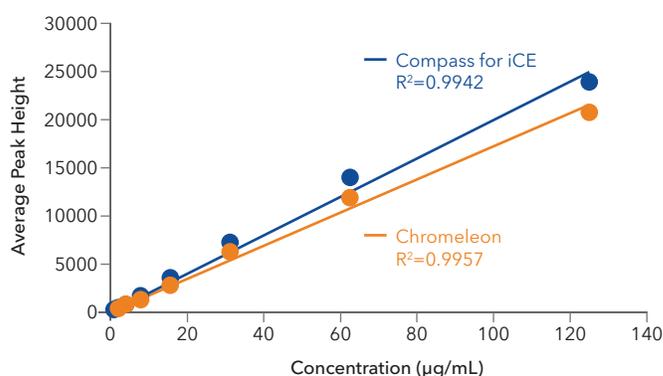


Figure 3. Demonstration of excellent method linearity by Chromeleon CDS and Compass for iCE. Rituximab samples were serially diluted two-fold, ranging from 125-0.1 µg/mL, and analyzed on the Maurice system with NF detection in two separate batches (one controlled with Chromeleon CDS and the other with Compass for iCE). Concentration was plotted against the average peak height, resulting in high R<sup>2</sup> values obtained from both software and demonstrating robust linearity of the iCE method on Maurice.

**TABLE 3. Limit of detection.**

	Chromeleon CDS	Compass for iCE
Rituximab LOD (µg/mL)	0.32	0.20

Table 3. The limit of detection (LOD) calculated on Chromeleon CDS and Compass for iCE for Rituximab biosimilar. The LOD was calculated by dividing three times the standard deviation of the noise by the slope of the linear regression for the peak height.

# Turbo CE-SDS



FIGURE 4. Maurice CE-SDS IgG Standard analyzed with Turbo CE-SDS under reduced conditions on Chromeleon CDS and Compass for iCE.

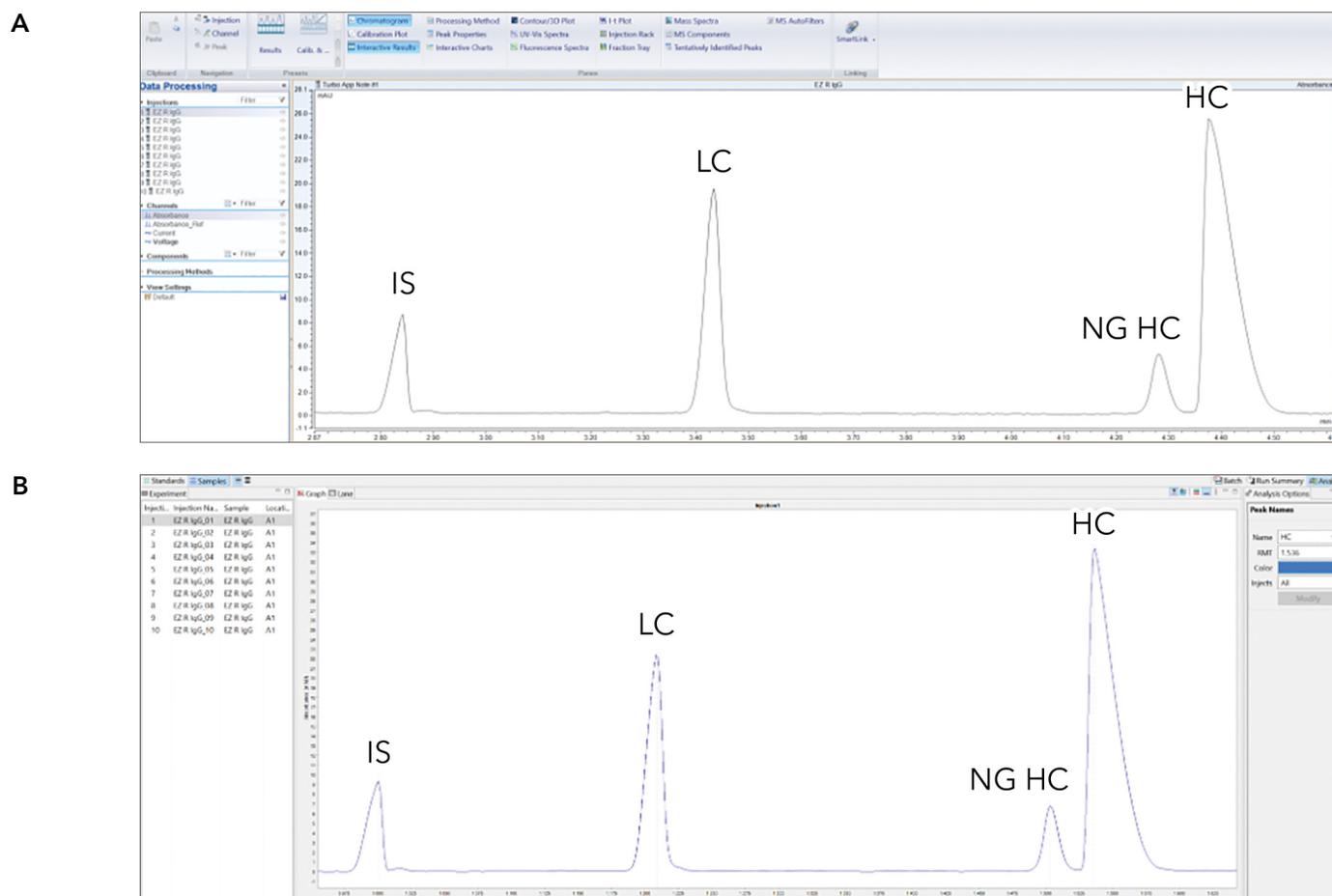


FIGURE 4. Representative electropherograms of the Maurice CE-SDS IgG Standard analyzed with Turbo CE-SDS under reduced conditions on Chromeleon CDS and Compass for iCE. A. Data on Chromeleon CDS, where peak migration is reported in minutes. B. The same sample as shown in A, run in another batch controlled by Compass for iCE, which reports data in terms of relative migration time (RMT) where peak migration times are normalized to the migration time of the Maurice CE-SDS Internal Standard (IS). The profiles are highly comparable between the two software, showing excellent separation of expected peaks—light chain (LC), heavy chain (HC), non-glycosylated heavy chain (NGHC), and IS.

**TABLE 4. Percent peak area values of Maurice CE-SDS IgG Standard analyzed with Turbo CE-SDS under reduced conditions.**

Injection Number	Chromeleon CDS			Compass for iCE		
	LC	NGHC	HC	LC	NGHC	HC
1	26.69	7.41	65.90	32.03	7.21	60.76
2	27.41	7.24	65.35	32.03	7.31	60.66
3	27.30	7.40	65.30	32.17	7.18	60.65
4	27.42	7.29	65.29	32.15	7.22	60.63
5	27.45	7.37	65.18	32.09	7.17	60.74
6	27.52	7.26	65.23	32.05	7.19	60.76
7	27.31	7.31	65.38	31.96	7.18	60.86
8	27.29	7.31	65.40	32.02	7.21	60.77
9	27.48	7.26	65.26	32.01	7.23	60.76
10	27.26	7.33	65.41	32.02	7.25	60.73
<b>Average</b>	27.31	7.32	65.37	32.05	7.22	60.73
<b>Standard Deviation</b>	0.24	0.06	0.20	0.07	0.04	0.07
<b>%CV</b>	0.87	0.83	0.31	0.20	0.58	0.11

TABLE 4. Percent peak area measurement of the Maurice CE-SDS IgG Standard with Turbo CE-SDS under reduced conditions. The average, standard deviation, and %CV for percent peak area for LC, NGHC, and HC calculated for 10 injections establish data comparability between Chromeleon CDS and Compass for iCE, and once again highlight excellent reproducibility of the Turbo CE-SDS method. The differences observed for the percent peak areas between the two software are attributed to the differences in peak integration methods for each software platform.

**FIGURE 5. Linearity of the Turbo CE-SDS method established by Chromeleon CDS and Compass for iCE.**

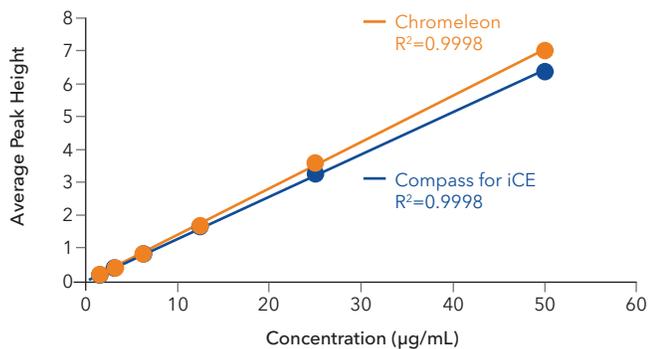


Figure 5. Linearity of the Turbo CE-SDS method established by Chromeleon CDS and Compass for iCE. The Maurice CE-SDS IgG Standard was serially diluted two-fold in a concentration range of 50 – 2 µg/mL. These samples were run on Maurice under non-reduced conditions in two separate batches, one analyzed with Chromeleon CDS and the other with Compass for iCE. The concentration was plotted against the average height of the intact IgG peak, demonstrating excellent linearity of the method, as shown from the R<sup>2</sup> values.

**TABLE 5. The limit of detection for the Turbo CE-SDS method calculated on Chromeleon CDS and Compass for iCE.**

	Chromeleon CDS	Compass for iCE
Maurice CE-SDS IgG Standard LOD (µg/mL)	0.50	0.37

Table 5. The limit of detection for the Turbo CE-SDS method calculated on Chromeleon CDS and Compass for iCE. The LOD was calculated by dividing three times the standard deviation of the noise by the slope of the linear regression for the intact IgG peak height.

# CE-SDS PLUS



FIGURE 6. Maurice CE-SDS IgG Standard analyzed with CE-SDS PLUS under reduced conditions on Chromeleon CDS and Compass for iCE.

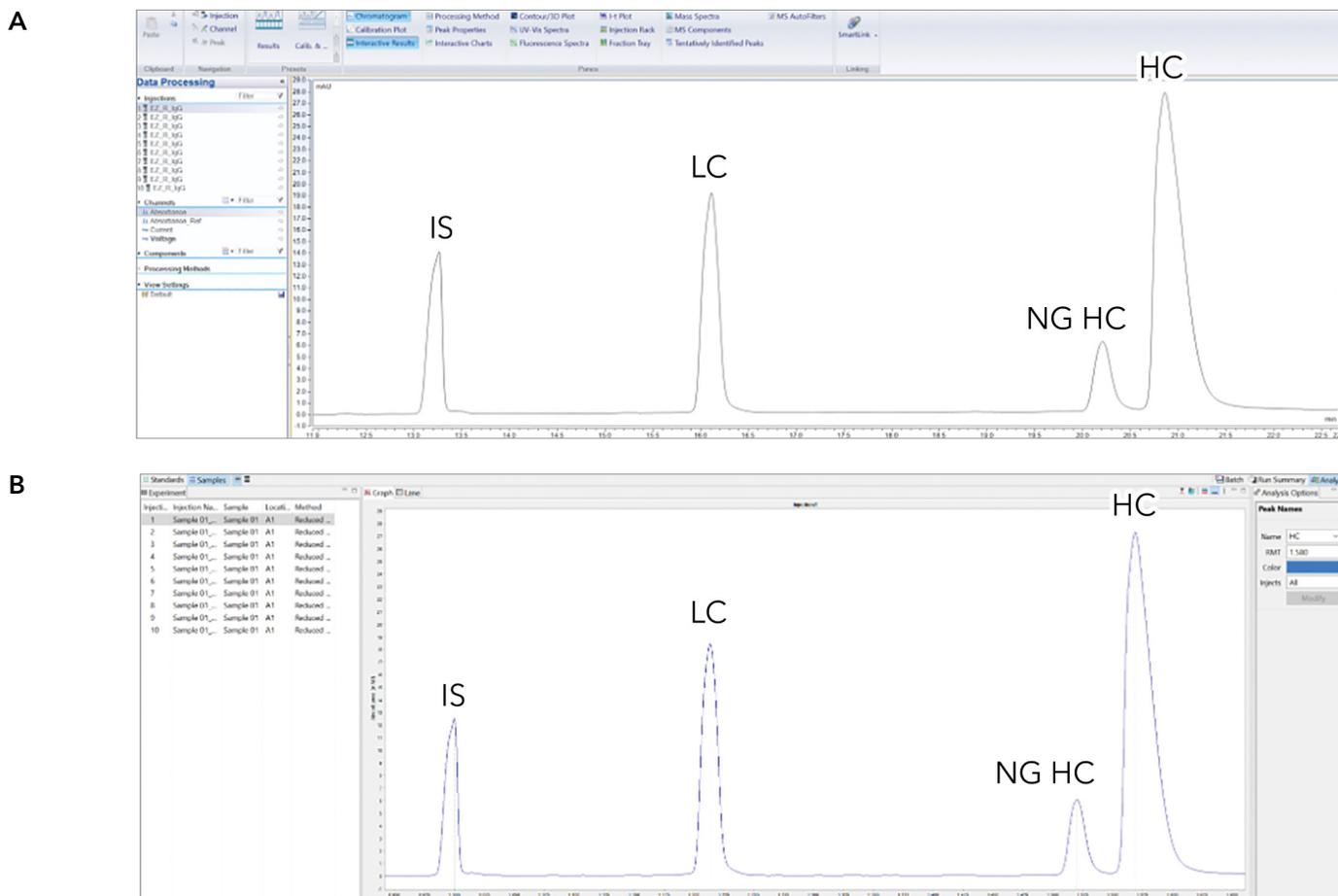


FIGURE 6. Representative electropherograms of the Maurice CE-SDS IgG Standard analyzed with CE-SDS PLUS under reduced conditions on Chromeleon CDS and Compass for iCE. A. Data on Chromeleon CDS. B. The same sample from a different batch analyzed with Compass for iCE. Both software show well-resolved peaks of LC, NGHC, and HC, demonstrating data comparability.

**TABLE 6. Percent peak area of Maurice CE-SDS IgG Standard analyzed with CE-SDS PLUS under reduced conditions.**

Injection Number	Chromeleon CDS			Compass for iCE		
	LC	NGHC	HC	LC	NGHC	HC
1	25.45	8.85	65.70	30.91	8.69	60.40
2	25.47	8.83	65.70	30.88	8.67	60.46
3	25.59	8.88	65.53	30.94	8.62	60.45
4	25.60	8.87	65.53	30.82	8.54	60.64
5	25.49	8.78	65.73	30.81	8.5	60.69
6	25.44	8.79	65.76	30.89	8.53	60.58
7	25.59	8.79	65.62	30.83	8.54	60.63
8	25.58	8.71	65.71	30.75	8.58	60.68
9	25.50	8.83	65.68	31.01	8.50	60.49
10	25.65	8.21	66.14	30.92	8.48	60.60
<b>Average</b>	25.53	8.76	65.71	30.88	8.57	60.56
<b>Standard Deviation</b>	0.07	0.20	0.17	0.08	0.07	0.10
<b>%CV</b>	0.29	2.25	0.26	0.24	0.85	0.17

TABLE 6. Percent peak area measurement of the Maurice CE-SDS IgG Standard with CE-SDS PLUS under reduced conditions. The average, standard deviation, and %CV of percent peak area for all three peaks over 10 injections demonstrates a high degree of comparability between Chromeleon CDS and Compass for iCE, while simultaneously confirming reproducibility of the CE-SDS PLUS method. Similar to the data from analysis with Turbo CE-SDS, slight differences in peak areas are observed between the two software, which are attributed to the differences in peak integration methods for each software platform.

**FIGURE 7. Linearity of the CE-SDS PLUS method established by Chromeleon CDS and Compass for iCE.**

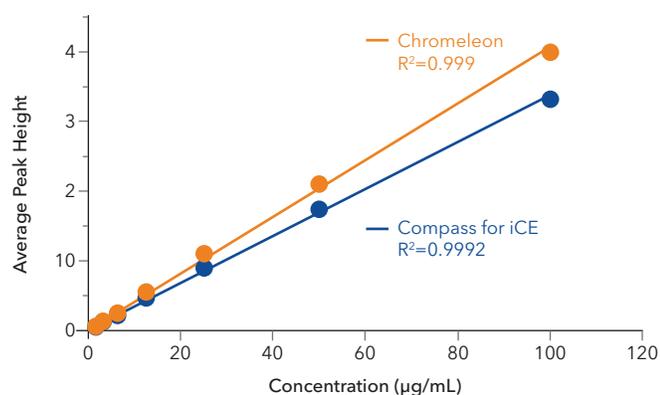


FIGURE 7. Linearity of the CE-SDS PLUS method established by Chromeleon CDS and Compass for iCE. Maurice CE-SDS IgG Standard samples ranging from 100 - 1.5 µg/mL were run on the Maurice system under non-reduced conditions and analyzed using both software. Sample concentrations were plotted against the height of the intact IgG peak, showing a linear correlation on both Chromeleon CDS and Compass for iCE

**TABLE 7. The limit of detection for the CE-SDS PLUS method calculated on Chromeleon CDS and Compass for iCE.**

	Chromeleon CDS	Compass for iCE
Maurice CE-SDS IgG Standard LOD (µg/mL)	1.26	0.89

Table 7. The limit of detection for the CE-SDS PLUS method calculated on Chromeleon CDS and Compass for iCE. The LOD was calculated by dividing three times the standard deviation of the noise by the slope of the linear regression for the intact IgG peak height.

## Conclusion

Using Chromeleon CDS to collect and analyze protein charge (icIEF) and size (CE-SDS) data from the Maurice system is now possible with the Maurice Chromeleon Driver Kit. By drawing comparisons with data collected using Compass for iCE, this application note shows how well Chromeleon CDS works with Maurice.

For icIEF analysis, the apparent pI values of the sample tested were comparable between Chromeleon CDS and Compass for iCE. Furthermore, an overall %CV value of  $\leq 0.06$  proved that reproducibility is guaranteed on both software.

Similarly, for CE-SDS analysis, both Turbo CE-SDS and CE-SDS PLUS batches resulted in excellent data on Chromeleon CDS and Compass for iCE. For each batch

type, the results were reproducible and comparable between the two software (%CV  $\leq 0.7$  for Turbo CE-SDS;  $\leq 0.9$  for CE-SDS PLUS). Additional experiments on linearity and limit of detection for all three methods further showed the reliability of Chromeleon CDS with the Maurice system.

Having industry-validated software integrated with Maurice and other analytical instruments in the lab ensures data consistency, easy method transfer, and efficiency, and also provides holistic data insights.

Enabling Chromeleon CDS control of the Maurice system is one of the many steps we've taken at Bio-Techne to simplify and enhance your life in the lab. To learn more about what else Maurice can do for you, visit our website.

[Learn more](http://www.bio-techne.com/instruments/ice) | [www.bio-techne.com/instruments/ice](http://www.bio-techne.com/instruments/ice)



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