

## Method Comparison Addendum:

# Digging Deeper on D2622

### INTRODUCTION

In August 2018, XOS published a paper that reviewed and discussed ASTM Proficiency Testing Program (PTP) diesel and gasoline sulfur data comparing reproducibility for three widely adopted methods for sulfur analysis: D7039 (Monochromatic Wavelength Dispersive X-ray Fluorescence or MWDXRF), D2622 (Wavelength Dispersive X-ray Fluorescence or WDXRF), and D5453 (Ultraviolet Fluorescence or UVF). The PTP data concluded that between the critical concentrations of 5-15ppm, D7039 outperformed both D5453 and D2622.

A distinction made in this review was that XOS' Sindie 2622 analyzers have built-in software and hardware functionality that allows users to run measurements in D2622 or D7039 mode, allowing them to stay method compliant while utilizing an MWDXRF analyzer that offers better overall precision. In the following brief addendum, we will be reviewing data collected on an XOS analyzer that utilizes D7039 monochromatic excitation in both D7039 and D2622 measurement modes to fully understand the ability to couple D2622 method compliance with superior D7039 precision.

### APPLICATION STUDY

To assess the comparison between measuring in D7039 and D2622 mode, 10 measurements of 10ppm sulfur in diesel were run on Sindie 2622 Gen 3.

For measuring in D7039 mode, 10 separate aliquots were run for 300 seconds with each aliquot representing a single measurement result. This data is showcased in **Table 1**. For D2622, 20 aliquots were prepared and measured in order to run duplicate determinations as per the method. One result is the average of two determinations (column 4 in **Table 2**).

Measurement time for each D2622 determination was 375 seconds, 75 seconds for the background measurement and 300 seconds for the sulfur measurement. The reason that the added background measurement time is only 20% of the total run time is because Sindie Gen 3 analyzers have an enhanced optic and updated software that allows for a 38% reduction in total measurement time.

This equates to a time savings of 7.5 minutes for each sample ( $\leq 100$  ppm) over the Sindie Gen 2 analyzer.

**Table 1 – D7039 Mode for 10ppm Sulfur in Diesel**

Measurement (300s)	Concentration (ppm)
1	10.46
2	9.98
3	10.01
4	10.37
5	10.28
6	10.14
7	9.84
8	9.78
9	10.01
10	10.56
Average	10.14
Standard Deviation	0.26
%RSD	2.61

**38%\*** reduction in total measurement time.

\*38% time savings is based on duplicate determinations for samples  $\leq 100$  ppm.

**Table 2 – D2622 Mode for 10ppm Sulfur in Diesel**

Measurement (375s)	Determination 1	Determination 2	Average (ppm)
1	10.34	10.08	10.21
2	9.95	10.40	10.18
3	10.54	10.32	10.43
4	10.55	10.02	10.29
5	10.47	10.44	10.46
6	10.44	10.39	10.42
7	10.70	10.28	10.49
8	10.04	10.11	10.08
9	10.44	10.58	10.51
10	10.15	10.19	10.17
Average			10.32
Standard Deviation			0.16
%RSD			1.52

## RESULTS

Looking at the data in **Tables 1 and 2**, there is similar performance across both measurement modes. There are minimal differences between the average, standard deviation, and relative standard deviation of each data set.

Additionally, the low RSD values for both data sets indicate very good precision at 10 ppm, with the RSD for the D2622 data being slightly lower due to the duplicate determinations.

## CONCLUSION

From the data shown above, XOS D7039 analyzers demonstrate excellent precision in both D7039 and D2622 mode, allowing users to fully comply with ASTM Test Method D2622 while enjoying the benefits of monochromatic excitation. ASTM PTP data shows that measuring sulfur in D7039 mode provides the best reproducibility compared to traditional XRF and UVF analysis when measuring in the critical ranges of 5-15ppm.

## PRODUCT HIGHLIGHT



### Analyze Sulfur with Precision and Flexibility

Easier to use than ever, Sindie R2 provides the best value and combination of detection limits, measurement speed, ease of use and reliability. Sindie R2 is the ideal sulfur analytical solution to help you stay in compliance with ASTM D2622, ASTM D7039, ISO 20884, and EN 16997 methods, enabling complete flexibility for your analytical needs.\*

\*All qualification herein are subject to user guide specifications. If you have further questions, reach out to our team of experts at [info@xos.com](mailto:info@xos.com).

