



better analysis counts

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Sulfur Measurement **Advanced**

A new 4294 analyzer from the brand you trust.



Petra **MAX**
Elemental Analyzer for Petroleum

Petra **4294**
Sulfur Analyzer for Petroleum

The Petra series delivers high-precision D4294 sulfur analysis across a broad measurement range. Petra MAX™ delivers D4294 sulfur analysis in addition to 12 elements from P to Zn, for rapid monitoring of critical elements like Ca, Fe, K, Ni, and V at sub-ppm levels.

**ASTM D4294
ISO 8754**

Advanced Sulfur Analysis with HDXRF

Petra is powered by High Definition X-Ray Fluorescence (HDXRF) technology: an elemental analysis technique offering significantly enhanced detection performance over traditional XRF technology. This technique applies state-of-the-art monochromating and focusing optics, enabling dramatically higher signal-to-background ratio compared to traditional polychromatic X-Ray Fluorescence. **Figure 1** shows the basic configuration of HDXRF and its use of focused monochromatic excitation. **Figure 2** compares the detector signal of polychromatic (competitor) with monochromatic (XOS) XRF to demonstrate how monochromatic excitation reduces background noise and improves signal definition that enables lower limits of detection and dramatically better precision.

Figure 1: HDXRF Technology

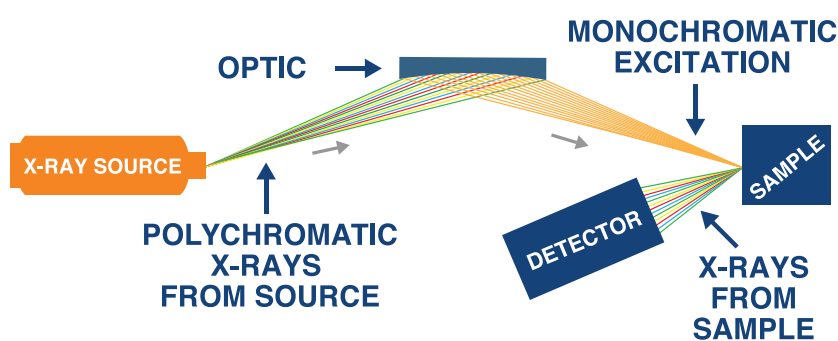
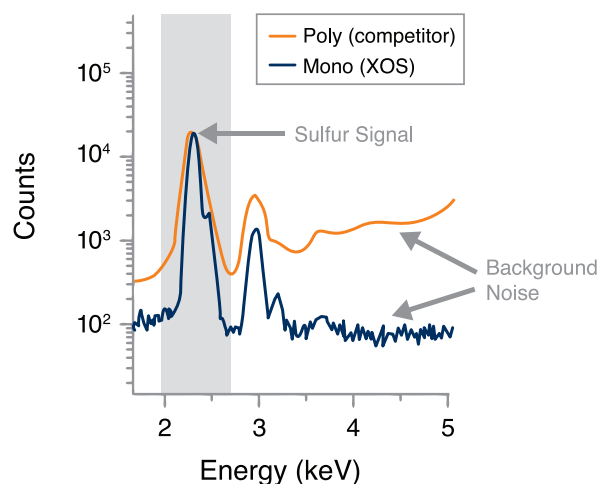


Figure 2: Superior Signal-to-Noise Ratio



Advanced Precision

Petra complies with ASTM D4294 and ISO 8754 for sulfur analysis of hydrocarbons like crude oil, diesel, gasoline, jet fuel, and lubricants. Petra 4294™ delivers precise sulfur analysis with limits of detection as low as 2.6 ppm. Petra MAX™ delivers sulfur measurements with a limit of detection as low as 5.7 ppm with rapid monitoring of critical elements like Ni, V, and Fe at sub-ppm levels.

The data in Table 1 represents ten separate aliquots of crude oil that were analyzed for 300 seconds by Petra MAX to demonstrate the advanced precision achievable with HDXRF technology.

Table 1: Crude Oil Analysis by Petra MAX (ppm)

Repeats	S	V	Fe	Ni
1	4,716	0.35	0.51	2.50
2	4,752	0.35	0.42	2.47
3	4,756	0.31	0.56	2.55
4	4,833	0.41	0.57	2.57
5	4,750	0.36	0.51	2.51
6	4,690	0.32	0.47	2.51
7	4,786	0.30	0.50	2.57
8	4,721	0.32	0.49	2.55
9	4,793	0.27	0.51	2.56
10	4,749	0.31	0.49	2.52
Average	4,755	0.33	0.50	2.53
Standard Deviation	41.4	0.04	0.04	0.03

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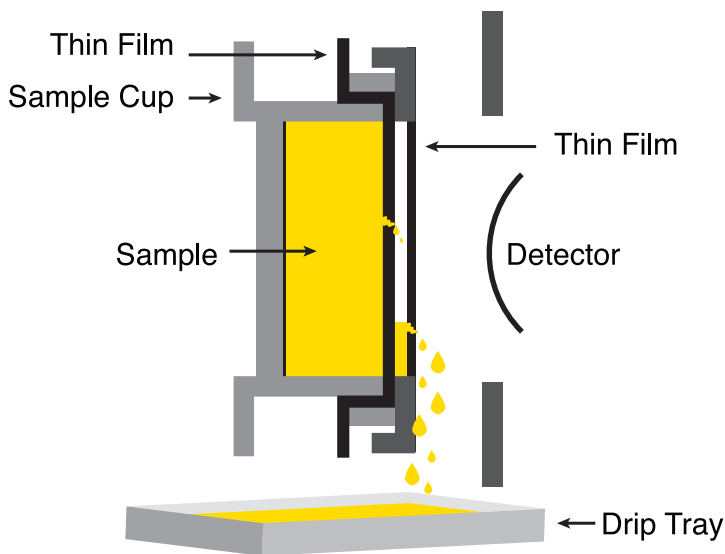
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Advanced Reliability and Robustness

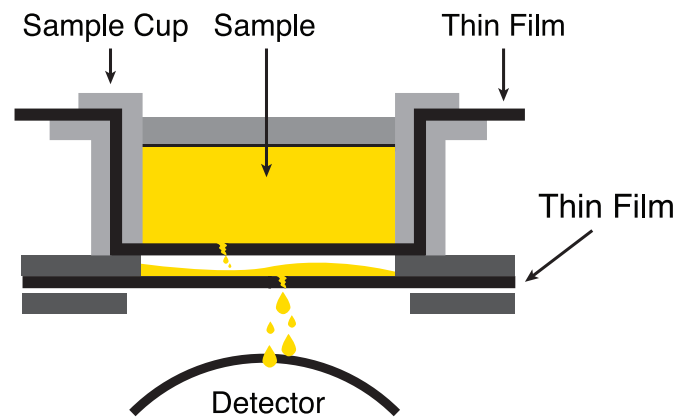
Petroleum laboratories depend on reliable, robust analytical solutions for their fast-paced environment. Petra was designed to meet these needs with an innovative sample introduction system that directs accidental spills to a drip tray and away from valuable components.

Petra Sample Chamber with Drip Tray



A sample is placed into the Petra sample chamber and when closed, it is turned on its side. This innovative design ensures that any accidental sample leaks are directed to a drip tray - to be easily removed and disposed.

Competitor Sample Chamber



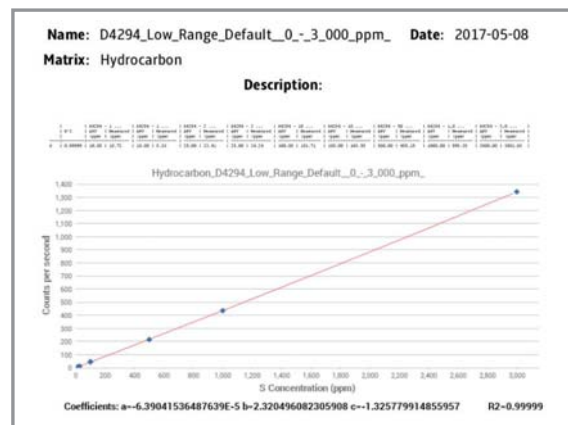
Most competitor sample chamber designs offer a thin film covering the cell window to protect the detector and X-ray tube from accidental sample leaks. If this thin film tears, the sample will leak onto the detector and X-ray tube - a very costly repair.

Advanced Software and Data Management

Petra offers the latest software features and data management for simple, intuitive operation.

- New software allows Petra to store 30 calibration data sets and offers both linear and quadratic curves.
- Data management is easy with storage for thousands of measurements, data transfer over USB and LIMS integration.

New data management software now provides calibration curve graph in printout.



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XOS

Technical Specifications

Dynamic Range, LOD & Applications														
Petra MAX	Dynamic Range	Sulfur 5.7 ppm – 10 wt%												
	Limit of Detection (ppm @ 600 s)	Sulfur 5.7 ppm												
		<table border="1"> <thead> <tr> <th>P</th> <th>Cl</th> <th>K</th> <th>Ca</th> <th>V</th> <th>Cr</th> </tr> </thead> <tbody> <tr> <td>17</td> <td>3</td> <td>0.7</td> <td>0.4</td> <td>0.1</td> <td>0.09</td> </tr> </tbody> </table>	P	Cl	K	Ca	V	Cr	17	3	0.7	0.4	0.1	0.09
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Mn	Fe	Co	Ni	Cu	Zn									
0.07	0.07	0.07	0.04	0.1	0.1									
Applications	S plus P to Zn in hydrocarbons like crude oil, diesel, gasoline, jet fuel, and lubricants.													
Petra 4294	Dynamic Range	Sulfur 2.6 ppm – 10 wt%												
	Limit of Detection (ppm @ 600 s)	Sulfur 2.6 ppm												
	Applications	S in hydrocarbons like crude oil, diesel, gasoline, jet fuel, and lubricants.												

Petra Series Specifications	
Method Compliance	ASTM D4294 & ISO 8754
Measurement Time	30-900 seconds
Calibration	- 30 calibration curves - Linear or quadratic (automatic and manual calibration available)
Sample Cup Volume	7 mL
Data Output	Printout, USB, and Ethernet to PC connection
I/O Ports	Ethernet 10/100, USB
Power Supply	110-240 VAC ± 10%, 50-60 Hz (hertz)
Operating Temperature	+41°F to 104°F (5°C to 40°C)
Operating Humidity	30 – 85 %
Weight	28 lbs (12.7 kg)
Dimensions	14.5 in W x 16.5 in L x 6 in H (36.8 cm W x 41.9 cm L x 15.3 cm H)



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