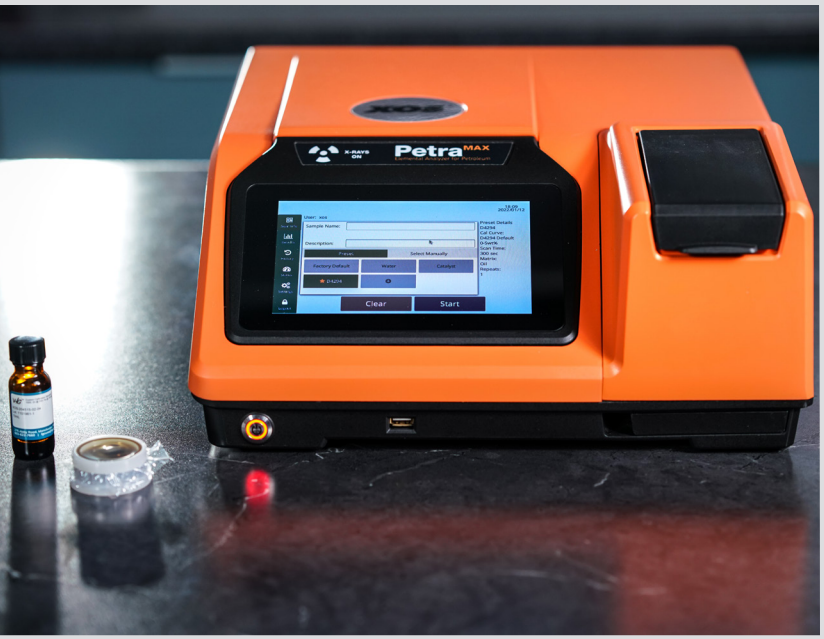
XOS®

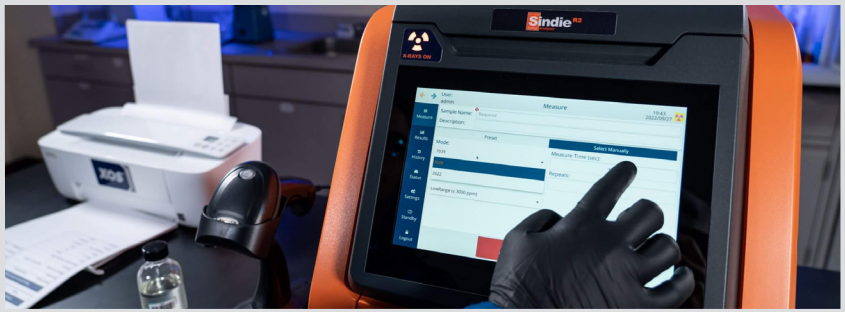
Benchtop & Process Analysis Solutions

Sulfur, Chlorine, & Other Elements at Sub-ppm Levels

Better Analysis Counts

XOS is a leader in the manufacture of X-ray analyzers for a wide range of elemental analysis, offering solutions that improve process monitoring efficiencies in the petroleum industry and deliver on public safety and environmental compliance. XOS offers lab and process analyzers for a range of applications, including conventional petroleum, renewable fuels, plastics recycling and pyrolysis, aviation fuel, maritime, and more.
XOS: better analysis counts.





Sulfur Analyzers

XOS offers XRF sulfur analyzers for a wide range of applications including diesel, jet, kerosene, other distillate oil, naphtha, residual oil, lubricating base oil, hydraulic oil, crude oil, gasoline, and gasoline-ethanol blends. Discover hassle-free sample prep, easy operation, rapid testing, compliance flexibility, and industry-leading precision.

Petra MAX, Petra SUPRA, & Petra 4294

Advanced sulfur, metals, and light element analysis and data management.

Sindie R Series

Analyze sulfur with unmatched precision & complete flexibility.

Sindie +Cl R Series

Ideal solution for refineries and labs to certify sulfur levels and assess chlorine for corrosion mitigation.

Sindie Online

Process analyzer delivering continuous sulfur measurement to monitor fuel or feed streams and help prevent contamination.

Chlorine Analyzers

Precise determination of chlorine in petroleum is critical during refining processes. Chlorine may poison expensive catalysts and lead to corrosion in areas like the overhead or reactor effluent systems.

Clora R Series

Analyze total chlorine with enhanced precision & performance.

Clora Online

Process analyzer delivering reliable and continuous chlorine analysis to monitor real-time process variation and improve optimization.

Total Phosphorus & Silicon Analyzers

Phoebe

From crude oil to bio-fuels, in additives or water, Phoebe benchtop analyzers deliver exceptional precision and accuracy for complete phosphorus analysis.

Signal

Complies with ASTM D7757 and delivers quantitative analysis of silicon (Si) from gasoline to ethanol, other hydrocarbons, and toluene.

Petra MAX
Elemental Analyzer for Petroleum

Petra SUPRA
Light Element Analyzer for Petroleum

Petra 4294
Sulfur Analyzer for Petroleum

ASTM D4294, ISO 8754, IP 336, ASTM 8252

Advanced Sulfur Analysis & Data Management

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—while complying with D8252.

TECHNICAL SPECIFICATIONS

Petra MAX	**Dynamic Range**	Sulfur 5.7 mg/kg (ppm) – 10 wt%
	Limit of Detection mg/kg (ppm) @ 600 s **	Sulfur 5.7 mg/kg (ppm)
		P: 17 · Cl: 3 · K: 0.7 · Ca: 0.4 · V: 0.1 · Cr: 0.09
		Mn: 0.07 · Fe: 0.07 · Co: 0.07 · Ni: 0.04 · Cu: 0.1 · Zn: 0.1
	Applications	Hydrocarbons, water and catalysts
Petra SUPRA	**Limit of Detection (ppm @ 300 s **)**	S: 0.13 · Si: 0.6 · Al: 2.0 · P: 0.25
		K: 0.06 · Ca: 0.03 · Mg: 29 · Na: 160
	Applications	Hydrocarbons, plastics, polymers, chemicals, water, solids
Petra 4294	**Dynamic Range**	Sulfur 2.6 mg/kg (ppm) – 10 wt%
	Limit of Detection (ppm @ 600 s **)	Sulfur 2.6 mg/kg (ppm)
	Applications	Hydrocarbons, water

Petra Series Autosampler

Boasts a novel design with advanced software features for a more flexible and **efficient workflow**. Using unique identifier (QR) sample cups and an open-ended sample slide, the autosampler offers sample tracking and continuous sample loading. It is an **optional add-on feature** for a Petra 4294 or Petra MAX analyzer. QR/barcode scanner included with purchase.

QR Sample Cup

Learn More

Click Here for Petra MAX

Click Here for Petra 4294

or

Scan the Code

Seamless data management with full LIMS integration

Save critical analysis time and minimize reporting errors with custom sample presets

Complies with ASTM D7039, D2622, ISO 20884

Powered by MWDXRF

Learn More About the Sindie R Series

Click Here or Scan the Code

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Sindie R Series

Sulfur Analyzer

APPLICATIONS

Petroleum Products

First & Second-Generation Biofuels

Oils (Edible) & Fats

Chemicals

Water

Analyze Sulfur with Unmatched Precision & Flexibility

Easier to use than ever, the Sindie R Series is our most advanced sulfur analytical solution for compliance with ASTM D2622, ASTM D7039, and ISO 20884 methods, enabling complete flexibility for your analytical needs.

Sindie R4

LOD: 0.12 mg/kg (ppm) at 300s, 0.09mg/kg (ppm) at 600s**

Our most advanced sulfur analytical solution for compliance with ASTM D2622, ASTM D7039, and ISO 20884 methods, enabling complete flexibility for your analytical needs.

Sindie R3

LOD: 0.18 mg/kg (ppm) at 300s, 0.15 mg/kg (ppm) at 600s**

Advanced R3 optics, provide extremely low limits of detection, allowing for cycle time flexibility to save up to hours per day in testing time.

Sindie R2

LOD: 0.4 mg/kg (ppm) at 300s, 0.28 mg/kg (ppm) at 600s**

Provides the best value and combination of detection limits, measurement speed, ease of use, and reliability.

16 32.06 Sindie +Cl 17 35,45 Chlorine

Sulfur and Chlorine Analyzer

APPLICATIONS

Total sulfur analysis from ultra low sulfur fuels to crudes

Total chlorine analysis from aqueous solutions and aromatic products to heavy fuels, and crudes

For use in refinery labs, pipeline terminals, additive plants, and inspection laboratories

Two Critical Elements with One Instrument

Sindie® +Cl is a two-in-one instrument enabling trace analysis of both sulfur and chlorine with one analyzer. It is the ideal solution to certify sulfur levels in finished products, assess chlorine for corrosion mitigation, and optimize process parameters.*

Sulfur

LOD: 0.4 mg/kg (ppm) at 300 s, 0.28 mg/kg (ppm) at 600 s**

Dynamic Range: 0.4 mg/kg (ppm) to 5 wt%

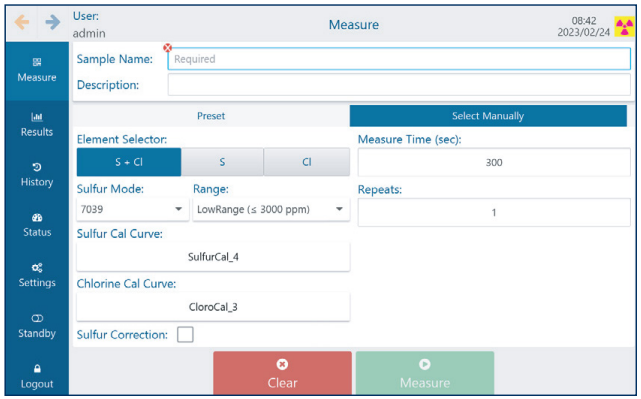
Chlorine

LOD: 0.3 mg/kg (ppm) at 300 s, 0.21 mg/kg (ppm) at 600 s**

Dynamic range: 0.3 mg/kg (ppm) to 3000 ppm

Two Critical Measurements

Sindie +Cl performs trace analysis of both sulfur and chlorine with one push of a button. You can measure both elements in one sample, or measure each separately by simply inserting a new sample.



Extremely low maintenance: no gases, heating elements, columns, or quartz tubing

Seamless data management with full LIMS integration

Complies with ASTM D2622, D7039, D7536, D4929C, SH/T 0842, ISO 20884

Powered by MWDXRF

Learn More About the Sindie + Cl

Click Here or Scan the Code

Seamless data management with full LIMS integration

Save critical analysis time and minimize reporting errors with custom sample presets

Complies with ASTM D7536 and D4929C

Powered by MWDXRF

17 35.45
Clora R Series
Chlorine Analyzer

APPLICATIONS

Total chlorine analysis in petroleum products, biofuels, aromatics and other chemicals, and water

For use in refineries, petrochemical and additive plants, pipeline terminals, and test laboratories

Analyze Chlorine with Enhanced Precison & Performance

Clora® measures total chlorine in hydrocarbons such as aromatics, distillates, heavy fuels, crude oils, and water. This state-of-the-art technology complies with ASTM D7536 and D4929C and delivers unparalleled accuracy and precision for petroleum and petrochemical applications where simple, quick, and reliable analysis is critical.*

Clora 2XP

LOD: 0.1 mg/kg (ppm) at 300s, 0.07 ppm at 600s in hydrocarbons**

Dynamic range: 0.1 mg/kg (ppm) – 2 wt%

Automatic sulfur correction saves time and improves accuracy and precision on high sulfur samples.

Clora

LOD: 0.13 mg/kg (ppm) at 300s, 0.09 mg/kg (ppm) at 600s for hydrocarbons, 0.3 mg/kg (ppm) at 300s, 0.21 mg/kg (ppm) at 600s for aqueous samples**

Dynamic range: 0.13 mg/kg (ppm) to 4 wt%

Manual sulfur correction to correct for high sulfur samples.

Learn More

Click Here for Clora 2XP

Click Here for Clora

or

Scan the Code

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Sindie ONLINE

Sulfur Analyzer

APPLICATIONS

Refinery: hydrotreating, hydrofiner, and blending processes

Pipeline Terminals: interface cuts, custody transfer acceptance, and tank contamination prevention

OPTIONS

Multi-stream analysis capability

Extended Range (XR) available for measurements above 3000 ppmw up to weight percent levels

Auto-validation capability

Variations of sample conditioning systems and environmental control equipment depending on installation requirements

ATEX Zone 1 model also available with different screen and features

NEC Certified

NEC C1D2 Certified

Uses ASTM D7039 technology

Low maintenance: no consumable liquids, gases, combustion, or sample conversion

Powered by MWDXRF

Effective Online Analysis in Petroleum Process Streams

Sindie® Online is an industrial grade process sulfur analyzer with breakthrough detection capability to monitor ultra low sulfur in petroleum or aqueous process streams.*

LOD: 0.5 ppmw in hydrocarbon matrices @ 300 s **
LOD: 1.5 ppmw in aqueous streams @ 300 s **
Dynamic range: 0.5 ppmw – 3000 ppmw

Learn More About the Sindie Online

Click Here or Scan the Code

NEC C1D2 Certified

Uses ASTM D7536 technology

Low maintenance: no consumable liquids, gases, combustion, or sample conversion

Powered by MWDXRF

ATEX or NEC Certified

17 35.45
Clora ONLINE
Chlorine Analyzer

APPLICATIONS

Upstream production, refining process, and effluent management

Total chlorine analysis in raw and desalted crudes, water and effluent streams, refinery process streams, and finished product

OPTIONS

Multi-stream analysis capability

Auto-validation capability

Variations of sample conditioning systems and environmental control equipment depending on installation requirements

ATEX Zone 1 model also available with different screen and features

Chlorine Analysis in Liquid Hydrocarbon Process Streams

Clora® Online uses ASTM D7536 technology and delivers real-time, continuous analysis of total chlorine by monitoring desalted crude, a plant can optimize performance and immediately see impacts of crude changes (including organic chloride).

LOD: 0.2 ppmw in hydrocarbon matrices @ 300 s **
LOD: 0.6 ppmw in aqueous streams @ 300 s **
Dynamic range: 0.2 ppmw – 3000 ppmw

Learn More About the Clora Online

Click Here or Scan the Code

14 28,08
Signal
Silicon Analyzer

APPLICATIONS

Total silicon analysis in hydrocarbons and biofuels

Refinery labs, pipeline terminals, additive plants, and inspection laboratories

User programmable measurement time: 10-900 s

Complies with ASTM D7757

Low maintenance: no conversion gases, heating elements, quartz tubes, or columns

Powered by MWDXRF

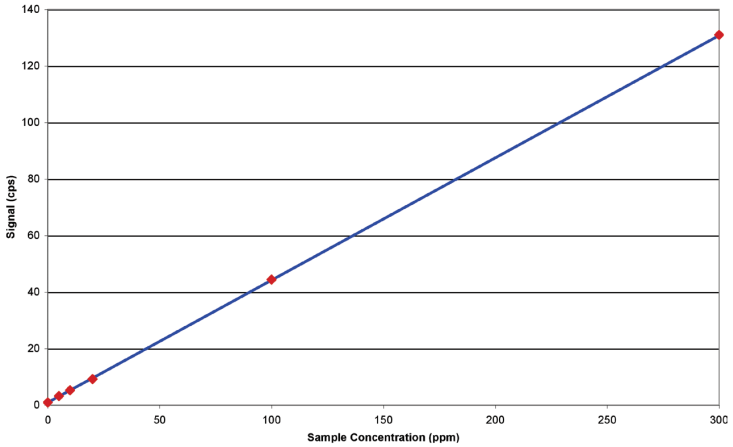
Silicon Analysis in Petroleum and Biofuels

Signal delivers quantitative analysis of silicon (Si) across multiple liquid hydrocarbons, including gasoline to ethanol, and toluene, as well as aqueous materials. Silicon contamination continues to impact fuel quality, resulting in costly engine failures and catalyst fouling. Powered by MWDXRF, Signal complies with ASTM D7757 and provides exceptional Si analysis and is an ideal solution for demanding petroleum and industrial environments.

LOD: 0.65 ppm at 600 s **
Dynamic Range: 0.65 ppm - 3000 ppm

Long Range Calibration

Signal uses a weighted least squares regression which is extremely linear and easy to set up. Typical correlation (R value) is expected to be on the order of 0.999 or better.



Learn More About the Signal Analyzer
Click Here or Scan the Code

User-programmable measurement time: 30-900 s

Automatic sulfur correction

Low maintenance: no conversion gases, heating elements, quartz tubes, or columns

Powered by MWDXRF

Learn More About the Phoebe Analyzer

Click Here or Scan the Code

15 30.97 Phoebe Phosphorus Analyzer

APPLICATIONS

Total phosphorus analysis in hydrocarbons, biofuels and aqueous matrices

Refinery, additive plants, oil recycle facilities and test labs

OPTIONS

LIMS data output compatible software

Accu-flow

Phosphorus Analysis in Hydrocarbon & Aqueous Matrices

From crude oil to biofuels, in additives or water, Phoebe benchtop analyzers deliver exceptional precision and accuracy for complete phosphorus analysis. It is very easy to operate with an intuitive touchscreen enabling use in various industrial environments. Phoebe is hassle-free and does not require extensive sample preparation, consumable gases, or sample conversion. Phoebe is available with Accu-flow.

LOD: 0.4 ppm at 600 s **
Dynamic Range: 0.4 ppm to 3000 ppm

Automatic Sulfur Correction

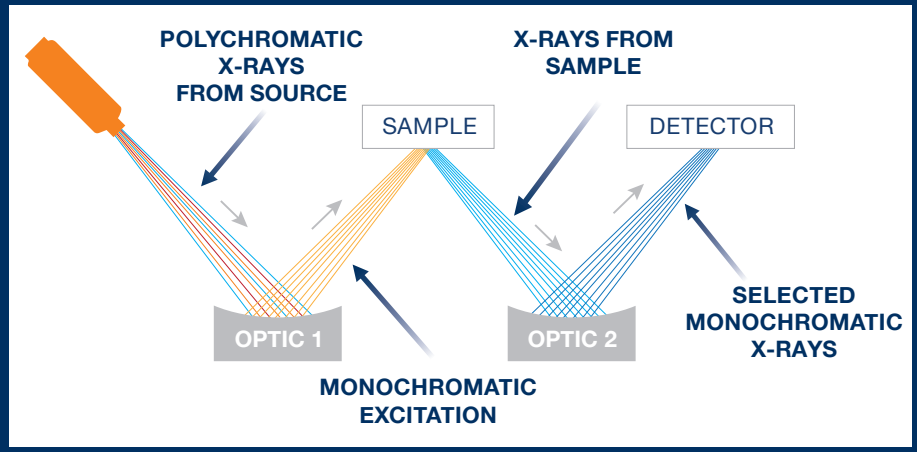
Many heavy samples, like crude oil, VGO or coker residual, may have percent-level sulfur present while phosphorus may be as low as a few parts per million. High sulfur levels will typically increase the phosphorus measurement result during XRF analysis. Phoebe is able to measure the phosphorus and sulfur concentrations simultaneously, and the sulfur counts information is then used to automatically correct the phosphorus measurement.

Advanced Analysis with MWDXRF

Monochromatic Wavelength Dispersive X-ray Fluorescence (MWDXRF) utilizes state-of-the-art focusing and monochromating optics to increase excitation intensity and dramatically improve signal-to-background ratio compared to traditional WDXRF instruments. This enables significantly improved detection limits, precision, and a reduced sensitivity to matrix effects.

A monochromatic and focused primary beam excites the sample and secondary characteristic fluorescence X-rays are emitted from the sample. A second monochromating optic selects the sulfur or chlorine characteristic X-rays and directs these X-rays to the detector.

MWDXRF is a direct measurement technique and does not require consumable gases or sample conversion delivering robust and low-maintenance analyzers with dramatically lower detection limits and faster response times.



Eliminate Particle Settling with Accu-flow

Available in Clora R Series

ACCU-FLOW

Accu-flow technology helps minimize the effect of particulate settling, which is common when testing for chlorides in crude oil using XRF. Over a typical measurement cycle, the heavier particles can settle to the bottom of the sample cup and cause higher-than-normal results. Accu-flow pushes the sample through the system, keeping the sample uniform and delivering results that better reflect sample characteristics present in the refinery.

Autosampler

Available on the R Series Sindie, Clora, and Sindie +Cl models

- Increases productivity
- Configuration options (decided at time of purchase)
  - 10-position carousel using Accucells® sample cups
  - 8-position carousel (shown) using standard 43mm sample cups

Streams & Applications Analyzed

- Aromatics
- Aviation Gasoline
- Biodiesel
- Blending Ethanol
- Crude Oil
- Diesel
- Fuel Oil
- Fuel Ethanol
- Gasoline
- High Sulfur Hydrocarbons
- Jet Fuel
- Kerosene
- Liquid Hydrocarbons
- Liquid Petroleum Products
- Naphthas

XOS®
better analysis counts

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* 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.

** Longer cycle time increases counts and lower LOD, but sample conditions over time must be considered. For further inquiries, please contact us at info@xos.com.