

# Total Phosphorus Analysis in Hydrocarbon and Aqueous Matrices

From crude oil to bio-fuels, in additives or water, Phoebe® delivers unprecedented precision and accuracy for quantification of phosphorus. Phoebe delivers a LOD of 0.4 ppm in hydrocarbon matrices in a ten-minute measurement cycle.

## Applications

- Total phosphorus analysis in hydrocarbons, bio-fuels and aqueous matrices
- For use in refinery, additive plants, oil recycle facilities and test labs

## Features and Benefits

- LOD: 0.4 ppm at 600 s
- Dynamic Range: 0.4 ppm to 3000 ppm
- Automatic sulfur correction
- Fits on any lab bench
- Robust touch-screen user interface
- User programmable measurement time: 30-900 s
- Extremely low maintenance: no conversion gasses, heating elements, columns, or quartz tubing
- Low power air-cooled excitation X-ray tube

## Options

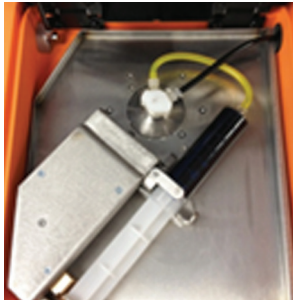
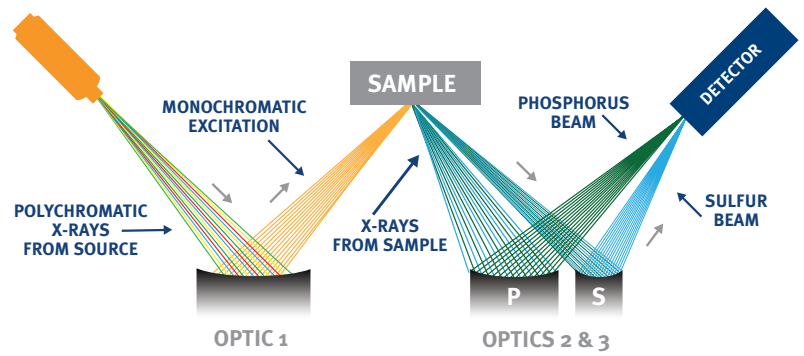
- LIMS data output compatible software
- Accu-flow

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**Phoebe**  
Phosphorus Analyzer



## TRUSTED PRECISION

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 over high power traditional WDXRF instruments. This enables significantly improved detection limits and 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 phosphorus characteristic X-rays and directs these X-rays to the detector. The third optic is used for sulfur correction of the phosphorus measurement. MWDXRF is a direct measurement technique and does not require consumable gasses or sample conversion.



**ACCU-FLOW**

## ACCU-FLOW

Accu-flow allows the sample to flow continuously during measurement. This continuous flow eliminates the settling or inhomogeneity effects of phosphorus, producing accurate and precise total chlorine results.

## Precision

Typical repeatability (r) and reproducibility (R) values, at 95% confidence.  
Measurement time: 600 s.

Phosphorus (ppm) in crude oil	r	R
2	0.8	1.2
5	1.0	1.6
10	1.4	2.0
15	1.7	2.5
20	1.9	2.8

## 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.

## Product Specifications

<b>Model</b>	Phoebe
<b>Dimensions</b>	37 cm (w) x 50 cm (d) x 34 cm (h)
<b>Power</b>	100-120 VAC, 47-63 HZ at 6.0 Amps
<b>Sample Cup Volume</b>	10 ml
<b>Ambient Temperature Requirements</b>	5-40° C (40-104° F)
<b>Dynamic Range</b>	0.4 ppm - 3000 ppm
<b>Measurement</b>	User selectable: 30-900 s
<b>Calibration</b>	8 calibration curves. Automatic and manual calibration functionality



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