



## Model 5380 PFPD

### Pulsed Flame Photometric Detector

#### Description

OI Analytical's patented\* Model 5380 Pulsed Flame Photometric Detector (PFPD) represents the latest advance in flame photometric detector design, optimizing selective detection of sulfur, phosphorus, and 26 other compounds.

From traditional FPD methods to additional, harder to perform applications, the PFPD can be configured for a wide variety of methods with improved results. The PFPD provides a 10–100x increase in signal-to-noise and a 10x increase in selectivity over traditional FPDs while requiring minimal maintenance and decreased gas requirements.

The 5380 PFPD consists of a 5380 Detector assembly, 5380 Detector Controller, pneumatic components located either in the Detector Controller or in the gas chromatograph (GC), and WinPulse user interface software.

#### Operating Principle

The PFPD operates using a propagating flame that terminates within a quartz combustor. The gas phase reactions produced by the propagating flame result in light emissions with specific luminescent spectra and lifetimes. The differences in specific emission lifetimes combined with the kinetics of the propagating flame allow both time and wavelength information to be used to improve the PFPD's selectivity and to decrease the observed noise,

enhancing sensitivity. The propagating flame uses low combustible gas flow rates, increasing the relative analyte concentration. In addition, using gated electronics permit the acquisition of two simultaneous, mutually selective chromatograms.

#### PFPD Capabilities

- Superior sensitivity and increased selectivity for S and P compared to conventional FPDs
- Linear, equimolar response for quick, easy calibrations
- Simultaneous mutually selective chromatograms for S/P, S/C, or S/N
- Inherent self-cleaning design completely eliminates soot formation, or "coking", seen in other sulfur-selective detectors
- Long-term stability and minimal maintenance
- Selective detection of 28 specific elements

#### Principal Applications

- Sulfur in petrochemical streams
- Phosphorus and sulfur pesticides
- Flavor and fragrance analyses
- Food and beverage analyses
- Sulfur in beverage-grade CO<sub>2</sub>
- Simultaneous PFPD and MS detection
- Chemical warfare agents
- Organotin compounds in environmental samples
- Organometallic detection
- Explosives analysis
- Process streams
- P, S, As, and Si detection in the semiconductor industry
- Sulfur and nitrogen in pharmaceuticals

## Performance Specifications

Detectivity	
Sulfur	<1 pg S/sec
Phosphorus	<100 fg P/sec
Sensitivity	
Sulfur Signal-to-Noise	>300 (at 10 pg S/sec elution rate peak-to-peak noise)
Drift (S or P)	<10x peak-to-peak noise in 20 min
Selectivity (at Optimum Detectivity Levels)	
Sulfur	> 10 <sup>6</sup> S/C
Phosphorus	>10 <sup>5</sup> P/C (selectivity is adjustable with a trade-off in detectivity)
Detector Linearity	
Sulfur	Quadratic in response. Linear to approximately three orders of magnitude, which gives five orders signal response.
Phosphorus	First order linear over three orders of magnitude.
Response Uniformity	Equimolar $\pm 8\%$ (S, P)
Chromatographic Peak Tailing	<0.2 sec in S and P

## Options

<b>PFPDView Software</b>	For post-acquisition signal processing
<b>Pneumatic Control</b>	Automatic electronic control of detector gases
<b>Combustor</b>	3 mm
<b>Filter and PMT Configurations</b>	For 28 different elements

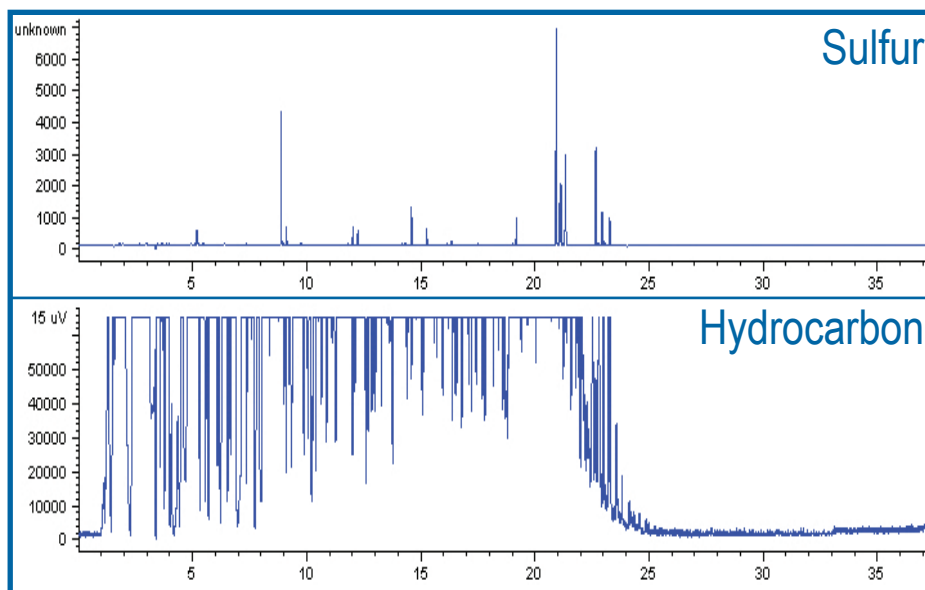
## Requirements

Gas	
Carrier	He, N <sub>2</sub> , or H <sub>2</sub> at 80 psig; 99.8% purity or better
Air	60 psig; zero air (CGA grade E)
Hydrogen	60 psig; 99.995% purity or better (electrolytic grade)
<b>Power Requirements</b>	115/230 V <sub>AC</sub> 50/60 Hz
Host Computer	
CPU	Windows® 2000 or XP, 90 MHz or better
Video	Color VGA or better
Ports	One serial (RS-232), 16550 UART recommended

\* Dr. Aviv Amirav, Professor of Chemistry at the University of Tel Aviv, Israel, developed and patented the PFPD under U.S. Patent number 5,153,673, and licensed it to O.I. Corporation.

## General Specifications

Temperature Limitations	
Minimum	180 °C
Maximum	420 °C
<b>Carrier Gas</b>	5 mL/min maximum flow rate (He, N <sub>2</sub> ); up to 10 mL/min using H <sub>2</sub> carrier gas
Typical Gas Consumption	
H <sub>2</sub>	10–15 mL/min
Air	20–30 mL/min
<b>Humidity</b>	5–80% relative humidity
Temperature	
Operating	+10 to +40 °C
Nonoperating	–20 to +65 °C
<b>Altitude</b>	2,000 m maximum
Controller Board Inputs and Outputs	
Two Channels	0–1 V
One Serial	RS-232-C
One Signal In	Electrometer; PFPD
High Voltage Out	PMT 0–1,000 V
Ignitor Current	0–3.4 A
Oscilloscope Output	20 Hz, 25 ms display
S/W HV Protection	PMT Protection
Timed Events (from GC Remote Start)	Autozero, range, attenuation, ignitor, mode or channel (e.g. S, P, N, C), and record
<b>Controller Dimensions</b>	22.2 cm H x 14 cm W x 33 cm D (8.75" H x 5.5" W x 13" D)
<b>Pneumatic Control (Standard)</b>	Manual control of detector gases with mass flow controllers and metering valve



Simultaneous sulfur and hydrocarbon chromatogram of gasoline containing 5 ppm total sulfur.



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