

Model 4450 Tandem PID/FID Photoionization/Flame Ionization Detectors

Description

The Model 4450 Tandem PID/FID is a patented combination detector incorporating the Model 4430 Photoionization and Model 4410 Flame Ionization Detectors. The two detectors in tandem produce simultaneous chromatograms for aromatics and aliphatics, eliminating the need for two separate analyses. Since the Tandem PID/FID occupies only one detector port, two 4450s can be installed on one GC, providing twice the throughput using an OI Analytical dual channel electrometer. The Tandem PID/FID can be used with either packed or capillary columns.

Operating Principle

The sample stream elutes from the GC column into the 4430 PID's reaction chamber where it is continuously irradiated with high-energy ultraviolet light. Compounds with an ionization potential lower than that of the irradiation energy (10.2 electron volts with a standard lamp) become ionized. An electronic field collects the ions formed, producing an ion current that is amplified and output by the GC's electrometer. The PID is a non-destructive detector, and the compounds retain their structural and elemental characteristics.

The sample stream passes directly from the 4430 PID exhaust port into the 4410 FID jet. The analytes are combusted in a hydrogen-air flame. The ionized combustion products pass through a negatively biased annular electrode, producing an ion current proportional to the sample concentration in the flame.

Tandem PID/FID Capabilities

- Patented tandem design uses only one GC detector port
- Tandem design acquires two simultaneous chromatograms from a single injection
- Eliminating transfer lines between detectors improves peak shape and performance
- System uses GC electronics or OI Analytical's dual channel electrometer

Principal Applications

- USEPA Methods (602, 604, 609, 8015, 8030, 8060, and 8090)
- BTEX
- GRO/DRO
- Massachusetts VPH
- ISO 15009 and 15680
- Standard Methods 6200C
- Underground storage tank monitoring

General Specifications

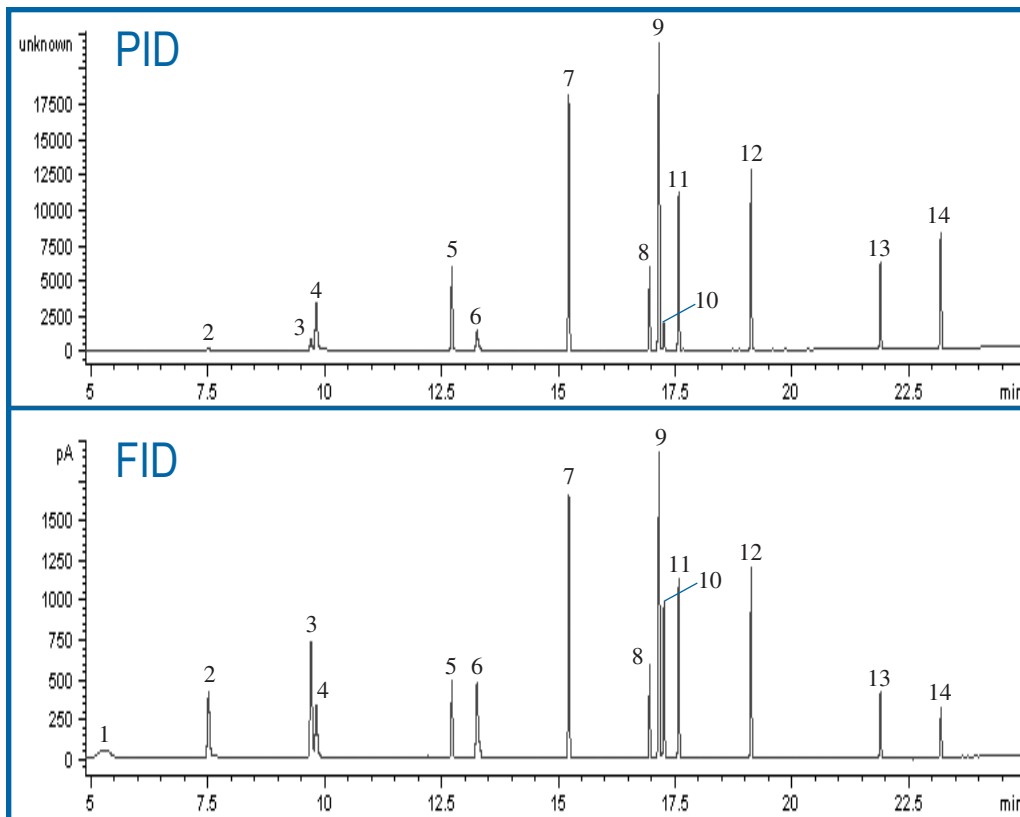
Weight	3 kg (5.5 lb)
Lamp Current	0–1.60 mA in 0.15 mA steps
Gas Requirements	
PID Sweep Gas	Hydrogen (99.999% purity), 35 ±3 mL/min flow rate
PID Makeup Gas	Nitrogen or Helium (99.999% purity), 20 ±5 mL/min flow rate
FID Air	Air (dry, best available purity), 170 ±15 mL/min flow rate
Patent	The OI Analytical Model 4450 Tandem PID/FID is protected under U.S. Patent number 4,804,846.

Model 4410 FID Specifications

Dynamic Range	>10 ⁶
Minimum Detection Limit	5 pg carbon/second propane
Maximum Linear Level	100 µg
Maximum Operating Temperature	270 °C
Jet Tip	0.30 mm I.D. (0.012")
Construction Materials	
Jet	Glass-lined stainless steel
Collector	Stainless steel

Model 4430 PID Specifications

Dynamic Range	>10 ⁶
Minimum Detection Limit	<40 pg benzene (Based on the USEPA minimum detection limit protocol. Several factors including GC, column, and compound class can affect performance.)
Maximum Operating Temperature	250 °C
Construction Materials	
Inlet	Glass-lined stainless steel
Ion Chamber	Gold-plated stainless steel
Vent	Controlled by GC external events relay
Detector Volume	Approximately 50 µL
Controller Dimensions	14.74 cm H x 7.05 cm W x 23.08 cm D (5.75" H x 2.75" W x 9.0" D)



Standard

Massachusetts VPH standard

Eclipse Sample

Concentrator

25-mL sample, 100–300 ppb range for each component; purge 11 minutes at 40 °C sample temperature; split 20:1

Column

DB-VRX, 60 m x 0.32-mm I.D. x 1.8-µm film thickness

1.	Methanol
2.	Pentane
3.	2-Methylpentane
4.	MTBE
5.	Benzene
6.	2,2,4-Trimethylpentane
7.	Toluene
8.	Ethylbenzene
9.	<i>m/p</i> -Xylene
10.	Nonane
11.	<i>o</i> -Xylene
12.	1,2,4-Trimethylbenzene
13.	Naphthalene
14.	2,5-Dibromotoluene



Publication 02330407



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