

Real-Time Monitor for Polycyclic Aromatic Hydrocarbons (PAH) **EcoChem PAS 2000**



Since 1991, EcoChem has pioneered the use of the Photoelectric Aerosol Sensor (PAS) for real-time measurement of particle-bound Polycyclic Aromatic Hydrocarbons (PAH). Previous versions of the PAH monitor (PAS 1000i, 1000e and 1002i) are widely used by regulatory, research and industrial organizations. Incorporating customer feedback and state-of-the-art advances in measurement techniques, the PAS 2000 features the following technological advances:

- ✓ Use of an UV Excimer lamp. This lamp has a higher efficiency than any traditional UV lamp. The Excimer Lamp can be rapidly switched on and off without a time delay. Operating the lamp in a chopped mode can eliminate the offset produced by pre-charged particles.
- ✓ The Excimer lamp produces monochromatic radiation with a half bandwidth of 2%
- ✓ Higher sensitivity instrument with a larger measurement range
- ✓ Total microprocessor control with internal data acquisition and storage
- ✓ Lighter and more compact design
- ✓ Responds to ultrafine respirable particles which act as carriers of PAH into the body.
- ✓ Measures 3 or more ringed PAH which are predominantly adsorbed on particles and also pose the maximum health risk.
- ✓ Sensitive in the nanogm/m³ range.
- ✓ Simple, reliable, field-rugged and proven technology.
- ✓ Automated operation requiring minimum human intervention. Built-in data acquisition for data points.
- ✓ Proven source monitoring with special dilution sample system.

Measuring Principle

The Photoelectric Aerosol Sensor (PAS) works on the principle of photoionization of particle-bound PAH.

- Using an Excimer lamp the aerosol flow is exposed to UV radiation. The Excimer lamp offers a high intensity, narrowband source of UV radiation. The wavelength of the light is chosen such that only the PAH coated aerosols are ionized, while gas molecules and noncarbon aerosols remain neutral.
- The aerosol particles that have PAH molecules adsorbed on the surface emit electrons, which are subsequently removed when an electric field is applied.
- The remaining positively charged particles are collected on a filter inside an electrometer, where the charge is measured. The resulting electric current establishes a signal, which is proportional to the concentration of total particle-bound PAH.

Also by operating the Excimer lamp in a chopped mode, the PAS 2000 can eliminate the background signal, which is sometimes found very close to combustion sources. The analyzer signal is a measure of total PAH adsorbed on carbon particles.

Calibration

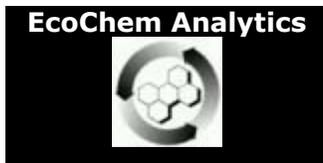
Source-specific calibration curves are available or can be generated where the monitor output is compared to an analytically determined PAH concentration. A site-specific calibration curve can provide greater accuracy for the particle size, charge and PAH distribution specific to the source. In addition to the site-specific curves, an approximate universal calibration curve can be used for screening and real-time trending applications. There is an approximate relationship between the charge and the total particle-bound PAH which is independent of the type of aerosol, within a factor of two.

Sampling System Options

A specially designed sample conditioning system is available for monitoring PAH in source emissions. It consists of a heated probe and a dilution system. These features permit the PAS 2000 to handle emission streams with high particle loading from stacks.

Technical Specifications

Display	LCD Panel with 128 by 64 pixel resolution
Power	115 volts AC / 60 Hz & 220 volts AC / 50 Hz
Range	User selectable: 0 to 100 picoamp or $\sim 0 - 100 \mu\text{g} / \text{m}^3$ PAH
Sensitivity	$\sim 0.3 - 1 \mu\text{g} / \text{m}^3$ PAH per picoamp (actual calibration is site-specific)
Lower Threshold	$\sim 3 \text{ ng} / \text{m}^3$ total particle-bound PAH
Response time	< 10 seconds (adjustable)
Analog Output	(0 to 10 volt) and (0 to 20 mA or 4 to 20mA)
Digital Output	RS - 232
Sample gas	Built-in pump with flowrate controlled at 2 L/min
Operating temp	40 to 104 °F (5 to 40°C)
Dimensions	Standard Desktop Unit (Height x Width x Depth) --- analyzer unit 4.5in x 9.3in x 12.5in (133mm x 236mm x 317mm)
Weight	20 lb. (9 kg) -- analyzer unit
Data Storage	8000 Data Points (each data point consisting of: Date, Time, Value)
Software	User-friendly PC-compatible graphical software collects data from PAS 2000. The software displays real-time strip charts and calculates averages. Data is stored in a variety of formats. Flat ASCII file output can also be generated for further analysis in standard spreadsheet programs (e.g. Microsoft Excel).



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