jas Atomic Emission Detector

Sensitive and Selective Universal Element Detection for Routine or Research Analyses

SIMPLY SMART SOLUTIONS

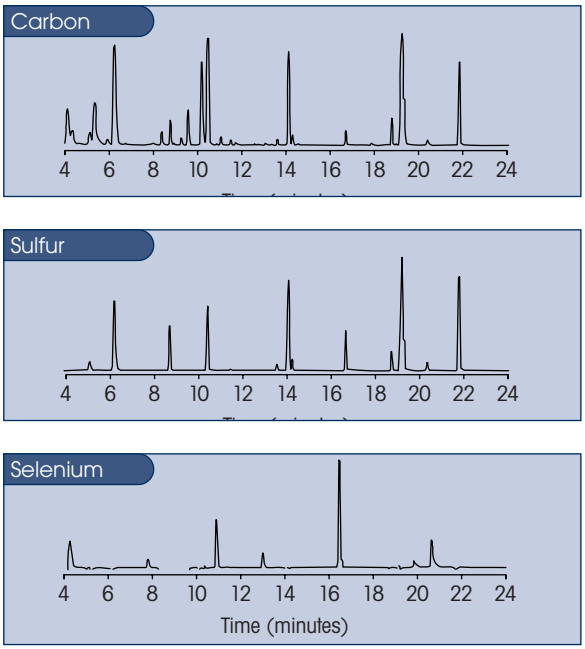
jas joint analytical systems

Sophisticated Multielement Detection Moves From the Research to the Routine Laboratory

A Unique, Versatile Instrument

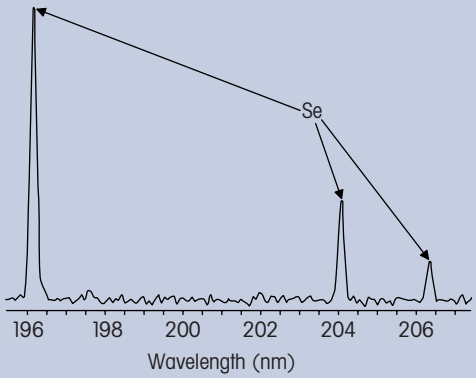
The jas 2370AA Atomic Emission Detector (AED) is the *only commercially available atomic emission detector for gas chromatography*. The jas AED lets you detect *virtually all* elements within any volatized compound (except helium, the carrier gas) at picogram-level sensitivities, with excellent selectivities. The jas 2370AA AED transports sophisticated research capabilities into a reliable, cost effective instrument that is easy to use and maintain-ideal for *both* routine QA/QC and research laboratories.

Emission Spectra for Element Confirmation



Garlic Extract

An extract of garlic shows low-level sulfur and selenium compounds important in flavor and nutritional analyses. Selenium is confirmed by its three characteristic atomic lines from 196 to 206 nm.



If you have any questions about the presence of an element in a chromatographic peak, an emission spectra "snapshot" helps to provide the answer.

As the compound elutes from the gas chromatograph, the jas AED can save a snapshot of the entire wavelength range where the photodiode array is positioned. You can pull up the snapshot at the apex of the peak and, because most elements have a distinctive pattern, conclusively prove or disprove the presence of that element.

Benefits of the jas 2370AA Atomic Emission Detector

Depth of Capabilities

The jas AED lets you:

- *Selectively detect compounds* containing any of over 20 pre-set elements, including organo-metallic species and compounds labeled with stable isotopes.
- *Enhance analytical confidence* by confirming the presence of elements in chromatograms using atomic emission spectra.
- *Increase productivity* by obtaining from one to several-element chromatograms with a single injection.
- Automatically *profile a sample* by sequencing detection of any number of elements in the sample.
- *Sequence* any number of samples.
- Screen a sample for specific elements prior to mass spectral analysis to *quickly locate peaks* of interest, speeding analysis of target or unknown compounds.
- *Perform quantitative analysis* using nearly constant response factors. You can calibrate with any readily available compound containing the element.
- *Analyze higher-boiling compounds* with operation up to 450 °C.
- Conduct *trace-level analyses.* The jas AED is:
  - Five times more sensitive than GC-FID for carbon.
  - Ten times more sensitive, with more linearity than GC-FPD for sulfur.
  - Typically more sensitive than GC-MS in SCAN mode.
  - Typically more selective than GC-NPD and GC-ECD in complex sample matrices.

Ease of Use

A Microsoft® Windows™ operating environment makes the jas AED easy to learn and use.
The system lets you:

- *Automate setup* of system parameters and data analysis-similar to the Agilent ChemStation for GC.
- *Quickly change methods* using the Agilent 6890 GC to set pressures electronically without bubble meters. An optional system configuration can even allow jas AED reagent gas pressures to be set electronically when plumbed through the Agilent 6890 GC to optimize element analyses.

Versatility

A single jas AED can be used instead of several element-specific systems for routine analyses. As a *universal element detector,* the jas AED is unmatched as a *screening tool* for target and unknown compound analyses.

Ease of Maintenance

Instrument components are *modularized* for convenient maintenance or repair.

Reliability

The jas 2370AA AED is designed for reliability by *minimizing total parts.* Simplified parts replacement provides minimal instrument downtime during routine maintenance.

Convenient Size

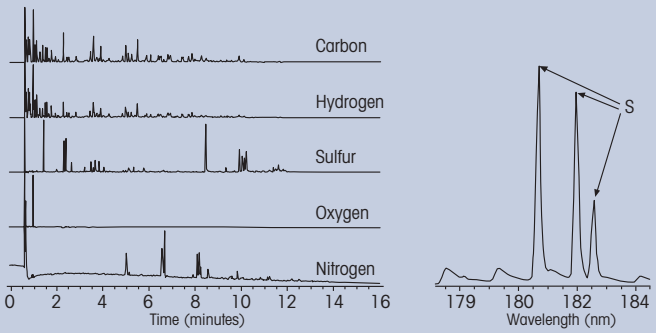
The jas AED's volume is *smaller than a GC,* easily fitting on an analytical bench.

Petroleum Applications: Optimizing Process Operations While Meeting Targeted Impurity Levels

The GC-AED system is much faster than physical distillation of feedstocks to determine the temperature distributions of targeted elements. The system provides this information for a wide range of elements, including sulfur, nitrogen and metals as well as underlying hydrocarbon content - *the only GC detector system with this capability*.

Finished Gasoline

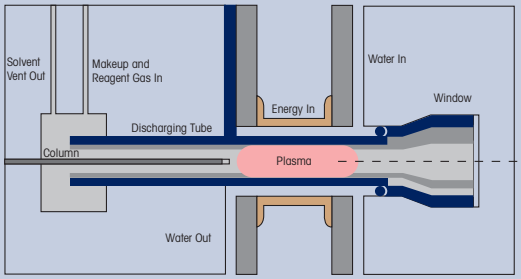
The jas AED can monitor a variety of intermediate processes and finished products. In this sample of finished gasoline, sulfur, nitrogen and oxygenates are easily measured. Here, an emission spectra showing sulfur's three characteristic atomic lines from 181 to 183 nm confirms the presence of a sulfur peak as not just a hydrocarbon interference.

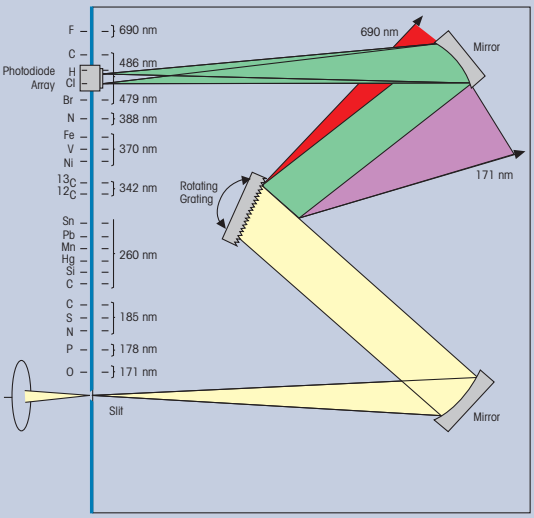


The Highest Sensitivities and Selectivities for Element Detection

The jas AED uses atomic emission spectroscopy to detect elements in compounds eluting from a gas chromatograph. A helium plasma fragments all compounds, with the excited atoms producing characteristic emission lines of light. A lens focuses the light onto the entrance slit of the spectrometer. A rotating grating varies the elemental light spectrum covered by the fixed-position photodiode array (PDA). The PDA can measure from one to several elements simultaneously. The jas AED can detect any number of elements per sample by automatically changing the light spectrum wavelength range focused on the PDA and subsequently making a second (or third or more) injection of the sample.

The Agilent AED software displays real-time, background-corrected chromatograms. This technology, using a GC, offers the highest sensitivities and selectivities for element detection.





A single GC-AED system can replace multiple dedicated GC systems that use element-specific detectors for analyzing various refinery process streams.

This is the instrument to choose for analyzing crude oils and fluidized-bed catalytic cracker (FCC) feedstocks. The jas AED's ability to characterize feedstocks lets you optimize processing conditions to avoid problems with impurities such as metals and sulfur. This enables you to avoid unscheduled shutdowns and to predict the appropriate time for maintenance and catalyst changeovers. The result is substantial operating cost savings.

Menu of Detectable Elements

Common Elements
- Carbon
- Hydrogen
- Nitrogen
- Oxygen

Halogens
- Bromine
- Chlorine
- Fluorine
- Iodine

Other Heteroatoms
- Boron
- Germanium
- Phosphorus
- Silicon
- Sulfur

Stable Isotopes
- Carbon-13
- Nitrogen-15
- Deuterium

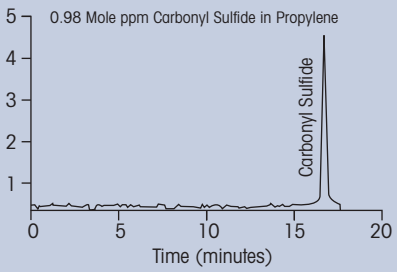
Metals
- Arsenic
- Iron
- Lead
- Manganese
- Mercury
- Nickel
- Selenium
- Tin
- Vanadium

A pre-set menu of elements simplifies the detection process.

The jas AED is also useful for:
- Monitoring intermediate refinery processes such as hydrotreating to remove sulfur- and nitrogencontaining compounds.
- Monitoring levels of expensive product additives in fuels and lubricating oils.

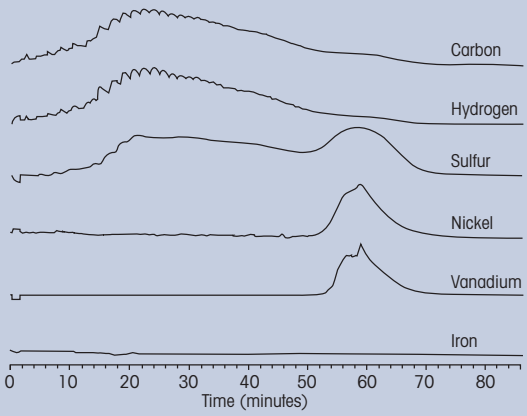
Impurities in Propylene

In the challenging analysis of trace-level impurities in polymer-grade propylene, the jas AED provides a convenient means for measuring AsH -PH -COS-CO-CO , for example, with low ppb minimum detectable levels. These chromatograms, courtesy of the Lyondell Petrochemical Company, show analyses at 1 mole ppm concentrations.



Fluidized-bed Catalytic Cracking Feedstock

The jas AED is an effective tool for characterizing the temperature distribution of impurities that can interfere with fluidized-bed catalytic cracking (FCC) units. The jas AED can show the temperature where metals begin to elute, confirming their presence even at low ppm quantities.



Environmental Applications: Complementing GC-MS Analyses

With the jas AED, you can screenfor target or unexpected compounds, even in complicated environmentalsamples. This instrument is particularly good for trace-level analysis, where sample cleanup is difficult.
You can, for example, identify and quantify pesticides in soil, water and agricultural samples at sub ppb concentrations. An GC-AED system with Agilent's retention time locking (RTL) software and Agilents pesticide library-which the contains locked retention times of more than 560 pesticides found worldwide lets you narrow the identity possibleof pesticides in your sample from hundreds to one or two in less than 14 minutes.

The jas AED also lets you characterize unknown compounds in hazardous waste samples. Or screen for organo-metallic species containing tin, mercury, lead, selenium and arsenic.
And with the jas AED's high sensitivity for carbon, you can easily detect trace-level chemical pollutants in air. Another environmental application lets you monitor for chemical weapon analytes. This includes agents, precursors and breakdown products. You can monitor simultaneously for carbon, phosphorous, sulfur and arsenic. Spectral fingerprinting and carbon/ heteroatom ratios help to confirm compound identification. You can accomplish quantitative analysis with any readily available standard that contains the targeted element. This avoids the need to purchase standards of the exact compound, which can be expensive or difficult to obtain.

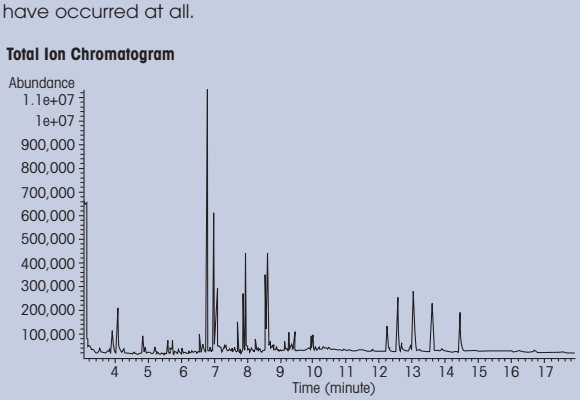
GC Analysis: Using the jas AED with GC-MS

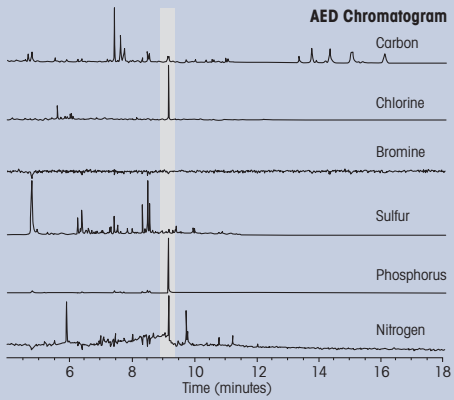
As your analytical requirements increase, you may want to obtain information beyond the data that a GC-MS provides. The jas AED can supply this complementary information, broadening your range of capabilities. You can:

- Pre-screen compounds by element, rapidly locating peaks of primary interest-particularly in complex matrices.
- Screen candidates for the correct composition of elements after a library search has identified possible matches.
- Progress toward identification of a particular compound if a library search does not reveal good candidates.

Pesticides in Food Products

These chromatograms show how the jas AED can pre-screen for compounds, reducing GC-MS analysis time and improving the effectiveness of identifications. In this case, the AED chromatograms show the presence of a pesticide of interest (chlorpyrifos) at a retention time of 9.2 minutes. With this information, you can use the AED carbon channel to help align retention times with a GC-MS total ion chromatogram (TIC). At the TIC's retention time of 8.6 minutes, the chlorpyrifos peak is obscured by other peaks. Without the jas AED pinpointing the suspected pesticide, identification by GC-MS alone would have been difficult-or may not have occurred at all.





Still More Applications

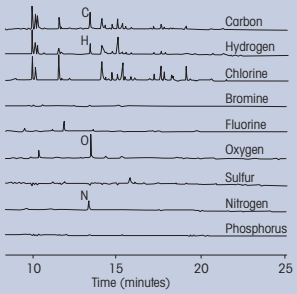
The jas AED is appropriate when screening for stable isotopes such as carbon-13, nitrogen-15 and deuterium for metabolite and chemical reaction studies in *pharmaceutical, chemical and food and flavor* industries. The ability to detect a variety of heteroatoms, including sulfur, phosphorous and silicon, and the ability to distinguish among the halogens fluorine, chlorine, bromine and iodine make the jas AED a versatile tool for a broad range of *general R&D* analyses.

Quantifying Elements

Because the response factors of most elements (except hydrogen) are virtually the same for all compounds, the jas AED can often quantify a compound to within 10 percent or better by calibrating with any compound that contains one or more of the same elements. This capability is useful if a pure standard of the compound is expensive or difficult to obtain. The jas AED can also use target analytes as standards when the highest calibration accuracy is required.

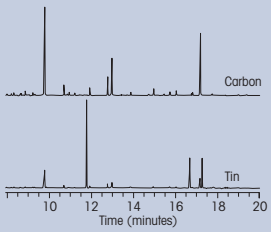
Chemical Dump Site Soil Extract

Screening for unknown compounds, the jas AED detected nine elements in a soil sample from a chemical dump site. It took just five runs to produce chromatograms for each element.



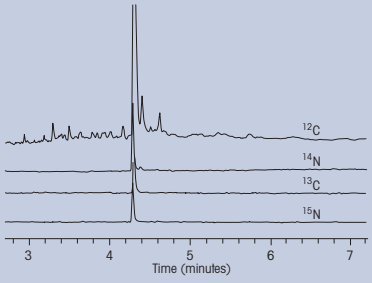
Organotin in Marine Sediment

With the jas AED, you can distinguish individual organotin species, shown here in a sample of marine sediment. This chromatogram is courtesy of the National Institute of Standards and Technology (NIST).



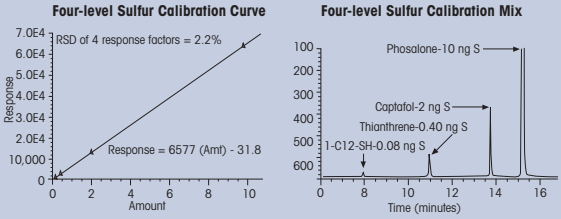
Urine Spiked with Caffeine

The jas AED lets you expand your metabolism study capabilities by labeling compounds with one or more stable isotopes. Here, caffeine is spiked with two different labels. The chromatograms show both natural and stable isotopes.



Four-level Sulfur Calibration

This four-level sulfur-specific calibration curve was generated from a single injection of a standard containing known amounts of sulfur in four different compounds. Using this calibration curve, you can determine the amount of sulfur in any other compound.



Flexible Service and Support

Jas offers a range of support services to help you:

- Get your system up and running fast.
- Resolve problems quickly.
- Keep productivity high.
- Extend instrument life.
- Comply with regulatory and quality requirements.

Our *installation and familiarization* services ensure that your instrument is installed correctly, and in the right environment. You save time, assure proper instrument performance and have your system up and running quickly.

For more information

For more information about the Jas AED,
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