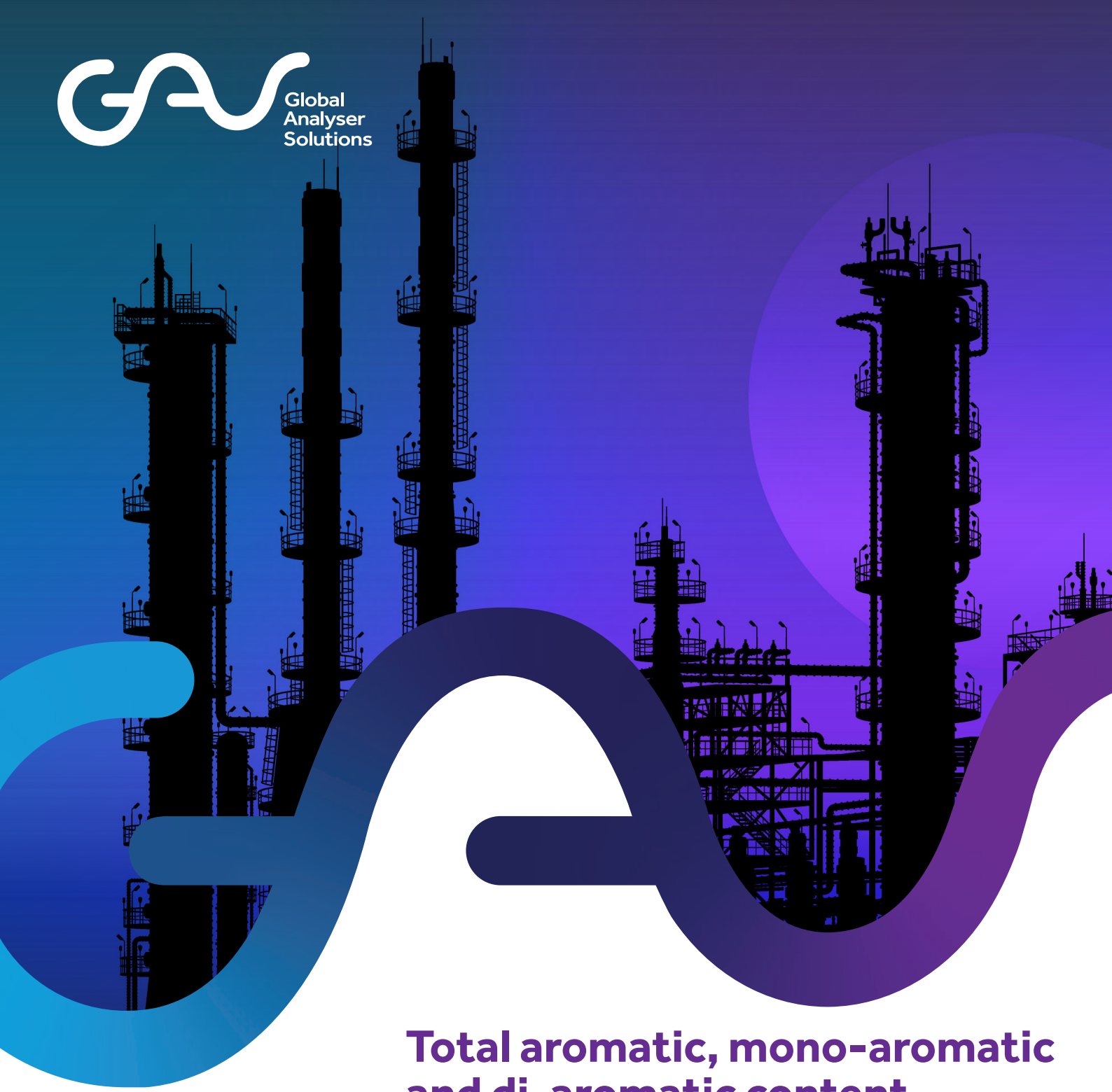
Global Analyser Solutions



Total aromatic, mono-aromatic and di-aromatic content of jet fuel

PF230

VUV ANALYTICS

- Fully compliant with ASTM D8267.
- 5-10 x better results compared to FIA and HPLC
- 2.5–16 times lower total cost compared to FIA and HPLC
- No sample preparation or calibration curves

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Jet fuel analyser GC-VUV

Aromatic hydrocarbons in jet fuel are restricted to a maximum of 25% volume due to their negative impact on jet engine performance, safety, environmental emissions, elastomer compatibility, and energy density. Established standards such as ASTM D1655 and DEF STAN 91091 regulate aromatic content in jet fuel. Traditional methods for analysing aromatics include Fluorescence Indicator Absorption (FIA) and High-Performance Liquid Chromatography (HPLC). FIA, dating back to the 1950s, is considered manual, laborious, and prone to human error. HPLC, a newer method, requires sample preparation, calibration standards, and the use of hazardous solvents. Despite improvements over FIA, HPLC is time-intensive and demands a skilled analyst. The application note introduces a new approach for analysing aromatic content in jet fuel.

Principle of operation

The jet fuel samples do not require any special sample preparation and are run on a VUV Analyser Platform for Fuels consisting of a VGA-100™ spectrometer coupled with a Thermo Instruments Trace GC1600 gas chromatograph, using both VUVision™ software and VUV Analyze™ software configured to run ASTM D8267.

Saturate, mono-aromatic, and di-aromatic content are easily visible using specific portions of the acquired wavelength range, referred to as spectral filters. See Figure 1 (2).

In GC-VUV analysis, unlike traditional chromatography - where components are identified and quantified using peak retention time and integration - data analysis relies on spectral validation with a compound library. Saturate, mono-aromatic, and di-aromatic compounds exhibit distinct spectral shapes, ensuring reliable quantification with spectral confirmation. Compound classes with similar spectra can be combined for accurate class-based reporting. Time Interval Deconvolution™ (TID™) enables the spectral distinction of co-eluting compounds. Using TID, chromatograms are divided into time intervals, and each interval's spectrum is matched against the library.

The table in Figure 1 (1) provides reported values in both mass % and volume % for total aromatic, mono-aromatic, di-aromatic, and saturate content. Chromatographic overlays are provided for easy visual distinction of mono-aromatic, di-aromatic, and saturate content.

Precision for ASTM D8267 has been validated through multiple studies covering a wide range of jet fuel types and production pathways. Additional independent studies further confirm the method's accuracy, with results aligning closely with ASTM D1319 within its reproducibility limits. Overall, jet fuel analysis using the VUV Analyzer™ for Fuels (ASTM D8267) delivers substantially improved precision - up to ten times better repeatability and reproducibility compared with the referee method (D1319) and the HPLC alternative (D6379).

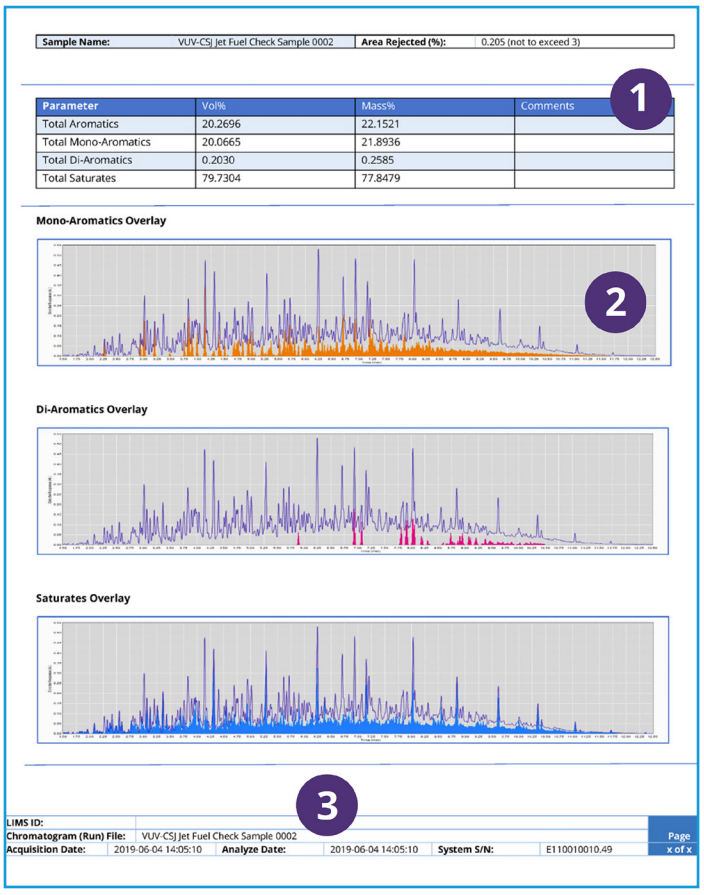

Figure 1 Typical report for GC-VUV running ASTM D8267. Compound classes are reported in the table (1) while chromatographic overlays (2) are provided for visual distinction of mono-aromatic, di-aromatic, and saturate content. Detailed acquisition information (3) is provided for analysis traceability.

Instrument specification

- Thermo Trace GC1600 with iConnect SSL (Split-splitless injector), capillary column and VUV VGA-100 detector
- VUV Analyze™ software
- Runtime 14 minutes

Ordering information PF23X - ABCDE				
code X	0	1	2	3
GC model, power	1600, 230V	1610, 230V	1600, 115V	1610, 115V

For the selection of options (e.g. GC oven cryo valves, Power plug type and more), see the options table in the order guide.

About GAS

Global Analyser Solutions provides GC & GC-MS solutions for Energy, Refinery, Chemical and Environmental markets. Our analysers address a broad spectrum of measuring requirements with high precision and reliability. Please reach out for more information on our website. www.gassite.com