

Mach-RGA

The Fast Refinery Gas Analyzer

jas Analyzer



JAS Mach-RGA

Refinery Gas Analyzer

jas Analyzer

Refinery gas is used as a fuel gas or as feedstock for further chemical processing. US EPA Title V Permit requires operators to monitor and report the composition of refinery gas used as fuel or burnt through refinery flares. Optimization and control of the refinery gas process requires an accurate and fast analyzer.

JAS Mach-RGA analyzer is ideal for the fast and complete analysis of the refinery gas.

Simultaneous three-channel measurement enables the separation of permanent gases and light hydrocarbons with excellent sensitivity, linearity and repeatability in less than 5 min. (7 min. if including H₂S.)

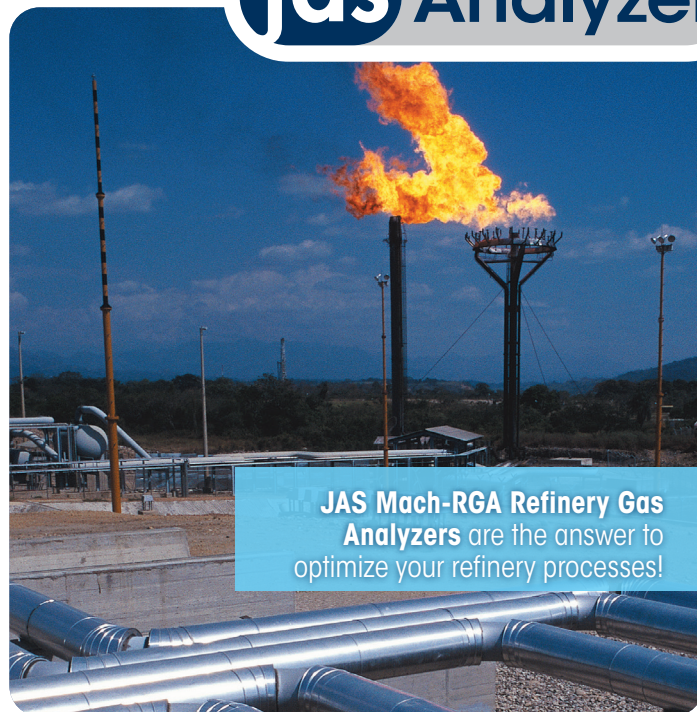
The Mach-RGA analyzer is a turn-key system with flexibility. By making minor modifications, the analyzer can be used for the analysis of propane, propylene and butanes in gas or compressed liquid phase.

JAS Mach-RGA analyzer

The JAS Mach-RGA analyzer is based on the Agilent Technologies' 8890 GC that is configured with three separation channels: Two TCD channels are used for the quantification of permanent gases and a FID channel is used for the quantification of light hydrocarbons. With the combination of unique JAS isothermal valve box, valve automation technology, optimized GC column set and JAS Report Generator software, **the JAS Mach-RGA analyzer distinguishes itself from competitors as a prime turn-key system for fast refinery gas analysis.**

JAS Mach-RGA offers a broad sample scope:

- All Refinery Process Gases
- Petrochemical Gases such as Propylene, Butadiene etc.
- Shale Gas and LPG products from Gas Process Industry



JAS Mach-RGA Refinery Gas Analyzers are the answer to optimize your refinery processes!

The Mach-RGA analyzer complies with the following methods ASTM D1946, ASTM D2163, UOP 539 and DIN 51666.

The analyzer uses an optimized configuration to determine the concentration of individual saturated and unsaturated hydrocarbon components from C₁ to C₆₊ (C₆₊ as a composite peak) and analyze all permanent gases present in Refinery Gases. Micro-packed columns are installed in a separate heated zone and the capillary column is located in the GC oven. This configuration allows oven temperature to be programmed in a more aggressive manner and provides a substantial reduction in overall analysis time from ~ 25 minutes to 5 minutes (or 7 minutes with H₂S) for high throughput.

Included in the system, the JAS Report Generator is fully integrated with Agilent OpenLab ChemStation for flexible report generation and gas property calculations.

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EXCELLENT DETECTION LIMITS

JAS uses de-activated tubing to avoid adsorption of (Sulfur) compounds: this contributes to more accurate results.

The quantification limits (QL) of JAS Mach-RGA system are:

- 0.02% for inert gases
- 0.01% for hydrocarbons
- 0.1% for hydrogen sulfide

MACH-RGA is a turn-key system which means JAS commits to all the followings:

1. **Physical Test:** Check of completeness of all hardware for the application.
2. **Functional Test:** Testing of all hardware components.
3. **Application Test:** Evaluation of the RGA on performance following requested standard methods.
4. **Reports & Methods:** Documentation and test reports for the requested methods.
5. **Shipment:** Shipment of the complete system to the customer.
6. **Installation & Familiarization:** Installation of the system and complete functionality test at the customer site.

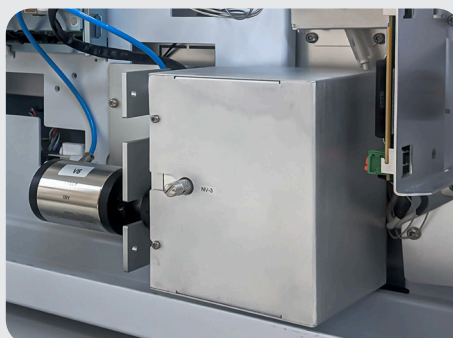
MACH-RGA: KEY SOLUTION ANALYZER BENEFITS

JAS guarantees your application!

- The JAS Report Generator with calculation of gas properties that can be tailored to your needs and is fully integrated into Agilent ChemStation™
- The system makes use of the proven quality products from Agilent Technologies
- All flows and pressures are fully EPC controlled
- JAS valve system and heated zones come in a valve box designed for reliable operation and easy maintenance.

FIELDS of APPLICATIONS

- Oil Refineries
- Gas processing plants
- Petrochemical plants
- R&D



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SYSTEM CONFIGURATION

Hardware: Agilent GC 8890, TCD x 2, FID, Special Valve Box, PC Bundle, Proprietary Capillary and Micro-packed Columns.

Software: Special JAS Report Generator integrated into the Agilent ChemStation™.

JAS REPORT GENERATOR, A DEDICATED UNIQUE SOFTWARE

This Software has the capability to automatically calculate physical properties selected by the user after each analysis. The S/W uses the result table generated in ChemStation™ to calculate needed properties according to ISO 6976. A standard database for gases with flexibility for users to modify for special needed is included in the software. Additional conditions such as temperature and pressure can be edited as well.

The screenshot shows the JAS BTUCalc software interface. It features a table of compounds with columns for CalNr, Compound, MolWeight (g/mol), Summation Factor, and Gross Calorific Value (MJ/m³). The table lists 17 compounds, including Hydrogen, Carbon Monoxide, Carbon Dioxide, Oxygen, Nitrogen, Hydrogensulfide, Ethylene, Methane, Acetylene, Propylene, Propadiene, Methylacetylene, and t-2-Butene. To the right of the table, there are sections for 'Metering constants' and 'Calculations'. The 'Metering constants' section includes input fields for Temperature (K), Pressure (Pa), Mass of Air (KG/K.mol), and Compression Factor. The 'Calculations' section displays results for Compressibility (Zmix), Superior Calorific Value on volumetric, mass, and molar basis, Relative Density of Real Gas, Density of Real Gas (Kg/m³), and Wobbe Index.

CalNr	Compound	MolWeight g/mol	Summation Factor	Gross Calorific Value MJ/m³
01	Hydrogen	2,0159	-0,0048	12,1020
04	Carbon Monoxide	28,0104	0,0224	11,9600
05	Carbon Dioxide	44,0098	0,0748	0,0000
06	Oxygen	31,9998	0,0283	0,0000
07	Nitrogen	28,0135	0,0173	0,0000
08	Hydrogensulfide	34,0819	0,1000	23,7800
09	Ethylene	28,0540	0,0800	59,7200
10	Methane	16,0428	0,0447	37,7060
11	Acetylene	26,0380	0,0837	55,0400
12	Propylene	42,0810	0,1265	87,1000
13	Propadiene	40,0648	0,1304	82,2100
14	Methylacetylene	40,0648	0,1304	82,2100
17	t-2-Butene	56,1080	0,1789	114,5400

Metering constants

Temperature (K) = 288,15
Pressure (Pa) = 101,325
Mass of Air (KG/K.mol) = 28,9626
Compression Factor = 0,99958

Calculations

Compressibility (Zmix) = 0,9766318895
Superior Calorific Value on volumetric basis = 102,7149921285 MJ/m³ (H)
Superior Calorific Value on mass basis = 49,4898561052 MJ/Kg
Superior Calorific Value on molar basis = 2.428,6882770891 KJ/mol
Relative Density of Real Gas = 1,7336526770
Density of Real Gas (Kg/m³) = 2,1253274592 Kg/m³
Wobbe Index = 78,0104512252 MJ/m³

SOFTWARE FEATURES

- Calculations according to ISO 6976
- Expandable Compound Table
- Flexible Report Generation, allows customization

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UPGRADE OPTIONS:

- Option LPG (Liquified Petroleum Gas):**
 - All JAS RGA solutions can be configured to analyze gas and pressurized liquids (LPG)
 - Additional liquid sampling valve
 - Analysis of all relevant liquid gas streams in less than 5 minutes
- Option Traces of CO, CO₂:**
 - JAS methanizer
 - Trace analysis of CO and CO₂ in the range of 0.1 to 100 ppm
- Option JAS GBS - Automatic Gas Sampler**
 - The JAS GBS allows automated sampling of gases, stored in Tedlar bags or gas sampling balloons, as well as gas cylinders, e.g. calibration gas cylinders.



GBS Features and Specification

Each gas sampling inlet is equipped with an in-line filter to avoid multi-position valve blocking. Sample transfer is carried out via a multi-position valve (MPV). In the standard version the MVP is controlled via Agilent OpenLAB CDS ChemStation sequence editor. The sampler can optionally be controlled via a special JAS Control Software, which is fully integrated into the Agilent Technologies Software.

Connection to the GC can be made by means of 1/16" SS tube.

Depending on the GBS model type, up to nine samples can be processed automatically, e.g. eight gas samples from gas sampling balloons and one reference gas.

Optional:

- Inert version
- Heated MPV & flow path
- MPV Control Software

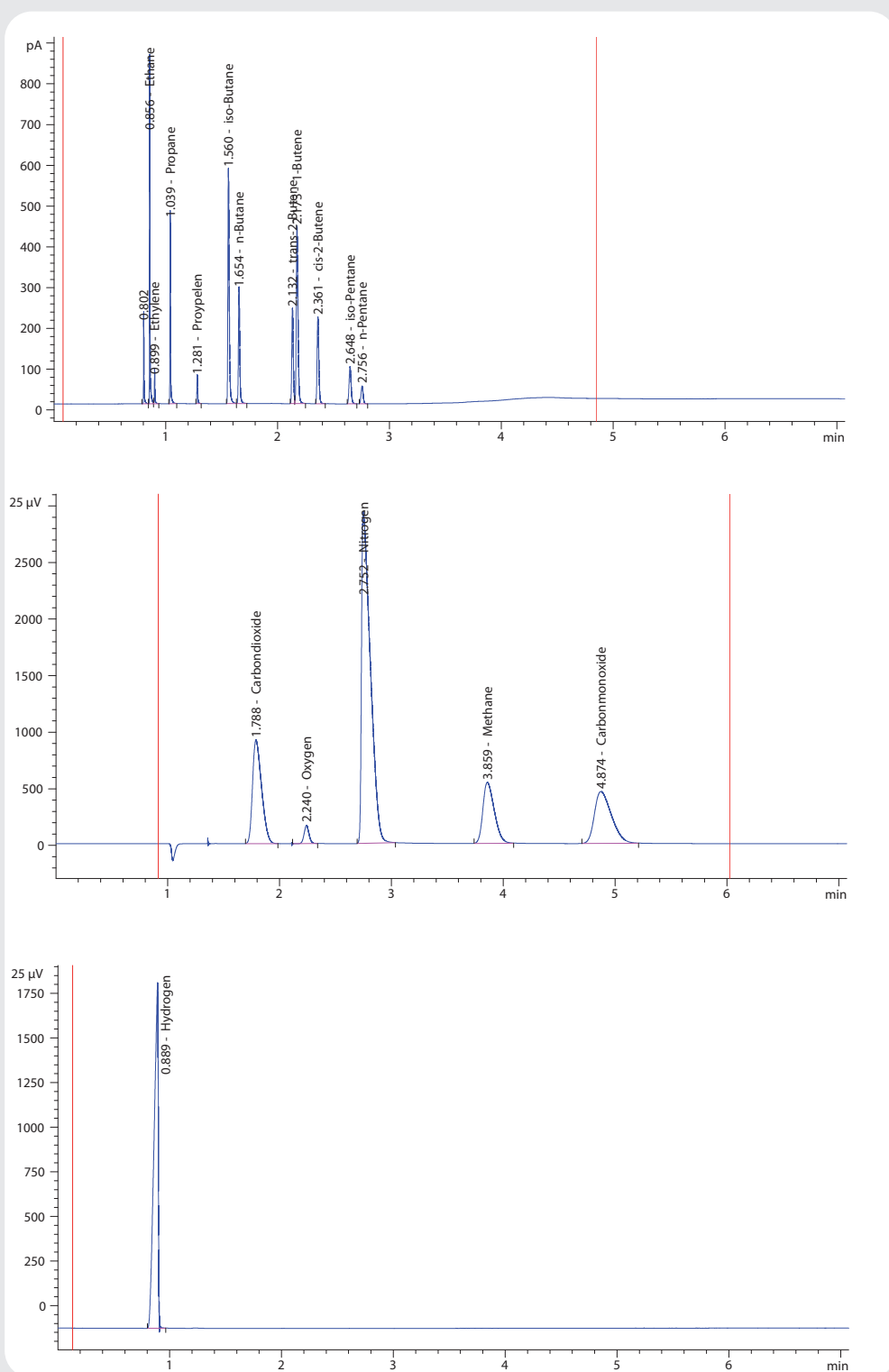
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TYPICAL CHROMATOGRAMS

Example of Final Check Test of the complete system:





About Joint Analytical Systems

Since 1995 JAS has been a Premier Solution Partner and Value Added Reseller of Agilent Technologies. We are an innovative-driven organization that offers customized solutions for GC, GCxGC, μ GC, GC-AED, GC-MS, GC-QQQ, LC, LC-MS, LC-QQQ and Q-TOF LC-MS applications.

JAS serves key industries such as

- Chemical
- Petrochemical/HPI
- Environmental
- Food & Flavor
- Forensic

JAS Products for GC

- Atomic Emission Detector
- UNIS Inlet Systems
- Automatic Gas Samplers
- CryoTrap
- Customized Valving Systems
- EzPrep - Preparative Fraction Collector
- Olfactometer
- GICU - Gas Injection Control Unit

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