

# Creating Value Downstream Solutions for Oil & Gas

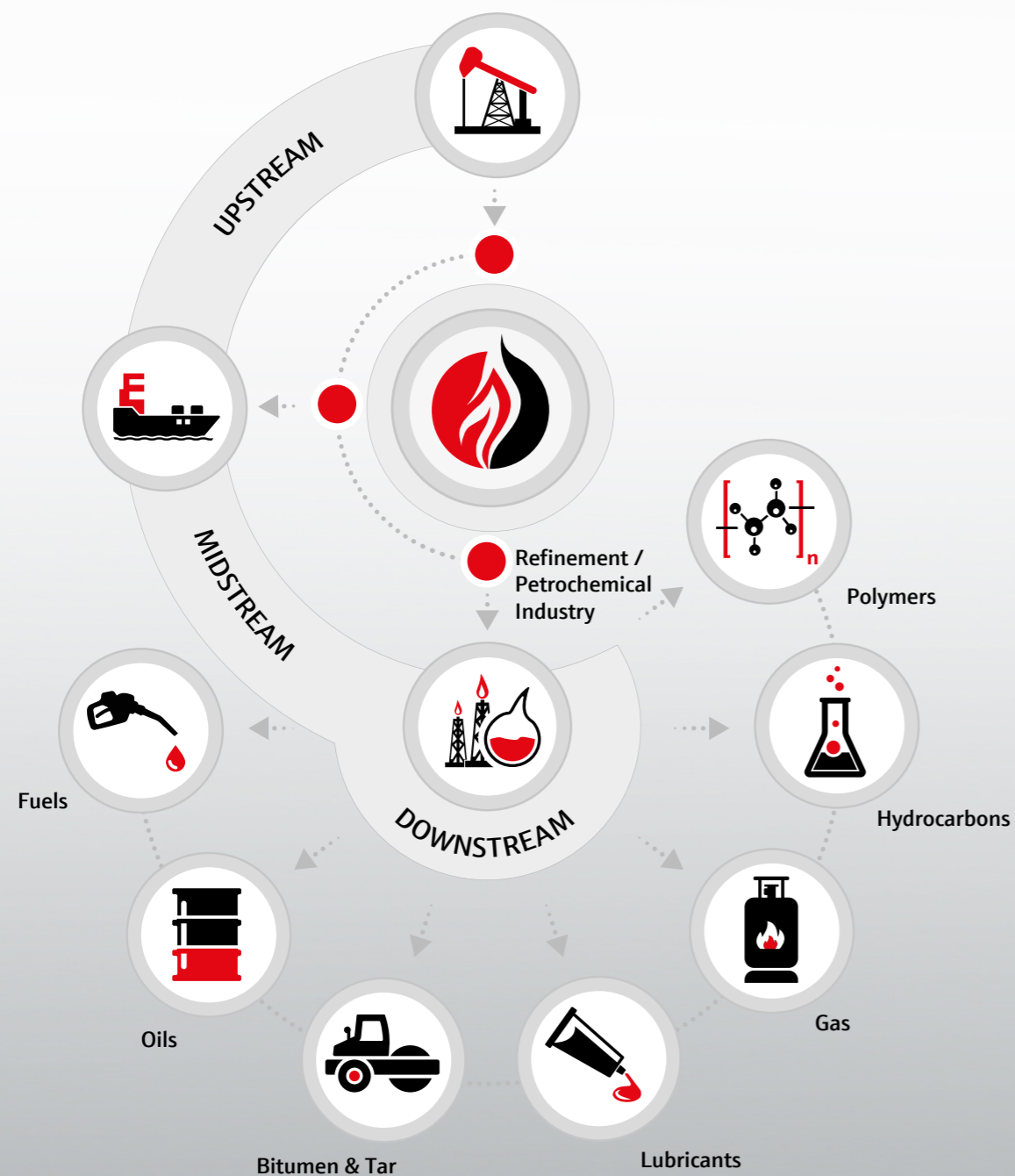
Oil & Gas



**analytikjena**  
An Endress+Hauser Company

## Creating Value Downstream

We help you become fully compliant with the strictest regulations and achieve the best product quality by providing tailor-made and easy-to-use lab instrumentation.



### Feedstock Control

- Composition analysis for optimization of further treatment
- Determination of metals and non-metals
- Risk assessment of corrosives, catalyst poisons, and volatile metal compounds



### Process Control

- Monitoring of corrosive and wear elements
- Multi-element analysis
- Control of process streams, additives, and residues



### Product Control

- Ensuring conformity with product specification according to ASTM and EN
- Confirmation of compliance with TIER and EURO regulations (e.g., sulfur in fuels)
- Purity control of final products (e.g., fuels, combustibles, hydrocarbons)



### Effluent Control

- Monitoring of industrial process effluents, contaminated soil, and sediments
- Ensuring compliance with environmental protection regulations adherence to legal emission limits



## Feedstock Control – Improving Refining Efficiency



We help you gain precise knowledge of the composition and contaminants of your feedstock materials, enabling you to precisely assess potential risks to refining process with reliable data on element impurities.



### The challenge

Determining metal and non-metal elements over a wide range of concentrations to ensure conformity with required feedstock specification. Securing a continuous flow of high-quality raw materials from transportation vessels to the plant.

### The solution

Robust elemental analyzers and spectrometers, equipped with the most reliable technology, that can analyze extremely challenging organic matrices in a short time.

### Minimize Off-Spec, Maximize Yield

Fast analytical data for your feedstock inspection – like iron, nickel, sulfur, vanadium in crude oil, or volatile sulfur in natural gas – allows you to efficiently plan the next process stages. Analytik Jena's robust analysis technology delivers reliable data about the quality of feedstocks and helps to avoid redundant measurements.

#### Innovative technologies for valid results

- Robustness and high tolerance for organic matter
- Wide linear measurement range of more than 70 elements from sub-ppb to wt-%
- Convenient analysis using matrix-optimized sampling systems

#### Convenient risk assessment

- Quick analysis without time-consuming pre-treatment
- Customized sample introduction systems to fit any matrix type
- Effortless sample processing with a ready-to-use method library

#### Analyze with us

- Organic elemental analysis (CNSX) in liquids, solids, and gases
- Analysis of metals, metalloids, and non-metal elements from traces to major components
- Ultra-trace analysis of elements and isotopes

## Process Control – Optimizing Productivity



We help you to process crude oil and natural gas as profitably as possible using offline monitoring of corrosive and wear elements throughout all stages of production.



### The challenge

Around-the-clock monitoring of intermediates for detection of hazardous elements to avoid corrosion, catalyst poisoning, and damage to plant system components.

### The solution

Highly automated analytical instrumentation, capable of running in a 24/7 shiftwork environment with maximum sample throughput and minimum effort.

### Easy Operation at High Throughput

Prevent corrosion and extend catalyst lifetime by trace metal determination in middle distillates (e.g., ASTM D7111) or sulfur control in blending components (e.g., EN 15486). Hardware and analytical methods are optimized to your individual application to ensure safe and effortless analysis with the support of Analytik Jena's technical solutions.

#### Faster sample processing thanks to automation

- High sample throughput due to minimal analysis time and reproducible results
- Software support to better plan maintenance with minimum downtime
- High degree of automation

#### Increase walk-away time

- 24/7 operation of the devices
- Remote accessibility
- Analysis techniques for nearly all kinds of matrices
- Compliant with relevant international standards

#### Analyze with us

- Full element portfolio (e.g., arsenic, mercury, vanadium, nickel, sodium, silicon, phosphorus, iron)
- Process streams, additives, and residues (e.g., ASTM D8130, ISO222421-2)
- Organically bound nitrogen, sulfur, and chlorine

## Product Control – Compliance with Specifications and Regulations



Meeting the strictest product specifications is crucial for complying with regulations and legal limits. We help you achieve a high product value for fuels and other refinery products using analyses with maximum sensitivity.



### The challenge

Fast and precise quality control of refined products and intermediates for undesired elements. Analyses need to be performed in accordance with local and international standards.

### The solution

Analytical instruments designed for achieving the lowest detection limits with operation around the clock, plus ready-to-use methods for compliance with standards and regulations.

## The Right Method for Any Measurement

Our devices enable you to meet quality and compliance needs with analyses of maximum reliability in accordance with standards such as ASTM D5453, EN 16476, and ASTM D4929. Analytik Jena's instruments offer optimized methods for any task, ranging from chlorine determination in naphtha to detection of nitrogen in engine oil.

### Verify product specifications with less effort

- Method library for selection of standards
- Lifecycle management (consumables, service, and application support)
- Flexible automation for any workload
- Standards-compliant analysis and reporting

### Lower maintenance, better data, higher value

- Low need for supplies and consumables for minimizing total cost of ownership
- Globally available support teams
- Higher productivity thanks to immediate availability of analytical data

### Analyze with us

- Interference-free sulfur determination in fuels (e. g. diesel, gasoline, kerosene, heating oil)
- Trace analysis of relevant elements (e.g., vanadium, tungsten, iron, nickel, silicon, cobalt, mercury, phosphorus)
- Determination of nitrogen, sulfur, and chlorine trace impurities in petroleum hydrocarbons

## Product Control – Purity and Performance



Because petrochemicals are major precursors of many industrial products, hydrocarbon feedstock analysis reduces risks during advanced processing. We help you to maximize yields, elevate product quality, and assure specifications.



### The challenge

Ensure consistent quality throughout the entire value chain – from simple feedstocks such as gases to sophisticated final products such as polymers. Measure ultra-low element quantities precisely and large quantities quickly, regardless of the sample matrix.

### The solution

Comprehensive analyzer portfolio featuring a wide measurement range and long-term performance stability. Flexible automation options with scalable throughput capabilities.

## Sensitive Detection for Predictable Quality

Satisfy even the highest quality requirements with the most sensitive analyses – from purity confirmation to approval of customized specifications of final products. Analytik Jena's analyzers ensure unmatched precision, independent of the analyzed matrix, e.g., pressurized liquified propylene, highly volatile pentane, or rubber samples.

### Solve complexities

- Customized methods to comply with your clients' specifications
- Easy calibration with liquid standards
- Optimized quantitative matrix separation
- Intelligent sampling systems for the entire application range

### Safe analysis, safe products

- High operational safety for pressurized gas and LPG
- Quick switching between different matrix types
- Excellent detection and measurement sensitivity
- Minimal sample preparation

### Analyze with us

- Element impurities in aliphatic and aromatic hydrocarbons
- Nitrogen impurities in adipic acid and polymers
- Traces of catalyst residues
- Ultrapure feed materials for polymer industry and chemical industry
- Chlorine and sulfur in carbonic and fatty acids, paraffins, and waxes



## Effluent Control – Recovering Valuable Resources



Direct dischargers have to ensure compliance with regulatory limits before releasing industrial effluents into the environment. We help analyze effluents in accordance with regulations such as EPA, ISO and EN.



### The challenge

Diverse and inhomogeneous sample materials contaminated with organic and inorganic substances and high particle contents which require complex sample preparation.

### The solution

Robust and durable analytical instruments with simplified sample preparation and particle handling.

## Simplified Waste and Wastewater Analysis

Analytik Jena's solutions for the analysis of aqueous matrices and other waste materials allow you to save time during sample preparation and gain reliable analysis results. Satisfy environmental regulations with equipment designed for routine analysis of demanding matrices combined with low maintenance needs.

### Robust hardware, low operation cost

- Excellent particle handling
- Accurate quantification of metals with high matrix tolerance
- Highly automated sample preparation systems e.g., AOX

### Maximum instrument utilization

- Multi-purpose instruments for quality control and environmental analysis
- High-resolution multi-elemental analysis
- Multiple background correction options for element analysis with AAS

### Analyze with us

- TOC in wastewater and in solid waste
- AOX/TOX, EOX in water, sludge, and soil
- Major, minor, trace, and ultra-trace elements
- TOX in used oil, residues, and organic waste

## SPECIAL: Synfuels – From Sustainable Source Materials to Advanced Fuels

We support you in all aspects concerning alternative fuels from development, production, and feedstock risk assessment to compliance and emission control.

### Different input – same output

Global demand for energy is growing while oil resources become increasingly scarce. Projections show that the world's non-renewable energy sources are likely to be depleted in less than a century, which means that, in order to create a secure energy supply for the future, it is essential to develop of equivalent alternative energy carriers. Fossil fuels, which consist of various valuable hydrocarbons, created over billions of years under high pressure, now need to be synthesized. There are many approaches to the production of synfuels, depending on the available feedstocks. Whether it's fossil materials such as coal (C-t-L) or gas (G-t-L), cellulosic biomass (B-t-L), fatty acids/fats (FAME), organic waste, or even the conversion of pure CO<sub>2</sub> (X-t-L) – the possibilities are unlimited. Despite the complexity of the manufacturing processes, the resulting fuels do not differ from conventional diesel, gasoline or jet fuel.

### Outstanding technology for sustainable processes

We support you in the analysis of metal, metalloid, and non-metal elements throughout the entire synfuel production process chain. From the determination of high element contents in a wide range of raw materials (e.g., biomass, animal fat, or plant oil) to the analysis of intermediate products to the determination of trace contents in the quality control of finished biofuels – Analytik Jena's instruments are reliable partners for every matrix and concentration range. Benefit from devices and methods designed for biofuel analysis while drawing on the expertise of our worldwide support network.

- Risk assessment for feedstock materials (e.g., palm oil, tallow oil) and process intermediates
- Controlling sulfur and other elements in bioethanol and biodiesel used as blending components
- Pre-configured analyzers for every industry standard





## Our Solutions at a Glance

Benefit from the advantages of our various methods and devices for element analysis. We offer full compliance with ASTM, UOP, DIN, EN, ISO, as well as other international and local standards.

Method	Device	Special Feature	Regulations
CNSX	multi EA 5100	<ul style="list-style-type: none"> <li>Matrix tolerance and robustness (double furnace)</li> <li>Intelligent flame sensor ensures quantitative combustion</li> <li>Fastest horizontal analysis</li> </ul>	<ul style="list-style-type: none"> <li>ASTM: D6667, D5453, D4929, D5808, D5762, D7184, etc.</li> </ul>
	compEAct	<ul style="list-style-type: none"> <li>Maximum throughput with minimum bench space of &lt; 0.3 m<sup>2</sup></li> <li>Interference-free TS analysis in fuels</li> </ul>	<ul style="list-style-type: none"> <li>ISO: 20846, etc.</li> <li>UOP: 981, 987, etc.</li> </ul>
ICP-MS	PlasmaQuant MS	<ul style="list-style-type: none"> <li>Direct analysis of any kind of organic sample matrix</li> <li>Measurement of nearly undiluted samples for optimum detection limits in sub-ppb range</li> </ul>	<ul style="list-style-type: none"> <li>UOP: 992, 1006, etc.</li> <li>ASTM: DB110, etc.</li> </ul>
ICP-OES	PlasmaQuant 9100	<ul style="list-style-type: none"> <li>High-resolution provides interference-free access to most sensitive emission lines</li> <li>Matrix tolerance for analysis of undiluted samples</li> <li>Detection limits of &lt; 1 ppb for most relevant elements</li> </ul>	<ul style="list-style-type: none"> <li>ASTM: D4951, D5185, D7111, D7691, D8130 etc.</li> <li>EN: 16576, 16476, etc.</li> <li>DIN: 51399, 51627, etc.</li> <li>ISO 22241-2, etc.</li> </ul>
AAS	novAA 800	<ul style="list-style-type: none"> <li>Easy operation with less hands-on time</li> <li>Compliant with the majority of regulations and standards</li> </ul>	<ul style="list-style-type: none"> <li>ASTM: D3831, D4628, D5184, D5863, etc.</li> </ul>
	contrAA 800	<ul style="list-style-type: none"> <li>One lamp - all wavelengths between 185-900 nm available</li> <li>High resolution for easy method development and elimination of spectral interferences</li> </ul>	<ul style="list-style-type: none"> <li>EN: 16135, etc.</li> </ul>
TOC/TN <sub>6</sub>	multi N/C 2100S	<ul style="list-style-type: none"> <li>Matrix robustness for challenging samples (high organic content, particles, high salt)</li> </ul>	<ul style="list-style-type: none"> <li>EN: 1484, 12260, etc.</li> <li>ISO: 20236, etc.</li> </ul>
AOX / EOX	multi X 2500	<ul style="list-style-type: none"> <li>High throughput with automated sample preparation and workflow</li> <li>Versatile application – analysis of AOX, EOX, TOX, POX</li> </ul>	<ul style="list-style-type: none"> <li>ISO: 9562, etc.</li> <li>DIN: 38414-S17, etc.</li> </ul>



Do you want to know how to benefit from these solutions?  
Get in touch with us directly.



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Subjects to changes in design and scope of delivery as well as further technical development!

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