PETROCHEMICAL INDUSTRY SOLUTIONS UTILIZING SIFT-MS

Most fuels and many modern products contain components that originate from hydrocarbons and other organic compounds occurring in crude oil. Since these crude oil-derived products form such an important part of modern life, there is an ongoing need to find and extract the raw material from Earth’s crust, separate it into various fractions, and transform these fractions into usable forms.

Hydrogen sulfide (H\textsubscript{2}S) is a highly toxic and corrosive gas that is often present in oil and gas. For worker safety and corrosion prevention in drilling and refinery plant infrastructure, it is of very great importance to have a rapid, on-line measure of hydrogen sulfide content in natural gas.

The SIFT-MS technique is extremely effective at detecting and quantifying H\textsubscript{2}S and other reduced sulfur compounds in natural gas and LPG. Instruments are able to determine the degree of souring of these fuel gases, in addition to determining their light to medium hydrocarbon composition. The fuel gases are typically diluted 100-fold prior to analysis, but the high sensitivity of SIFT-MS to H\textsubscript{2}S means that the crucial concentration of 3.5 ppm in neat natural gas (or 35 ppb in a 1% dilution) is easily measured. This dilution can be performed online.

SIFT-MS, however, provides comprehensive, quantitative C\textsubscript{1} – C\textsubscript{14} analysis of mud gas in less than 15 seconds to part-per-billion-by-volume concentrations (ppbv). The SIFT-MS technique also has high immunity to water and a wide dynamic range, which simplifies sample pre-treatment and delivery. Calibration requirements are also greatly reduced in SIFT-MS compared to GC and other methodologies.

SIFT-MS instruments also deliver benefits in ease of use, ease of integration, remote operation and long-term calibration stability.

SIFT-MS presents a breakthrough in the detection, quantitation and tracing of petroleum hydrocarbons. This brochure outlines several SIFT-MS-based petrochemical industry solutions provided by Syft Technologies.

MUD LOGGING

High-penetration-rate drilling technologies present a challenge to current mud-gas analysis techniques: analytical tools are either too slow, or do not quantify a complete range of compounds. For example, gas chromatography (GC) analyses are often limited to 1 – 5 minutes per analysis cycle, and compounds containing less than six carbon atoms. Faster photometric and electrochemical techniques detect only a limited range of compound types.

SIFT-MS, however, provides a ground-breaking opportunity to the petrochemical industry across the entire spectrum of prospecting, extraction, and processing. SIFT-MS is the first technology that can quantify the full breadth of light to medium hydrocarbons and other volatile organic compounds (VOCs) in real time, at the required concentrations, and with wide linear and dynamic ranges. Syft SIFT-MS instruments also deliver benefits in ease of use, ease of integration, remote operation and long-term calibration stability.

SOUR GAS DETECTION

Hydrogen sulfide (H\textsubscript{2}S) is a highly toxic and corrosive gas that is often present in oil and gas. For worker safety and corrosion prevention in drilling and refinery plant infrastructure, it is of very great importance to have a rapid, on-line measure of hydrogen sulfide content in natural gas.

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Syft SIFT-MS quantitation of hydrogen sulfide in natural gas (1% in nitrogen) using the H\textsubscript{3}O\textsuperscript{+} reagent ion. Note that logarithmic scales are used.
Syft Technologies’ SIFT-MS instruments offer unparalleled opportunities for highly sensitive, selective and non-discriminatory analysis of hydrocarbons and other VOCs in diverse petrochemical industry applications, including:

- Real-time, selective analysis of hydrocarbons in high penetration rate mud logging
- Enhanced protection of infrastructure through detection of ‘sour’ compounds such as hydrogen sulfide
- Greatly increased sample throughput for oil and gas surveys
- Faster detection of leaks that cause product losses, pollution, and pose a hazard to workers
- Assuring the public that there is good air quality at your fence-line in real time, and correlated with meteorology.

Syft Technologies’ is committed to its customers’ success, delivering fully integrated solutions, user-friendly software, product reliability and extensive after-sales support.
SELECTED ION FLOW TUBE MASS SPECTROMETRY (SIFT-MS)

SIFT-MS is the leading real-time analytical technique for comprehensive gas analysis to ultra-trace levels.

SIFT-MS uses ultra-soft, precisely controlled chemical ionization coupled with mass spectrometric detection to rapidly quantify VOCs and permanent gases to low part-per-trillion concentrations by volume (pptv). Eight chemical ionization agents (reagent ions) are applied in Syft instruments: H₃O⁺, NO⁺, O₂⁻, O⁻, OH⁻, NO₂⁻, and NO₃⁻. These eight reagent ions react with VOCs and inorganic gases in very well controlled ion-molecule reactions but they do not react with the major components of air (N₂, O₂, and Ar). This enables SIFT-MS to analyze air at trace and ultra-trace levels without preconcentration.

Rapid switching of eight reagent ions provides unsurpassed selectivity among direct MS techniques.

BENEFITS OF SYFT SIFT-MS INSTRUMENTS

- Instantaneous identification and quantitation of VOCs and inorganic gases using a fully integrated, extensive chemical ionization library
- Real-time air analysis to low part-per-trillion by volume (pptv) concentrations with class-leading selectivity, no preconcentration, and high robustness to humidity
- Analysis of chemically diverse VOCs in a single analysis (e.g. aldehydes, amines and organosulfur compounds)
- Ease of operation with push-button simplicity (including smartphone access), no sample preparation, and comprehensive LabSyft data analysis software
- Designed and engineered for use in commercial, industrial and research environments, with easy integration into sample delivery systems and IT infrastructure
- Reliable, low maintenance instruments and accessories, with market-leading after-sales support

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[A] = \gamma \left( \frac{[P^+]}{[R^+]} \right) \quad \text{or} \quad [A] = \gamma \left( \frac{[P^-]}{[R^-]} \right)
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\( \gamma = \text{instrument calibration factor} \)