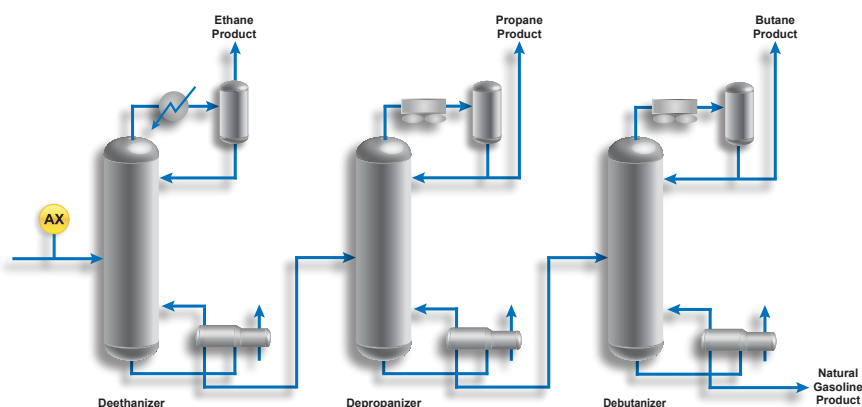


APPLICATION NOTE - NATURAL GAS PROCESSING

Hydrogen Sulfide Measurement in Y-Grade NGL Fractionation

Natural Gas Liquids (NGL) fractionation plants use a series of columns to extract NGLs from natural gas. Once methane is separated from the raw natural gas in the demethanizer, the remaining mixed Y-grade stream can be divided further into ethane, propane, and butanes by processing the gas through fractionation columns. Operation of the fractionation columns is optimized so that the overhead streams yield individual hydrocarbon product streams ready for marketing to petrochemical complexes. Sometimes the hydrocarbons are mixed, such as with ethane and propane, referred to as E/P Mix.



NGL Fractionation Process

Critical Measurement of H₂S

NGL product streams typically have a H₂S specification set by customers, or pipelines. An amine unit will often be located upstream of the NGL fractionator with dehydration and other pretreatment. Knowing the H₂S level prior to sale is typically required. Measurements can be taken on the inlet to the fractionator, as well as on each overhead product stream.

Issues with Traditional Measurements

Lead Acetate paper analyzers have been used but they require frequent replacement of the tape, and disposal of the tape is problematic because it contains lead. Gas Chromatographs equipped with Flame Photometric Detectors (FPDs) are also used. FPDs experience coking and flame-outs with hydrocarbon streams and are maintenance intensive. GCs have relatively long measurement cycle times.

SpectraSensors' Solution

The SpectraSensors TDL analyzer offers a new solution for this measurement. There are no cylinder gases to replace on a routine basis, so the analyzer is very low maintenance and has a low cost of ownership over the life of the analyzer. The high resolution TDL technology eliminates errors from interferences that have hampered other spectrometric approaches. Analysis time with Tunable Diode Laser technology is fast, with results updated in seconds.

Validation

SpectraSensors analyzers require no calibration in the field and calibration is stable for the life of the analyzer, however, calibration of trace H₂S concentration is essential. At the SpectraSensors factory, calibration is performed by mixing certified blends of H₂S at fairly high concentrations with pure gases through NIST-traceable mass flow controllers. In the field, the analyzer can be validated by using a certified blend of H₂S in nitrogen.

KEY POINTS

- Tunable Diode Laser and Detector are isolated and protected from the process gas and contaminants
- Low Cost of Ownership – No Lead Acetate tape or GC carrier and detector gases to buy
- Fast, High Sensitivity measurement of H₂S
- TDL Differential Spectroscopy Technology avoids interference from changes in background compounds

Hydrogen Sulfide Measurement in Y-Grade – NGL Fractionation

Application Data

Target Components	H ₂ S in Y-grade
Typical Measurement Ranges	0-20 ppm*
Typical Repeatability	±1 ppm**
Measurement Response Time	1 to ~60 seconds
Principle of Measurement	Differential Tunable Diode Laser Absorption Spectroscopy (H ₂ S scrubber included)
Validation	Certified blend of H ₂ S in Nitrogen

* Consult factory for alternate ranges.

** Repeatability is based on a single stream composition with minimal variation and which falls within the table below. If the stream composition varies, the factory should be consulted for specification.

Typical Background Stream Composition

Component	Minimum (Mole %)	Typical (Mole %)	Maximum (Mole %)
Methane	0	1	1.5
Ethane	35	45	55
Propane	30	36	45
C4	0	12	20
C5+	0	5	6
Water	0	100 ppb	250 ppm
Carbon Dioxide	0	100 ppm	500 ppm

The background stream composition must be specified for proper calibration and measurement performance. Specify the typical composition, along with the minimum and maximum expected values for each component, especially water, and the measured component. Other stream compositions may be allowable with approval from SpectraSensors.