

Application Note

Hydrogen sulfide in natural gas product

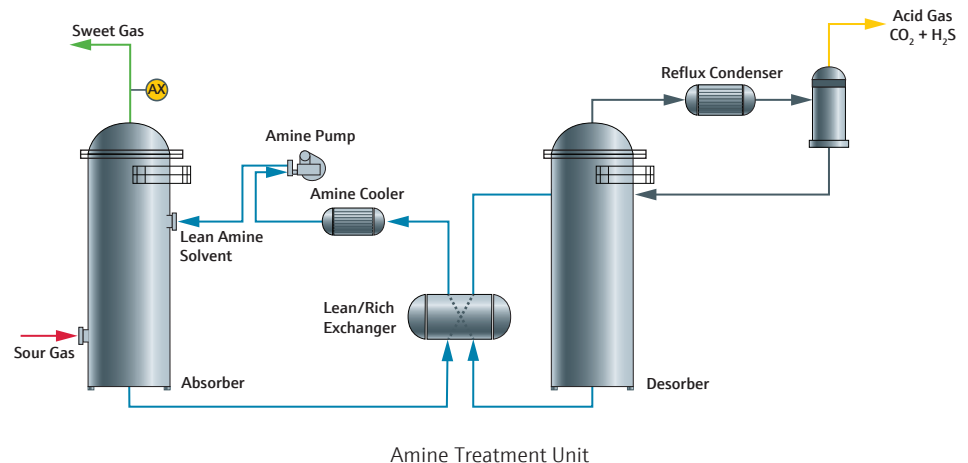
Industry:
Natural Gas Processing
Application Note 33802

Key Points

- Fast response to H₂S concentration changes
- Patented* Differential Spectroscopy technique measures H₂S at low ppm levels in natural gas
- Low maintenance and OPEX costs – no cylinders of carrier and combustion gases or lead acetate tape
- Laser-based measurement is highly selective and accurate for H₂S in natural gas

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Amine treatment and gas sweetening Raw natural gas extracted from different geological formations contains varying amounts of acid gases (H₂S and CO₂). Natural gas that contains H₂S in excess of pipeline-quality gas is generally considered sour gas. Gas sweetening processes such as amine treatment are used to remove H₂S from sour gas to meet specifications for gas transmission pipelines. The maximum allowable concentration of H₂S in natural gas product is typically <5 ppm.



Reduction and control of H₂S In operation, sour gas is contacted with an aqueous amine solution which removes H₂S by chemical reaction and absorption. Measuring the H₂S concentration in sweet gas at the outlet of an amine treatment unit ensures the gas meets specifications for pipeline transmission.

SpectraSensors' solution SpectraSensors tunable diode laser absorption spectroscopy (TDLAS) analyzers have proven highly effective for this critical gas processing measurement. TDLAS analyzers have an exceptionally fast response to changes in H₂S concentration, an important performance characteristic for monitoring the efficiency of the amine treatment process and quality of the resulting natural gas product. SpectraSensors' patented* differential spectroscopy technique enables detection and quantitation of low ppm levels of H₂S in the outlet gas stream of an amine treatment unit. Laser and detector components are isolated and protected from the process gas and entrained contaminants avoiding fouling and corrosion and ensuring stable long-term operation and accurate measurements in the field.

Application Data	
Target Component (Analyte)	H ₂ S in Natural Gas Product (residue gas)
Typical Measurement Ranges	0-5 ppm, 0-10 ppm or 0-20 ppm _v
Typical Repeatability	±250 ppb _v or ±2% of reading (whichever is greater)
Typical Accuracy	±500 ppb _v at 4 ppm _v or 16 ppm _v
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 Methane balance

*Application specific; consult factory.

Typical Background Stream Composition			
Component	Minimum (Mol%)	Typical (Mol%)	Maximum (Mol%)
Hydrogen Sulfide (H ₂ S)	0	<2 ppm	10 ppm
Water (H ₂ O)	0	<1 ppm	10 ppm
Nitrogen (N ₂)	0	0.1	3
Oxygen (O ₂)	0	0	1
Methane (C ₁)	75	95	100
Carbon Dioxide (CO ₂)	0	0	3
Ethane (C ₂)	0	3	10
Propane (C ₃)	0	1	5
Butanes(C ₄ H ₁₀)	0	0.5	2
C ₅ +	0	0.4	0.5

The background stream composition must be specified for proper calibration and measurement performance. Specify the normal composition, along with the minimum and maximum expected values for each component, especially H₂S, the measured component. Other stream compositions may be allowable with approval from SpectraSensors.

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