

Application Note

Hydrogen sulfide in amine treatment unit outlet for LNG production

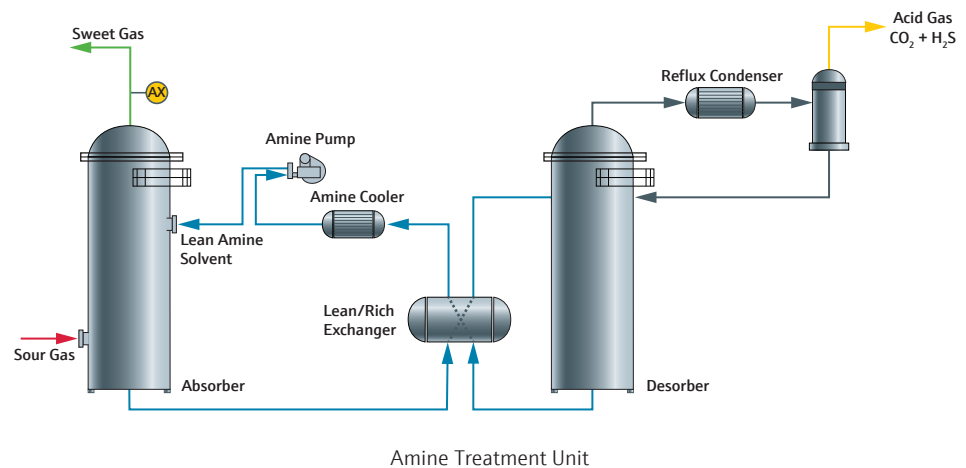
Industry:
Natural Gas Processing
Application Note: 44302

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

www.spectrasensors.com/patents

Amine treatment and gas sweetening Raw natural gas extracted from different geological formations contains varying amounts of acid gases (H₂S and CO₂). The H₂S concentration in gas intended for cryogenic liquefaction into liquefied natural gas (LNG) must be reduced below 4 ppm. Amine treatment units are commonly used in gas processing plants to scrub H₂S from natural gas.



“Reduction and control of H₂S optimization 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 LNG cryogenic liquefaction.

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 Components (Analyte)	H ₂ S in Amine Treatment Unit Outlet for LNG Production
Typical Measurement Ranges	0-10, 0-20, ppm _v
Typical Repeatability	±250 ppb _v or ±2% of Full Scale
Typical Accuracy	±500 ppb _v at 4 ppm _v or 16 ppm _v
Measurement Update Time	<5 seconds
Principle of Measurement	Differential Tunable Diode Laser Absorption Spectroscopy (H ₂ S scrubber included)
Validation	Binary Cal Gas Bottle with Methane or Nitrogen Background (Nitrogen is optional with auto-validation)

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
Carbon Dioxide (CO ₂)	0	1	3
Methane (C ₁)	50	95	100
Ethane (C ₂)	0	3	20
Propane (C ₃)	0	1	15
Butanes (C ₄)	0	0.5	5
C ₅ +	0	0.4	2

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.

www.spectrasensors.com/contact