

Application Note

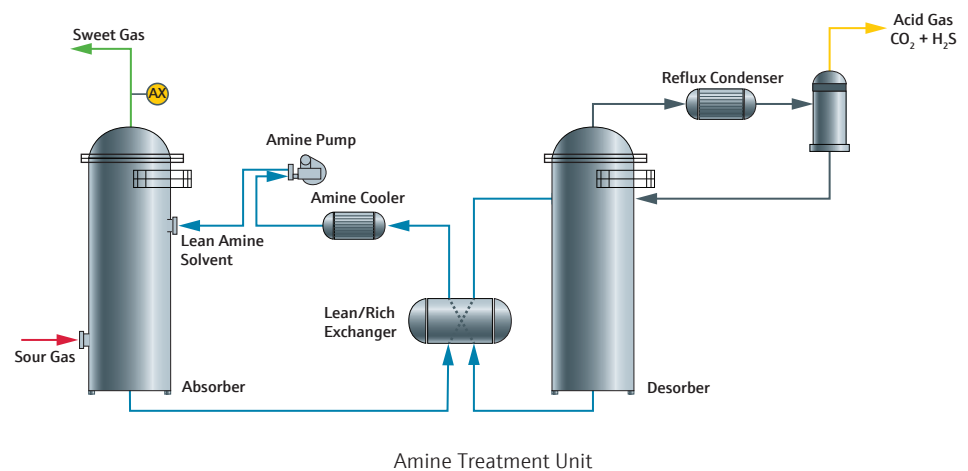
Carbon dioxide in amine treatment unit outlet

Industry:
Natural Gas Processing
Application Note 36103

Key Points

- Fast response to CO₂ concentration changes
- Laser based measurement is highly selective and accurate for CO₂ in natural gas
- Non-contact laser measurement avoids fouling and corrosion for reliable long-term operation
- Low maintenance and OPEX costs – no carrier gases or consumable items

Amine treatment and gas processing Raw natural gas extracted from different geological formations contains varying amounts of acid gases (CO₂ and H₂S). Natural gas containing CO₂ at concentrations in excess 2% and H₂S concentrations in the ppm range are highly corrosive. Natural gas sweetening processes remove acid gases from sour gas to meet specifications for gas transmission pipelines. The CO₂ concentration in gas intended for cryogenic liquefaction into LNG must be reduced below 50 ppm to avoid solidification and damage to plant equipment. Amine treatment units are commonly used in gas processing plants to remove CO₂ from natural gas.



Reduction and control of CO₂ In operation, sour gas is contacted with an aqueous amine solution which remove CO₂ by chemical reaction and absorption. Measuring the CO₂ concentration in sweet gas at the outlet of an amine treatment unit ensures the gas meets specifications for pipeline transmission or 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 CO₂ concentration, an important performance characteristic for monitoring the efficiency of the amine treatment process and quality of the resulting natural gas product. 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	CO ₂ in Amine Unit Treatment Outlet
Typical Measurement Range	0-100 ppm
Typical Repeatability	±2 ppm
Measurement Response Time	1 to ~60 seconds*
Principle of Measurement	Non-differential Tunable Diode Laser Absorption Spectroscopy
Validation	Certified blend of CO ₂ in N ₂ or CO ₂ in a balance that matches the normal stream composition.

*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	500 ppm	1
Nitrogen (N ₂)	0	0.1	3
Oxygen (O ₂)	0	0	1
Methane (C ₁)	75	95	100
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 CO₂, the measured component. Other stream compositions may be allowable with approval from SpectraSensors.

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