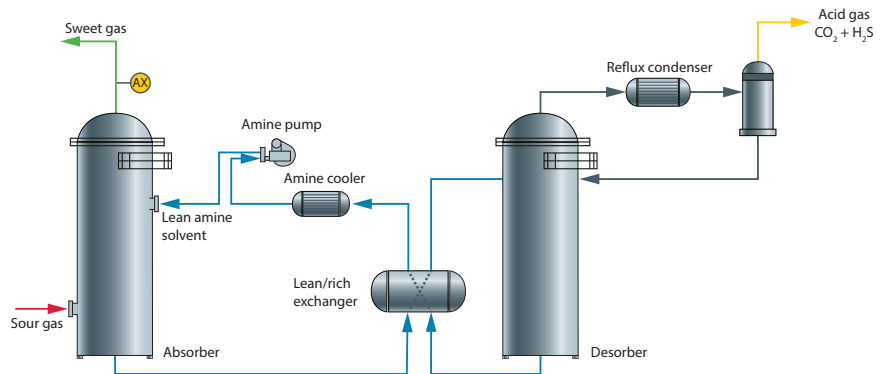


Natural gas processing: CO₂ in amine outlet (sweet gas)



Amine treatment unit

Benefits at a glance

- 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 ppmv 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 ppmv 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.

Endress+Hauser's solution

Tunable diode laser absorption spectroscopy (TDLAS) is a SpectraSensors technology 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 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 ppmv
Typical repeatability	±2 ppmv
Measurement response time	1 to ~60 seconds*
Principle of measurement	Non-differential tunable diode laser absorption spectroscopy (TDLAS)
Validation	Certified blend of CO ₂ in nitrogen

*Application specific; consult factory.

Typical background stream composition

Component	Minimum (Mol%)	Typical (Mol%)	Maximum (Mol%)
Hydrogen sulfide (H ₂ S)	0	<2 ppmv	10 ppmv
Water (H ₂ O)	0	500 ppmv	1
Nitrogen (N ₂)	0	0.1	3
Oxygen (O ₂)	0	0	1
Methane (C1)	75	95	100
Ethane (C2)	0	3	10
Propane (C3)	0	1	5
Butanes(C4)	0	0.5	2
Pentanes and heavier (C5+)	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, and the measured component. Other stream compositions may be allowable with approval from Endress+Hauser.