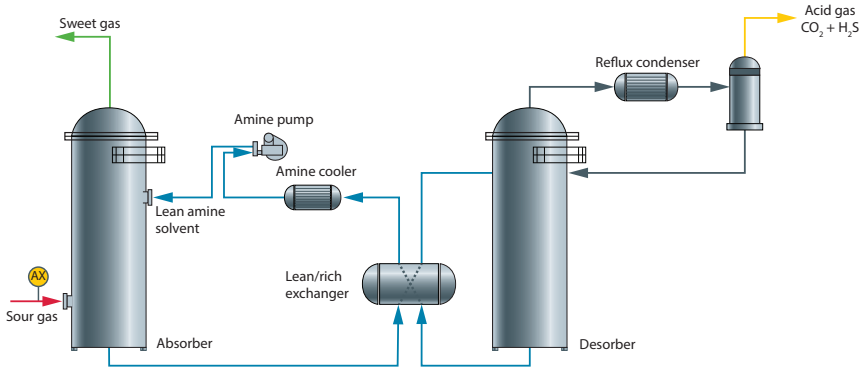
Natural gas processing: H_2S in raw gas feed (produced gas)



Amine treatment unit

Benefits at a glance

- Fast response to H_2S concentration changes
- Patented differential spectroscopy technique measures H_2S at low ppmv levels in natural gas
- Low maintenance and OPEX costs – no cylinders or carrier and combustion gases or lead acetate tape
- Laser-based measurement is highly selective and accurate for H_2S in natural gas

Amine treatment and gas sweetening

Raw natural gas extracted from different geological formations contains varying amounts of acid gases (H_2S and CO_2). Natural gas that contains H_2S in excess of pipeline-quality gas is generally considered sour gas. Gas sweetening processes remove acid gases from sour gas to meet specifications for gas transmission pipelines. Amine treatment units are commonly used in gas processing plants to remove H_2S from natural gas.

Process control and optimizationnt

In operation, sour gas is contacted with an aqueous amine solution which removes H_2S by chemical reaction and absorption. Measuring the H_2S concentration in sour gas at the inlet and sweet gas at the outlet of an amine treatment unit is important for control and optimization of the treatment process.

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 H_2S concentration, an important performance characteristic for monitoring the efficiency of the amine treatment process and quality of the resulting gas product. Endress+Hauser's patented differential spectroscopy technique enables detection and quantitation of low levels of H_2S in natural gas streams. 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.

Endress+Hauser

People for Process Automation

Application data	
Target component (Analyte)	H_2S in raw natural gas
Typical measurement ranges*	0-10, 0-20, 0-50, 0-100, 0-500 ppmv
Extended measurement ranges	0-1000, 0-2500, 0-5000 ppmv
Typical repeatability	SS2100, SS2100a, SS2100i: ± 250 ppbv or ± 2% of reading JT33: ± 100 ppbv or ± 1% of reading
Typical accuracy	SS2100, SS2100a, SS2100i: ±500 ppbv at 4 ppmv or 16 ppmv JT33: ± 200 ppbv @ 4 ppmv and ± 500 ppbv @ 16 ppmv
Measurement update time	<5 seconds
Principle of measurement	Tunable diode laser absorption spectroscopy (TDLAS)
Recommended validation	Binary cal gas bottle with methane or nitrogen background (nitrogen is optional with auto-validation)

* These low ppmv measurements are performed by differential TDLAS.

Typical background stream composition

Component	Minimum (Mol%)	Typical (Mol%)	Maximum (Mol%)
Hydrogen sulfide (H_2S)	0	10-1000 ppmv	5000 ppmv
Water (H_2O)	0	100-200 ppmv	5000 ppmv
Nitrogen (N_2)	0	1	10
Oxygen (O_2)	0	0	1
Carbon dioxide (CO_2)	0	5-10	20
Methane (C1)	50	90	100
Ethane (C2)	0	3	20
Propane (C3)	0	1	15
Butanes(C4)	0	0.5	5
Pentanes and heavier (C5+)	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 H_2S, the measured component. Other stream compositions may be allowable with approval from Endress+Hauser.