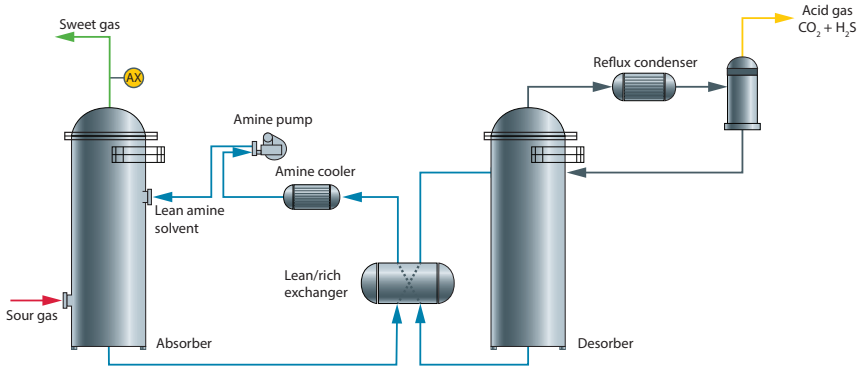
Natural gas processing: H_2S in natural gas product (purity/residue gas)

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 of carrier and combustion gases or lead acetate tape
- Laser-based measurement is highly selective and accurate for H_2S in natural gas



Amine treatment unit

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 such as amine treatment are used to remove H_2S from sour gas to meet specifications for gas transmission pipelines. The maximum allowable concentration of H_2S in natural gas product is typically <5 ppmv.

Reduction and control of H_2S

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 sweet gas at the outlet of an amine treatment unit ensures the gas meets specifications for pipeline transmission.

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 natural gas product. Endress+Hauser's patented differential spectroscopy technique enables detection and quantitation of low ppm levels of H_2S 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.

Endress+Hauser

People for Process Automation

Application data	
Target component (Analyte)	H_2S in natural gas product (residue gas)
Typical measurement ranges	0-5 ppmv, 0-10 ppmv or 0-20 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 response time	1 to ~60 seconds*
Principle of measurement	Differential tunable diode laser absorption spectroscopy (TDLAS) (H_2S scrubber included)
Validation	Certified blend of H_2S in methane or nitrogen balance

*Application specific; consult factory.

Typical background stream composition

Component	Minimum (Mol%)	Typical (Mol%)	Maximum (Mol%)
Hydrogen sulfide (H_2S)	0	<2 ppmv	10 ppmv
Water (H_2O)	0	<1 ppmv	10 ppmv
Nitrogen (N_2)	0	0.1	3
Oxygen (O_2)	0	0	1
Methane (C1)	75	95	100
Carbon dioxide (CO_2)	0	0	3
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, especially H_2S, the measured component. Other stream compositions may be allowable with approval from Endress+Hauser.