

Application Note

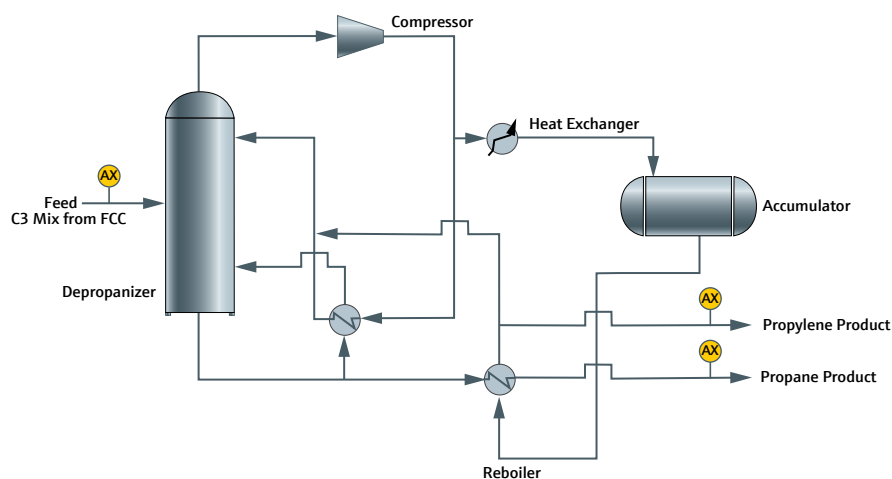
Hydrogen sulfide in propane/propylene mix

Industry:
Refining
Application Note 23502

Key Points

- Fast response to H₂S concentration changes
- Patented* Differential Spectroscopy technique measures H₂S at ppm levels
- Laser-based measurement is highly selective and accurate for H₂S in C₃ mixtures
- Low maintenance and OPEX costs – no cylinders of carrier or combustion gases, or lead acetate tape

FCCU propylene production Refinery Fluidized Catalytic Cracking Units (FCCU) are a major source of the propylene feedstock used in petrochemical plants. The yield of propylene from an FCCU varies with feedstock and operating conditions. Refineries operate FCCUs to achieve a balance of gasoline and propylene production, maximizing the production of one decreases the yield of the other. The gas plant associated with an FCCU separates fuel gas from C₃ and C₄ gases and gasoline, and contains treatment equipment to remove H₂S and other sulfur compounds from these products.



Fractionation and Recovery of Propane and Propylene from an FCCU

On-line H₂S monitoring Sulfur compounds in the feed to an FCCU are converted to H₂S, which tends to partition into the C₃ propane/propylene mix. H₂S must be removed from the C₃ mix to avoid carryover into the separated propane and propylene product streams. On-line monitoring of the H₂S concentration in C₃ mix and the separated propane and propylene product streams ensures purity specifications are met for downstream petrochemical production processes.

SpectraSensors' solution SpectraSensors tunable diode laser absorption spectroscopy (TDLAS) analyzers have proven highly effective in this critical measurement. TDLAS analyzers have an exceptionally fast response to changes in H₂S concentration, an important performance characteristic for monitoring and controlling H₂S levels in propane and propylene streams. SpectraSensors' patented* differential spectroscopy technique enables detection and quantitation of low ppm levels of H₂S in propane/propylene mixtures. 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.

*www.spectrasensors.com/patents

Application Data

Target Component (Analyte)	H ₂ S in Propane/Propylene (C ₃) Mix
Typical Measurement Range	0-10 ppm*
Typical Repeatability	±0.5 ppm*
Measurement Response Time	1 to ~60 seconds*
Principle of Measurement	Differential Tunable Diode Laser Absorption Spectroscopy (H ₂ S scrubber included)
Validation	Certified blend of H ₂ S in Nitrogen balance

*Consult factory for alternate ranges.

Typical Background Stream Composition

Background 1 - Propane

Component	Minimum (Mol%)	Typical (Mol%)	Maximum (Mol%)
Ethane (C ₂ H ₆)	0	1	2
Propane (C ₃ H ₈)	65	90	100
Propylene (C ₃ H ₆)	0	8	35
C ₄ +	0	1	2.5

Background 2 - 35/65 Propane/Propylene Mix

Component	Minimum (Mol%)	Typical (Mol%)	Maximum (Mol%)
Ethane (C ₂ H ₆)	0	1	2
Propane (C ₃ H ₈)	0	34	50
Propylene (C ₃ H ₆)	50	64	100
C ₄ +	0	1	2

Background 3 - 65/35 Propane/Propylene Mix

Component	Minimum (Mol%)	Typical (Mol%)	Maximum (Mol%)
Ethane (C ₂ H ₆)	0	1	2
Propane (C ₃ H ₈)	50	64	80
Propylene (C ₃ H ₆)	20	34	50
C ₄ +	0	1	2.5

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 H₂S, the measured component. Other stream compositions may be allowable with approval from SpectraSensors.

www.spectrasensors.com/contact