

## Application Note

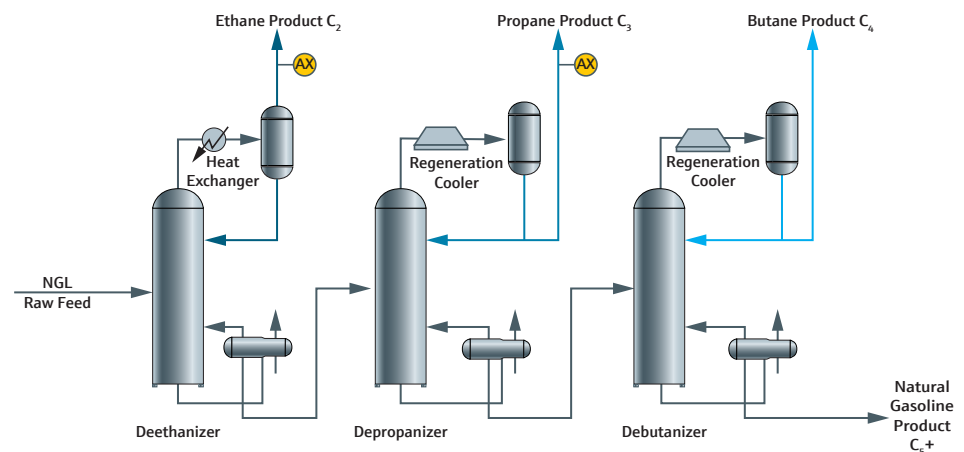
# Carbon dioxide measurement in ethane/propane mix

**Industry:**  
Natural Gas Processing  
Application Note 35203

### Key Points

- Fast response to CO<sub>2</sub> concentration changes
- Laser-based measurement is highly selective and accurate for CO<sub>2</sub> in ethane/propane mix
- Non-contact laser measurement avoids fouling and corrosion for reliable long-term operation
- Low maintenance and OPEX costs – no cylinders of carrier gases or other consumables

**Fractionation and recovery of NGLs** Natural gas from some geological formations contains natural gas liquids (NGLs); ethane, propane, butane and a mix of C<sub>5</sub>+ liquid condensates. These NGL compounds are commercially valuable as feedstocks for production of petrochemicals, octane-boosting gasoline additives, and for use as fuels. Cryogenic processing is used to separate and recover NGLs from natural gas using a series of fractionation columns. Ethane and propane are sometimes mixed to form an 80/20 hydrocarbon blend, termed E/P mix, which is used as a feedstock for ethylene plants.



NGL Fractionation Process

**Measurement of CO<sub>2</sub> to meet purity specifications** The purity specifications for E/P mix and other NGL fractionation products are based upon their intended use and downstream processing. Contaminants including CO<sub>2</sub>, H<sub>2</sub>O, and H<sub>2</sub>S are measured in E/P mix to ensure purity specifications are met and documented as required in tariff and sales agreements between suppliers, carriers, and end users. Specifications and contracts typically require that CO<sub>2</sub> in E/P mix not exceed 1,000 ppm.

**SpectraSensors' solution** SpectraSensors tunable diode laser absorption spectroscopy (TDLAS) analyzers have proven highly effective for this important measurement. TDLAS analyzers have an exceptionally fast response to changes in CO<sub>2</sub> concentration, an important performance characteristic for monitoring CO<sub>2</sub> levels in an NGL fractionation plant and at downstream custody transfer points. Laser and detector components are isolated and protected from process gas and entrained contaminants, avoiding fouling and corrosion, and ensuring stable long-term operation and accurate measurements.

### Application Data

Target Component (Analyte)	CO <sub>2</sub> in Ethane/Propane Mix
Typical Measurement Ranges	0-100 ppm*
Typical Repeatability	±2 ppm**
Measurement Response Time	1 to ~60 seconds
Principle of Measurement	Tunable Diode Laser Absorption Spectroscopy
Validation	Certified blend of CO <sub>2</sub> in Nitrogen

\* Consult factory for alternate ranges.

\*\* Repeatability is based on a single stream composition with minimal variation and which falls within the table below. If the stream composition varies, the factory should be consulted for specification.

### Typical Background Stream Composition

Component	Minimum (Mol%)	Typical (Mol%)	Maximum (Mol%)
Methane (C <sub>1</sub> )	0	0.5	25
Ethane (C <sub>2</sub> )	70	85	90
Propane (C <sub>3</sub> )	0	15	30
C <sub>4</sub> +	0	0	3
Water (H <sub>2</sub> O)	0	20 ppm	250 ppm
Hydrogen Sulfide (H <sub>2</sub> S)	0	10 ppm	1

The background stream composition must be specified for proper calibration and measurement performance. Specify the typical composition, along with the minimum and maximum expected values for each component, especially CO<sub>2</sub>, the measured component. Other stream compositions may be allowable with approval from SpectraSensors.

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