

# Application Note

## Water measurement in ethane

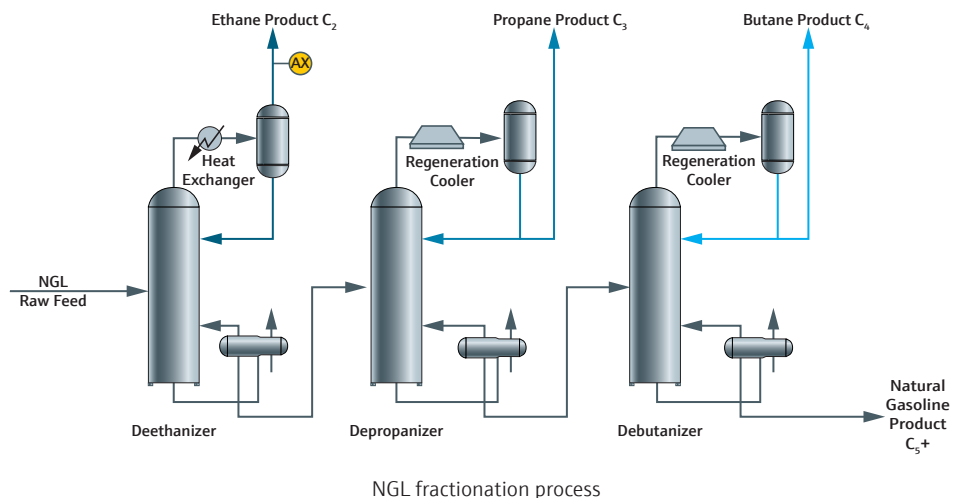
**Industry:**  
Natural Gas Processing  
Application Note 35101

### Key Points

- Fast response to H<sub>2</sub>O concentration changes
- Patented\* Differential Spectroscopy technique measures H<sub>2</sub>O at sub-ppm levels in ethane
- Integrated permeation tube supports automated validation checks
- Laser-based measurement is highly selective and accurate for H<sub>2</sub>O in ethane

\*[www.spectrasensors.com/patents](http://www.spectrasensors.com/patents)

**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.



**Measurement of H<sub>2</sub>O to meet purity specifications** The purity specifications for ethane and other NGL fractionation products are based on their intended use and downstream processing. Contaminants including H<sub>2</sub>O, CO<sub>2</sub>, and H<sub>2</sub>S are measured in NGL fractionation products 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 state that an NGL fractionation product shall not contain free or entrained water.

**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 H<sub>2</sub>O concentration, an important performance characteristic for monitoring H<sub>2</sub>O in the outlet of a deethanizer and at downstream custody transfer points. SpectraSensors patented differential spectroscopy technique enables detection and measurement of sub-ppm levels of H<sub>2</sub>O in ethane. An integrated permeation tube supports automated validation checks to verify the analyzers is operating properly during the extended periods of time when H<sub>2</sub>O is not present in the deethanizer outlet or downstream distribution system. Laser and detector components are isolated and protected from process gas and contaminants avoiding fouling and corrosion and ensuring stable long-term operation and accurate measurements in the field.

### Application Data

Target Component (Analyte)	H <sub>2</sub> O in Ethane
Typical Measurement Range	0-10 ppm*
Typical Repeatability	±0.5 ppm or 2% of reading
Measurement Response Time	1 to ~60 seconds
Principle of Measurement	Differential Tunable Diode Laser Absorption Spectroscopy (H <sub>2</sub> O dryer included)
Validation	Integrated Permeation System

\*Consult factory for alternate ranges.

### Typical Background Stream Composition

Component	Minimum (Mol%)	Typical (Mol%)	Maximum (Mol%)
Methane (C <sub>1</sub> )	0	1	5
Ethane (C <sub>2</sub> )	95	98	100
Propane (C <sub>3</sub> )	0	1	3
C <sub>4</sub> <sup>+</sup>	0	0	1
Carbon Dioxide (CO <sub>2</sub> )	0	100 ppm	1
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 H<sub>2</sub>O, the measured component. Other stream compositions may be allowable with approval from SpectraSensors.

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