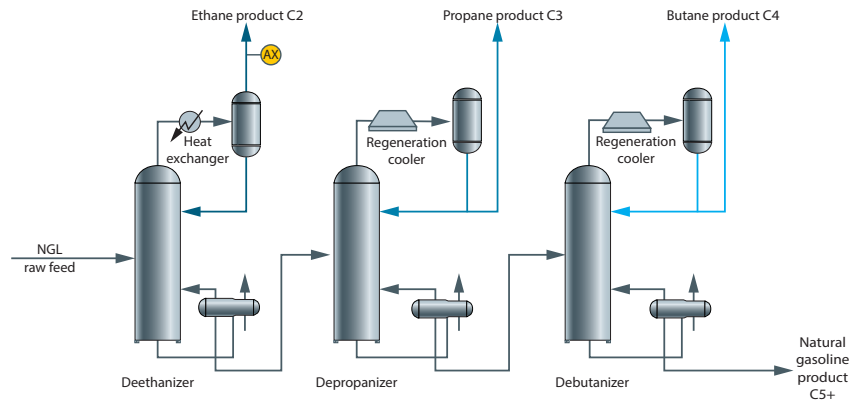


Natural gas processing: H₂O in ethane, NGL fractionation

Benefits at a glance

- Fast response to H₂O concentration changes
- Patented differential spectroscopy technique measures H₂O at sub-ppm levels in ethane
- Integrated permeation tube supports automated validation checks
- Laser-based measurement is highly selective and accurate for H₂O in ethane



NGL fractionation process

Fractionation and recovery of NGLs

Natural gas from some geological formations contains natural gas liquids (NGLs); ethane, propane, butane and a mix of C5+ 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 H₂O 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 H₂O, CO₂, and H₂S 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.

Endress+Hauser's solution

Tunable diode laser absorption spectroscopy (TDLAS) is a SpectraSensors technology proven highly effective for this important measurement. TDLAS analyzers have an exceptionally fast response to changes in H₂O concentration, an important performance characteristic for monitoring H₂O 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 H₂O in ethane. An integrated permeation tube supports automated validation checks to verify the analyzers is operating properly during the extended periods of time when H₂O 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 ₂ O in ethane
Typical measurement range	0-10 ppmv*
Typical repeatability	±0.5 ppmv or 2% of reading
Measurement response time	1 to ~60 seconds
Principle of measurement	Differential tunable diode laser absorption spectroscopy (H ₂ O dryer included)
Validation	Integrated permeation system

*Consult factory for alternate ranges.

Typical background stream composition

Component	Minimum (Mol%)	Typical (Mol%)	Maximum (Mol%)
Methane (C1)	0	1	5
Ethane (C2)	95	98	100
Propane (C3)	0	1	3
Butanes and heavier (C4+)	0	0	1
Carbon dioxide (CO ₂)	0	100 ppmv	500 ppmv
Hydrogen sulfide (H ₂ S)	0	10 ppmv	500 ppmv

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 H₂O, the measured component. Other stream compositions may be allowable with approval from Endress+Hauser.