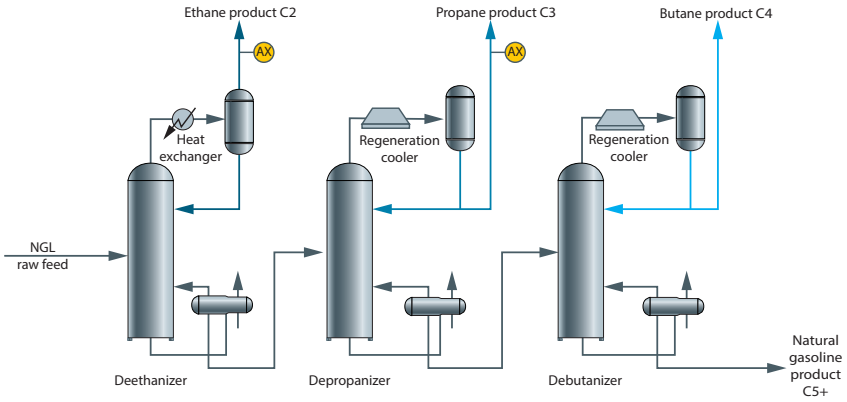
Natural gas processing: H_2O in ethane/propane mix, NGL fractionation

Benefits at a glance

- Fast response to H_2O concentration changes
- Patented differential spectroscopy technique measures H_2O at low ppm levels in ethane/propane mix
- Laser-based measurement is highly selective and accurate for H_2O in ethane/propane mix
- Integrated permeation tube supports automated validation checks



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. 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.

Measurement of H_2O 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 H_2O, CO_2, and H_2S 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 state that E/P mix shall contain no free or entrained water.

Endress+Hauser's solution

Our tunable diode laser absorption spectroscopy (TDLAS) technology has proven highly effective for this important measurement. TDLAS analyzers have an exceptionally fast response to changes in H_2O concentration, an important performance characteristic for monitoring H_2O levels in an NGL fractionation plant and at downstream custody transfer points. SpectraSensors' patented differential spectroscopy technique enables detection and measurement of low ppm levels of H_2O in E/P mix. An integrated permeation tube supports automated validation checks to verify the analyzer is operating properly during the extended periods of time when H_2O is not present in the E/P mix product stream. 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.

Endress+Hauser

People for Process Automation

Application data

Target components (Analyte)	H_2O in ethane/propane mix
Typical measurement ranges	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 (TDLAS) (H_2O dryer included.)
Validation	Integrated permeation system

* 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 (C1)	0	0.5	2
Ethane (C2)	65	85	90
Propane (C3)	0	15	30
Butanes and heavier (C4+)	0	0	3
Carbon dioxide (CO_2)	0	100 ppmv	500 ppmv
Hydrogen sulfide (H_2S)	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 H_2O, the measured component. Other stream compositions may be allowable with approval from Endress+Hauser.