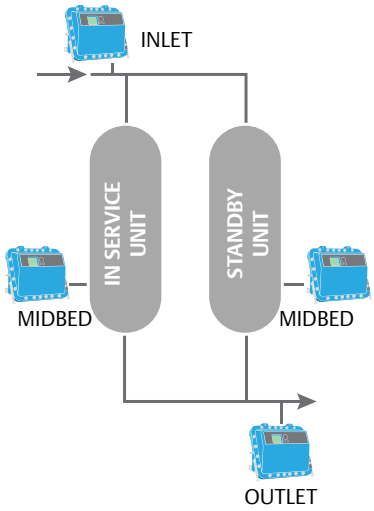
Best in Class Control of your Acetylene Converters

Did you know that Rosemount QCL/TDL technology provides multicomponent analyses with a wide dynamic range in a single unit?

What if you could...

- Measure all your critical components in a single analyzer?
- Have fast analysis times, and high sensitivities to optimize your process control applications?
- Lower the total life cycle cost associated with maintaining your analyzers?



Ethylene is one of the most important organic compounds made in the world today. It is a building block chemical needed to manufacture many commercial products and is estimated to reach a global manufacturing capacity of 200 million tons by 2020. Approximately half of the world demand for ethylene is for the manufacture of polyethylene but it is also used to make vinyl chloride, ethylbenzene and many other valuable intermediate products such as ethylene oxide and ethanol.

ACETYLENE CONVERTERS NEED ANALYSES AT THE INLET, MIDBED AND OUTLET

In the cracking process, some molecules are over-cracked into acetylene. An important step to maximize production is to convert acetylene back into ethylene. This is done through the addition of hydrogen in catalytic beds called acetylene converters. Two acetylene converter units are employed: one in service and one on stand-by. Analytical data are required for the inlet stream, mid-bed and outlet streams of acetylene converters in order to optimize conversion and avoid process excursions.

ACETYLENE CONVERTERS INLET

Measurement of the composition of the stream entering the converters is useful for feed forward control. Measurement of the concentrations of acetylene and CO are particularly important. mid-bed and outlet streams of acetylene converters in order to optimize conversion and avoid process excursions.

Typical Measurements - Inlet

Components	Range[1]	LOD[2]	UOM
Acetylene	0 - 0.5	0.01	Mol%
Ethylene	0 - 60	0.6	Mol%
Ethane	0 - 30	0.3	Mol%

ACETYLENE CONVERTERS MID-BED

Precise and rapid control of the catalyst activity is vital in order to maximize the ethylene produced: not active enough and not all the acetylene will be converted to ethylene; too active and some ethylene could be converted back to ethane. Measurement of CO is a key to controlling catalyst activity. In addition, monv itoring the concentration of acetylene is required in order to initiate the switch from the in-service to the standby unit.

Typical Measurements - Mid-Bed

Components	Range[1]	LOD[2]	UOM
Acetylene	0 - 500	5	ppmv

ACETYLENE CONVERTERS OUTLET

It is essential to look for acetylene breakthrough at the outlet of the converters in order to avoid process excursions downstream. Measurement of the outlet must be fast and with a very low limit of detection.

Typical Measurements - Outlet

Components	Range[1]	LOD[2]	UOM
Acetylene	0 - 50	0.1	ppmv
Response time less than 10 seconds			

1 Components and ranges are indicative. Analyzer requirements will depend on complete gas list. Detailed specs will be provided during the ordering process.

2 Repeatability +/- 1% of reading or the Limit of Detection (LOD), whichever greater.

EMERSON

THE EMERSON SOLUTION

Rosemount™ CT5800 Continuous Gas Analyzer with Integrated Sample Handling

- Measure all your critical acetylene converter components in a single analyzer utilizing multiple QCL/TDL lasers
- Analysis time of approximately 5 seconds ensures timely delivery of critical information for process monitoring and control
- Unmatched sensitivity detects trace impurities at sub ppm concentrations
- Excellent linearity of response and repeatability
- Field mountable eliminating the need for expensive analyzer shelters and minimizes sample transport line
- Flameproof enclosure certified for hazardous areas
- Integrated sample handling ensures the gas sample is representative and delivered timely to the analyzer

DRAMATICALLY LOWER OPERATIONAL AND MAINTENANCE COSTS

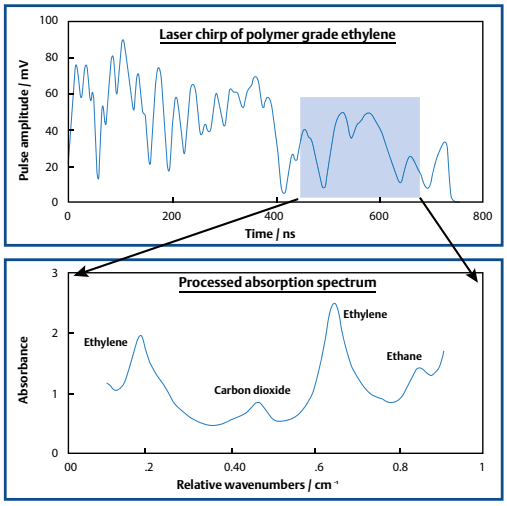
- Real time validation on process samples guarantees performance and minimizes field maintenance intervention
- Inherently stable spectroscopic technique extends calibration intervals to as little as once per year
- Interchangeable modular components for easy field service and configuration
- Remote factory support available, either by direct connection or by secure file exchange

LASER CHIRP TECHNIQUE – MULTIPLE MEASUREMENTS IN A SINGLE SYSTEM

Quantum Cascade Lasers are semiconductor devices which produce light in the mid-IR region. They are fabricated to emit light at a desired wavelength and are made to scan a spectrum using a laser chirp technique. When a QCL is pulsed with electrical energy to start the laser process, it heats up. As the temperature increases, the wavelength of the emitted light also increases. A laser chirp lasts about one microsecond and in this time a spectrum of between 1-3 wavenumbers is scanned.

The raw detector signal is then processed to convert it into a spectrum from which the concentration of analytes can be calculated. QCLs can be chirped at a frequency of up to 100 KHz, enabling many thousands of spectra to be gathered in a few seconds and processing these spectra gives a strong signal with a good signal to noise ratio.

The wavelength region which is scanned is selected to enable measurement of the desired analytes and it is often possible to detect more than one compound with a single QCL device. An advanced signal processing procedure enables real time validation of measurements and greatly reduces the need for calibrations.



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