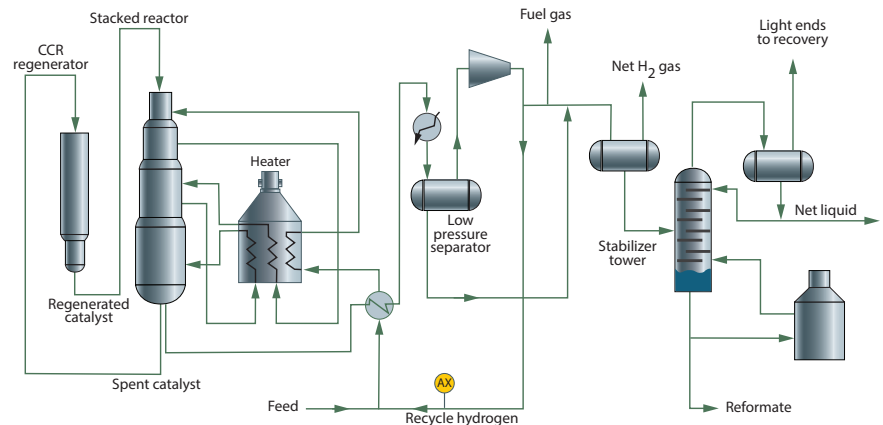


# H<sub>2</sub>S in continuous catalytic reformer hydrogen recycle streams

## Benefits at a glance

- Fast response to H<sub>2</sub>S concentration changes for process monitoring and control
- Non-contact laser measurement avoids detector contact, corrosion and damage from H<sub>2</sub>S, HCl and other contaminants
- Laser-based measurement is highly selective and accurate for H<sub>2</sub>S in catalytic reformer hydrogen recycle streams



Continuous catalytic reformer

## Catalytic reforming

A catalytic reformer unit converts naphtha into high-octane compounds termed reformates used in gasoline blending, and yields large quantities of hydrogen, which is recycled and used in other processes. Sulfur compounds in the naphtha feed are converted to H<sub>2</sub>S. A continuous catalytic reformer (CCR) unit has a three-stage stacked reactor employing a platinum/rhenium (Pt/Re) catalyst on a chloride alumina support. H<sub>2</sub>S and other sulfur compounds poison the Pt/Re catalyst increasing coking, and decreasing hydrogen production and reformate yield. For this reason the naphtha feed undergoes treatment in a hydrotreater unit to remove H<sub>2</sub>S and other sulfur compounds.

## On-line H<sub>2</sub>O monitoring

On-line monitoring of the H<sub>2</sub>S concentration in CCR hydrogen recycle gas streams enables refineries to control H<sub>2</sub>S contamination at the low

levels required for optimum catalyst activity and reformate yield.

## 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 H<sub>2</sub>S concentration, an important performance characteristic for monitoring and controlling H<sub>2</sub>S levels in refinery CCR units. Laser and detector components of a TDLAS analyzer 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)	H <sub>2</sub> S in continuous catalytic reformer hydrogen recycle gas
Typical measurement ranges	0-50 ppmv*
Typical repeatability	±1 ppmv
Measurement response time	1 to ~60 seconds
Principle of measurement	Tunable diode laser absorption spectroscopy (TDLAS)
Validation	Certified blend of H <sub>2</sub> S in pure N <sub>2</sub>

\*Consult factory for alternate ranges.

### Typical stream composition

Component	Minimum (Mol%)	Typical (Mol%)	Maximum (Mol%)
Hydrogen (H <sub>2</sub> )	70	80	90
Methane (C1)	8	12	20
Ethane (C2)	3	5	10
Propane (C3)	0	2	5
i-butane (i-C4)	0	1	2
n-butane (n-C4)	0	<1	2
Pentanes (C5)	0	0	1

The background stream composition must be specified for proper assessment, calibration and measurement performance. Specify the normal composition, along with the minimum expected values for each component, especially H<sub>2</sub>S, the measured component. Other stream components may be allowable with approval from Endress+Hauser.