



HLT Hilase

APPLICATION NOTE

H₂S Analysis in Liquid Applications using TDL with Photo Acoustics

In liquid streams such as crude oil, water and condensate, direct measurement of H₂S is not possible. Hobr  has designed a complete sample solution, based on stripping the H₂S from the liquid phase by use of a stripper column. This method allows H₂S measurement in the gaseous phase, with conversion to the liquid phase in accordance with Henry's Law.

The Hobr  TDL is a big step forward in terms of technology. It offers a combination of features not available in any other analyzer on the market: no moving parts; full separation of the photoacoustic measuring cell from the electronics; stable calibration; and close-to-zero maintenance. Supply to ATEX, IECEx and CSA classification are all possible.

FIXED VOLUME INJECTION

The fixed volume injection method is available in three versions: loop type injection, low-pressure sampler type and high-pressure sampler type. Selection depends on process pressure and sample type.

Fixed volume injection makes the instrument independent of fluid characteristics such as viscosity and temperature. A fast loop scaled on the application is an integral part of the system.

The sample is taken directly from the fast loop, with identical sample characteristics to those of the process.



Figure 1. H₂S in Liquid Sampling System

COUNTERCURRENT STRIPPER SYSTEM

The design of the countercurrent stripper system results in a combination of fast response to H₂S breakthrough together with a stripper column efficiency of greater than 98%.

The stripper column, which is filled with glass beads, is designed to be easy to clean. This minimizes service and reduces analyzer downtime.

LIQUID SAMPLE RETURN

To return the stripped sample to the fast loop, a liquid sample return pump is integrated into the analyzer system.

LIQUID FILTRATION

The HLT Hilase analyzer is protected against any liquid carry-over by a bypass filter (HPFF), used in combination with a multi-phobic membrane filter. In wet-gas applications, the HPFF design has proven to be maintenance-free up to a year.

SAMPLE HANDLING AND ANALYZER CABINET

All features, such as the fixed volume injection system, stripper column, sample return point and liquid filtration system, are installed in an insulated and temperature-controlled stainless steel 316 cabinet. The sample-wetted parts can be heated to between 30°C and 100°C. The temperature set point is dependent on the initial boiling point and viscosity of the product. The system can be supplied as a dual-compartment cabinet, or the analyzer can be supplied for indoor installation in an analyzer room, with sample handling in a separate, temperature-controlled cabinet.

CALIBRATION

Currently, there is no accurate and stable calibration standard on the market for the analysis of H₂S in liquids. The HLT Hilase analyzer's gas phase calibration, which combines measured liquid and stripper gas volume with more than 98% stripper efficiency, results in better accuracy than for calibration experiments in the liquid phase.

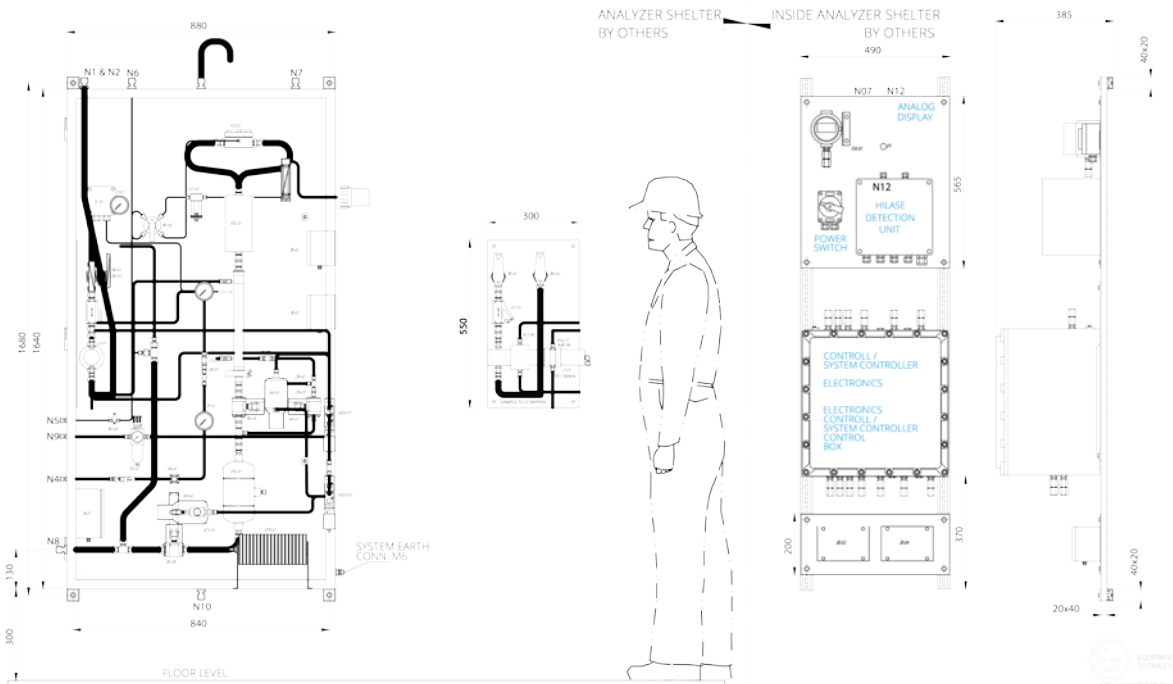
HLT HILASE GAS ANALYZER

The HLT Hilase TDL analyzer with photoacoustic detection makes analysis of H₂S possible in the gas phase. This analyzer has some unique features:

- It is unaffected by interference from aromatic hydrocarbons from the oil. Benzene, toluene and xylenes will result from the stripping process, but the infrared TDL technology is not disrupted by these aromatics, unlike other technologies, e.g. UV spectroscopy.
- The photoacoustic cell is heated above the stripper column temperature, to avoid condensation of water and hydrocarbons inside the cell.
- Full separation of the photoacoustic cell from the electronics allows field servicing without the need to power-down the electronics.
- The IR light source has a much longer lifetime than UV light sources. The life expectancy of an IR laser is more than 10 years.
- The moving parts of the entire system are limited to the fixed volume injector and liquid sample return.

CUSTOMER BENEFITS

1. Correlates well with most accepted laboratory methods based on head space analysis.
2. Eliminates the risk of loss of volatile H₂S associated with sampling and laboratory analysis.
3. Flexibility for installation, and low installation cost, because the functional responsibility for the integrated fast-loop sampling system, sample return and analyzer is with one supplier.



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