931 and 932 Analyzers

AMETEK’s combined sulfur and hydrogen analyzers offer cost-effective analysis for optimal control of tail gas treaters, with high performance and reliability.

PROBLEM

To ensure the complete removal of hydrogen sulfide (H\textsubscript{2}S), as well as efficient operations, measurement of H\textsubscript{2}S and hydrogen (H\textsubscript{2}) is required.

PROCESS AND EQUIPMENT

The Claus sulfur recovery process is limited to 97 to 98% overall recovery efficiency because of the equilibrium nature of the reaction. To meet more stringent regulatory requirements, many sulfur recovery units (SRUs) are followed by a tail gas treater unit (TGTU) or tail gas clean-up unit (TGCU).

In the standard process, all unreduced sulfur components are catalytically converted to H\textsubscript{2}S in a reduction reactor.

After cooling, the H\textsubscript{2}S is selectively absorbed from the tail gas by means of an amine solvent or absorber. In the amine regenerator, the bulk of the H\textsubscript{2}S is desorbed from the solvent and recycled back to the front end of the Claus SRU.

The off-gas from the top of the absorber is incinerated to sulfur dioxide (SO\textsubscript{2}).

TAIL GAS TREATMENT UNIT

931 and 932 Analyzers

AMETEK’s combined sulfur and hydrogen analyzers offer cost-effective analysis for optimal control of tail gas treaters, with high performance and reliability.

PROBLEM

To ensure the complete removal of hydrogen sulfide (H\textsubscript{2}S), as well as efficient operations, measurement of H\textsubscript{2}S and hydrogen (H\textsubscript{2}) is required.

PROCESS AND EQUIPMENT

The Claus sulfur recovery process is limited to 97 to 98% overall recovery efficiency because of the equilibrium nature of the reaction. To meet more stringent regulatory requirements, many sulfur recovery units (SRUs) are followed by a tail gas treater unit (TGTU) or tail gas clean-up unit (TGCU).

In the standard process, all unreduced sulfur components are catalytically converted to H\textsubscript{2}S in a reduction reactor.

After cooling, the H\textsubscript{2}S is selectively absorbed from the tail gas by means of an amine solvent or absorber. In the amine regenerator, the bulk of the H\textsubscript{2}S is desorbed from the solvent and recycled back to the front end of the Claus SRU.

The off-gas from the top of the absorber is incinerated to sulfur dioxide (SO\textsubscript{2}).

TAIL GAS TREATMENT UNIT
AMETEK ANALYZERS

The 931 and 932 analyzers are based on the 9xx series ultraviolet (UV) photometers used extensively in SRU tail gas, feed gas, and stack gas applications. A thermal conductivity (TC) detector is integrated into the UV sample cell for the continuous measurement of $H_2$. The non-moving-parts UV light bench is used for single gas measurement or the multi-wavelength analyzer for a combination of sulfur gases. The 931 analyzer can measure both $H_2$ and $H_2S$ continuously, and can monitor both $SO_2$ and $H_2$ after the reduction reactor. The 932 can measure two or more sulfur gases, as well as $H_2$, from one sample point.

Possible combinations

- $H_2S$: 0-50 ppm/0 to 500 ppm/0 to 5% (higher ranges available)
- $H_2S + H_2$: $H_2$ 0 to 5%/0 to 10%
- $H_2S + COS or CS_2$: COS or CS_2 0 to 500 ppm minimum range
- COS or CS_2: 0 to 200 ppm as primary measurement
- $H_2S + H_2 + COS or CS_2, or SO_2$: SO_2 0 to 50 ppm
- $H_2$: $H_2$ 0 to 5%/0 to 10%
- $H_2S + NH_3$: for sour water stripper (SWS) feed gas

Primary measurements

The basic analyzer requirements are to measure $H_2$ at the outlet of the reduction reactor and the $H_2S$ at the top of the absorber. However, both measurements can be made at the top of the absorber as the $H_2$ content does not change after the reactor.

Secondary measurements

$SO_2$ breakthrough in the reduction reactor off-gas and the COS concentration in the absorber outlet are also important measurements for optimum control.

RESULTS

- Fast response – both detection principles (UV & TC) are continuous and instantaneous. Response time <30 seconds compared to three minutes or more for gas chromatographs
- No consumables, no carrier gas
- Single sample point and one sample system for multiple measurements
- Safety – the unique HAG (heated acid gas) probe containing the pipe-mounted sample system components, can be completely isolated from the process on both the sample and vent legs of the analyzer. This allows the entire sample system to be back-purged before maintenance
- Combined spares and maintenance with other series 9xx analyzers used in the sulfur recovery plant

MEASUREMENTS

SALES, SERVICE & MANUFACTURING

USA - Pennsylvania
150 Freeport Road
Pittsburgh PA 15238
Tel: +1 412 828 9040
Fax: +1 412 826 0399

USA - Delaware
455 Corporate Blvd.
Newark DE 19702
Tel: +1 302 456 4400
Fax: +1 302 456 4444

Canada - Alberta
2876 Sunridge Way NE
Calgary AB T1Y 7H9
Tel: +1 403 235 8400
Fax: +1 403 248 3550

SALES, SERVICE & MANUFACTURING

USA
Tel: +1 713 466 4900
Fax: +1 713 849 1924

Brazil
Tel: +55 19 2107 4100

France
Tel: +33 1 30 68 89 20
Fax: +33 1 30 68 89 99

Worldwide Sales and Service Locations

USA
Tel: +49 2159 9136 0
Fax: +49 2159 9136 39

Germany
Tel: +49 2159 9136 0
Fax: +49 2159 9136 39

China
Beijing
Tel: +86 10 8526 2111
Fax: +86 10 8526 2141
Chengdu
Tel: +86 28 8675 8111
Fax: +86 28 8675 8141
Shanghai
Tel: +86 21 5868 5111
Fax: +86 21 5866 0969

© 2019, by AMETEK, Inc. All rights reserved. Printed in the U.S.A. A-0229 Rev 5 (0119)
One of a family of innovative process analyzer solutions from AMETEK Process Instruments. Specifications subject to change without notice.

To find out more or request a quote visit our website ametekpi.com