On-line Process Gas Monitoring in Ethylene and Propylene Production Plants

APPLICATION

Emerson provides valuable measurements for on-line process monitoring in ethylene and propylene production plants. On-line gas monitoring of process streams maximizes yields and ensures product quality specifications.

BACKGROUND

Cracked gases such as ethane and propane from petroleum refining overheads and naptha streams are used as feedstock for ethylene and propylene production. Ethylene and propylene are important building-block petrochemicals for the value-added processing required to synthesize plastics, rubber, fibers and other organic products.

A typical ethylene and propylene production plant is shown in Figure 1 (application source point locations are circled).

GAS ANALYZER APPLICATIONS

Ethylene in Demethanizer Overhead: Hydrogen and methane are removed in the first demethanizer for use in the fuel gas header system. Because loss of valuable ethylene product in the overhead of the demethanizer is undesirable, an on-line stream analysis will help minimize product losses. Operation of the demethanizer is accordingly adjusted to minimize the ethylene content in the fuel gas product.

Solution: Ethylene concentration is determined by the CAT 100 or CAT 200 Continuous Gas Analyzer Transmitter. The CAT is typically calibrated to operate on a 0 to 1% range.

Ethylene in Secondary Demethanizer Overhead:

A secondary demethanizer removes the residual methane and hydrogen which is recycled to a point earlier in the process for recovery and use as fuel gas. Monitoring ethylene in the overhead minimizes loss of the valuable ethylene product to this recycle stream.

Solution: Ethylene concentration is determined by the CAT 100 or CAT 200 Continuous Gas Analyzer Transmitter. The CAT is typically calibrated to operate on a 0 to 1% range.

Carbon Dioxide Impurity in Ethane-Ethylene Splitter:

Bottom product of the secondary demethanizer is fed to the ethane-ethylene splitter. The overhead product is finished ethylene. The monitoring of the carbon dioxide impurity is an important quality check of the finished product.

Solution: Carbon Dioxide concentration is determined by the CAT 200 Continuous Gas Analyzer Transmitter. The CAT is typically calibrated to operate on a 0 to 50 ppm range.

Propylene in Splitter Bottoms:

The bottom product of the propylene splitter is recycled back to the cracking furnace as propane cracking feed. On-line monitoring of propylene in the propane feed ensures minimum propylene loss.

Solution: Propylene concentration is determined by the CAT 100 or CAT 200 Continuous Gas Analyzer Transmitter. The CAT is typically calibrated to operate on a 0 to 5% range.
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Emerson Process Management
Rosemount Analytical Inc.
Process Analytic Division
6565 P Davis Industrial Parkway
Solon, OH 44139 USA
T 440.914.1261
Toll Free in US and Canada 800.433.6076
F 440.914.1271
e-mail: gas.csc@EmersonProcess.com
www.raihome.com

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