

Atmospheric distillation and sulfur analysis in the gasoline blender

APPLICATION

Total sulfur and atmospheric distillation (boiling point) analysis for process control in the gasoline blender

CHALLENGE

One of the toughest challenges for a refinery is to select the best combination of components to produce cost-effective, on-spec gasoline products. The goal of gasoline blending is to blend as economically as possible to reduce the octane usage and achieve the desirable boiling point target, while still meeting the required specification. Accurate, online measurement of boiling point and total sulfur provides crucial information to prevent product giveaway and reprocessing, and helps optimize the gasoline blending process.

When processes rely on laboratory testing, they may only get three data points in 24 hours. This lengthy process means that variables can change within the process and impact the accuracy of the measurements. A laboratory test is a critical part of the measurement process. However, it can be time consuming, making it inadequate for process control.

SOLUTION

To achieve minimum product giveaway, it is important to utilize an online analytical method that correlates to the laboratory analysis. This correlation is critical for validating the online results to ensure the final product meets specification. Online analyzers that use the same methodology as the laboratory method are preferred since they reduce errors and bias. This allows refineries to ensure specifications are met to satisfy environmental concerns and target blending requirements.

PAC offers process solutions for measuring both boiling point and total sulfur with the MicroDist and NSure analyzers. MicroDist uses the same technology as the PMD110 lab analyzer (which follows ASTM method D7345), resulting in very high correlation between lab and process. NSure is based on the same technology as PAC's MultiTek for laboratory analysis (which follows ASTM method D5453). Implementing the same technology for both lab and process analysis improves the correlation of the measurements.

The MicroDist is a boiling point analyzer that offers real distillation in less than 10 minutes in tight correlation with ASTM D86. It is ideal for certification of atmospheric distillation of light and middle

RESULTS

- Achieve ROI in 36 days with the MicroDist process analyzer
- Capture a significant total sulfur step change within 2 sample injections using NSure
- Correlate with ASTM methods (D86 with MicroDist and D5453 with NSure)



MicroDist provides accurate results in less than 10 minutes, helping to achieve ideal operating ranges.



NSure provides accurate sulfur and nitrogen measurements for quality control and regulatory compliance.

distillate fuels with boiling points in the range of 20°C to 400°C. MicroDist detects any of the Group 1-4 fuel types by doing a test distillation in which the new heating profile is set up automatically, minimizing delay in the next analysis.

The method is highly precise for determining gasoline boiling point data, and field tests have proven the 50% point to be well within the D86 method limits. This results in better tracking of blending alterations caused by component changes, since it measures the variations in pressure and temperature in the flask and does not require correlation software.

By correlating with ASTM D5453, NSure measures total sulfur detection through pyro-fluorescence, which involves heating the sample to over 1000°C in the presence of excess of oxygen and exposing the combusted material to UV light. Because of the harmful effects of sulfur emissions on the environment, sulfur content is tightly controlled in fuels for automobiles, aviation, marine vessels, off-road vehicles, power plants, and home heating.

An online analyzer that provides a data point every 5-10 minutes and is well-maintained will have a short pay-off period. With fast results that agree with the lab, the refinery can easily detect process changes and make corrections with confidence. The immediate feedback facilitates process optimization around the clock (24 hours a day, 365 days a year).

Online analysis provides crucial information to prevent giveaway and reprocessing, and optimize the gasoline blending process. It also ensures specifications are met to satisfy environmental concerns and target blending requirements.

For more information about the MicroDist or NSure, visit us online at www.paclp.com.



Economics of Utilizing a Boiling Point Analyzer in a Gasoline Blender

Investment	
Boiling Point Analyzer and Sample System with Installation costs, including shelter, total per system	\$350,000
Economics	
Incremental analyzer earnings \$/year 400,000 barrel/day refinery (1° F closer results to 50% recovery point)	\$300,000/ month x 12 months= \$3,600,000
Analyzer maintenance \$/year	\$14,160
Net analyzer earnings \$/year	\$3,585,840
Before tax payout, years	0.10 (pay off in 36 days or about 5 weeks)

This table demonstrates a profitability calculation in the gasoline blender for a boiling point analyzer. A return on investment can be obtained in a little over a month.

