

# Whitepaper

## rapiDist-4

Advanced Distillation Process Analyzer Technology  
for Industry-leading Performance and Robustness



## Introduction

To remain competitive, today's refiners must employ all optimization tools available to run processes (e.g. blending units) as economically as possible while, on the other hand, keeping as much flexibility as possible to cope with increasing demands such as constantly changing feedstocks and new blending recipes. The use of online physical property analyzers is one of the key tools to reach those objectives as they measure important quality properties in the process and final blending quality directly. One of the most common quality parameter of liquid hydrocarbons is the boiling response, which is typically measured according to the ASTM D86 standard. The analysis method is based on distillation, a physical method of separating the

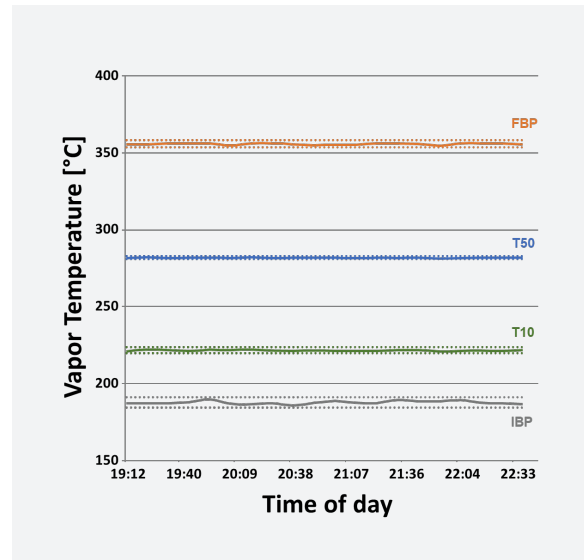
component substances from a liquid mixture by selective vaporization and re-condensation based on differences in volatilities. This analysis gives important information about the sample properties and as a result, behavior during storage and use. Leveraging Bartec Benke's decades of experience in physical property analysis and an installed base of well above 2000 units, the rapiDist-4 Distillation Process Analyzer was developed to target the growing demands of 21st-century refineries. With highly accurate boiling curve measurements, cycle times as fast as 10 minutes and high closeness to the ASTM D86 procedure, it is the perfect choice for fast process control (e.g. atmospheric distillation columns and blending processes).



Bartec Benke rapiDist-4 with optional chiller installed.

## Industry leading distillation analyzer technology

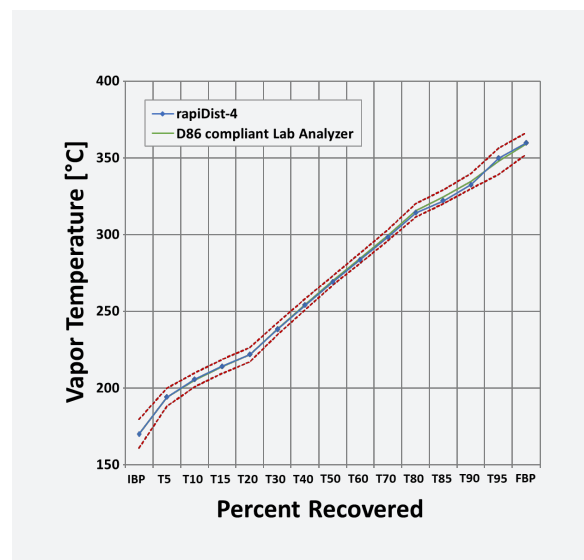
The rapiDist-4 analyzer uses an advanced optical imaging measurement technology that combines highly precise volume measurement with unrivaled robustness. The optical imaging device detects continuously, in real-time, the volume of distillate during the distillation process through detection of the meniscus in the receiver cuvette from 0% to FBP. The IBP is determined separately through an additional sensor in the receiver cuvette. This ensures the highest reliability and precision in measuring the IBP. The sample volume, dosed prior to each run, is measured in the dosing cuvette using the same optical imaging technique. The result and resolution of volume measurement fully correlates with the requirements of ASTM D86. Another advantage of this measuring principle is the detection of the complete meniscus in the cuvette which, for the calculation of volumes, ensures precise, reliable and quality data even in the presence of particles, drops and bubbles.



Results from a refinery diesel unit. Repeatability limits according to ASTM D86 are marked as dotted lines.

## Outstanding correlation with ASTM D86

The rapiDist-4 analyzer provides real distillation measurement with true volume measurement resulting in outstanding correlation with the ASTM D86. Unlike other distillation process analyzers on the market, the IBP and FBP are directly measured by the rapiDist-4 removing the need for uncertain extrapolation. Furthermore, there is no need for any timely and cumbersome recalibration when changing to new blending recipes or changing sample composition regardless of product type: gasoline, naphtha, jet fuel, fuel oil, diesel fuel, petroleum products and other liquid hydrocarbons. This ensures perfect results from the first analysis even when samples are of unknown composition. The core components of the rapiDist-4, i.e., dosing unit, vaporizer, condenser and receiver, are state-of-the-art components and is according to the design specifications set out by ASTM D86.



Outstanding reproducibility and correlation of the rapiDist-4 with an ASTM D86 compliant laboratory analyzer. Repeatability limits according to ASTM D86 are marked as dotted lines.

## A new level of system up time

Like all Bartec Benke process analyzers, the rapiDist-4 is designed to provide unmatched reliability and longevity. This is achieved by using only the highest quality components combined with high quality manufacturing under strict quality control. Thanks to the contactless volume measurement without moving parts, the analyzer provides

industry leading robustness and system uptime. A fully automated preventive de-coking procedure for flask regeneration significantly reduces required manual maintenance efforts compared to other D86 correlative analysis technologies. Finally, the analyzer is always on and ready to run as no recalibration is required when changing sample composition.

## Increased profits with advanced technology

The precise measurement of the IBP and FBP as well as the 5% and 95% recovered volumes with the rapiDist-4 analyzer helps increase profitability. The analyzer significantly helps to improve control of distillation towers and the quality of product blends by optimizing cut points. The rapiDist-4 also

prevents product giveaway by continuously measuring online the real distillation curve of final product. With its minimal maintenance requirement combined with low running costs the rapiDist-4 shows unsurpassed low cost of ownership for a maximum return of investment.

## A perfect alternative to Simulated Distillation Online GC

When comparing gas chromatographs (GC) solutions with distillation process analyzers like the rapiDist-4, one has to understand the differences in the analysis technology. The rapiDist-4 is capable of directly measuring the IBP and FBP with high precision, as required by the ASTM D86. GC solutions merely extrapolate the IBP and FBP, which makes this important process parameter more uncertain. To handle changing input composition, especially in blending processes, gas chromatographs require

frequent and tedious recalibrations with laboratory samples which adds another error source to the analysis. On the other hand, the rapiDist-4 does not require any recalibration or measurement correction using correlative equations. Overall, the rapiDist-4 analyzer shows significant advantages over GC solutions which makes Bartec Benke's advanced distillation process analyzer technology clearly the desirable solution.

## Application Areas

The rapiDist-4 analyzer is designed for fast process control and perfectly fits into the following applications, along many others:

- Atmospheric distillation tower (CDU) to control the 5% and/or 95% recovered volumes for side cut products, e.g., light naphtha, heavy naphtha, kerosene, and diesel.
- Catalytic reforming processes to control the naphtha charge stream to prevent reaching excessively high end points (by sending a warning signal to the DCS) in order to keep optimal yields of reformate and increase the lifecycle of catalyst.
- Fractionating tower of hydrocracking processes, which produces light straight run, light naphtha and a distillate stream by controlling the 5% and 95% recovered volumes of each stream.
- Monitoring intermediate product blending at remote terminals to control final products specifications.



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