PAC solid partners proven solutions

CRUDE OIL ANALYZER

Combining Detailed Hydrocarbon Processing Analysis and Simulated Distillation Techniques to Provide More Accurate Crude Oil Analysis

- More Accurate Analysis of the Whole Crude Oil
- Optimize Product Value with More Accurate Boiling Point Range and Cut-point Intervals Determination
- In Compliance with ASTM D7169, IP 545, IP 601 and EN 15199-3

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Crude Oil Analyzer

MORE ACCURATE CRUDE OIL ANALYSIS

The Crude Oil Analyzer combines the results of DHA Front End (FE) and High Temp (HT) SIMDIS analyses into one total true boiling point (TBP) report for the best performance in crude oil analysis. Standardization committees such as ASTM, IP and CEN are developing methods to allow the merging of a separate DHA analysis of the front end of a crude oil with the high temperature SIMDIS analysis. As a result of this merge, more accurate boiling point range data is obtained allowing precise cut point intervals determination for the whole crude oil.

PERFORMANCE STUDY

OVERCOMING CRUDE OIL CHALLENGES

CRUDE OIL CHALLENGES

The accurate analysis of crude oil samples is a challenge due to:

1. Samples generally having a very wide boiling point range (<100˚C to >750 ˚C)
2. API gravity ranges from light to heavy
3. Viscosity of sample

In High Temperature SIMDIS data, the CS2 used as a sample diluent quenches the FID signal of the relatively volatile part of the sample (Figure 1). As a result, data obtained from High Temp SIMDIS has a slightly lower recovery in the initial fractions of the sample than may have been expected. The quenching also affects precision.
Figure 2 and 3 demonstrate this effect on recovery, comparing typical HT SIMDIS and DHA FE data for the same sample.

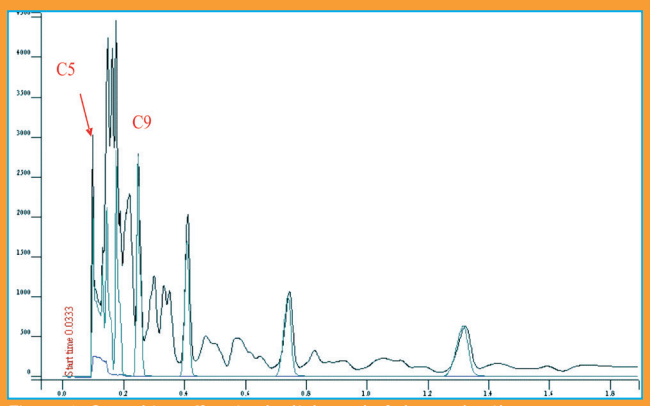
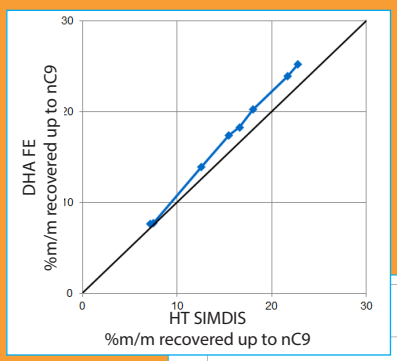


Figure 1. Quenching effect in the light end of the crude oil

AC CRUDE OIL ANALYZER PERFORMANCE

Combining DHA FE and HT SIMDIS analyses offers all the benefits in terms of boiling point range, precision and accuracy. Figure 3 demonstrates the typical improvement in precision for DHA Front End over HT SIMDIS alone in the first part of the boiling point curve.

Determining characteristics of the whole crude oil using the Crude Oil Analyzer improves accuracy and precision of data. This allows for modelling end product closer to specs and ultimately less product give-away, while still meeting stringent product specifications.



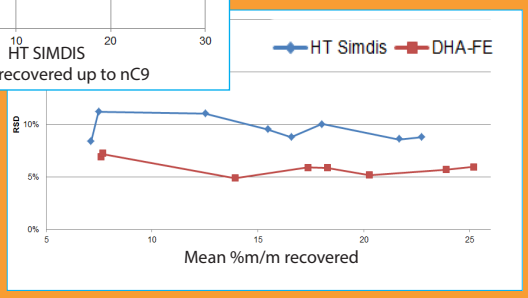
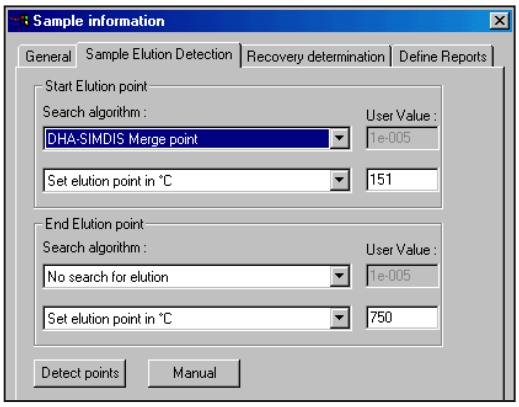


Figure 2 and 3.
For the light end of crude oil, DHA FE offers better accuracy and precision then HT SIMDIS

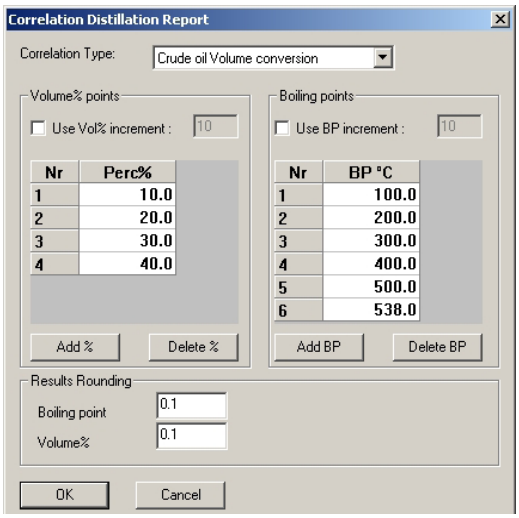
MORE ACCURATE WHOLE CRUDE OIL ANALYSIS OPTIMIZES PRODUCT VALUE

More Accurate Boiling Point Range and Cut-point Intervals Determination:

- Based on high resolution DHA analysis to separate individual components for the light end of the crude oil up to and including C9 without quenching
- Uses HT SIMDIS for the heavier components >C9 according to ASTM D7169
- Built-in calculations ensure the amount residue (or sample recovery) is determined using an external standard
- Intuitive AC software merges DHA and SIMDIS results into one boiling point distribution curve for the whole crude oil
- Special reporting option to convert data from mass% to volume%
- Unique AC User Group with performance monitoring program (PMP) contributes to high confidence level and a strong QC program
- Includes certified AC Quality Control Samples dedicated to crude oil.



Sample Information Menu: allows setting the DHA-SIMDIS merging boiling point

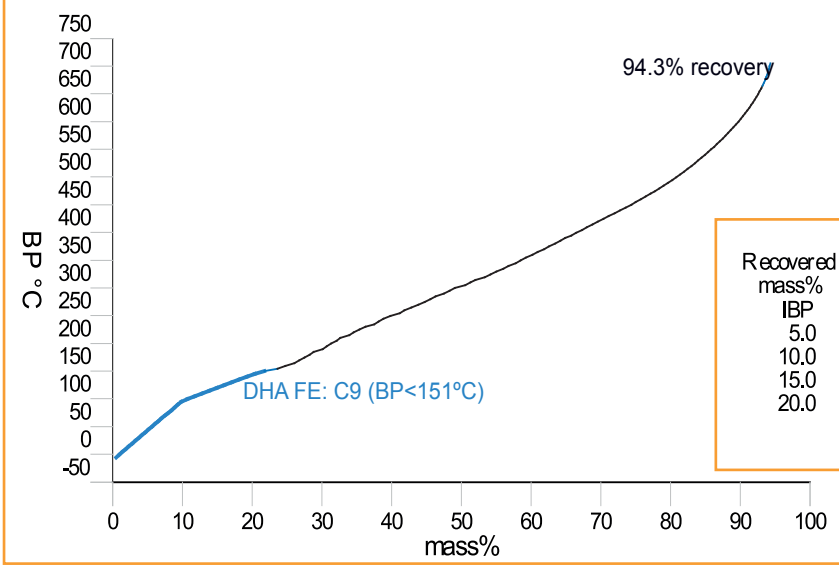


Correlation distillation report option allows calculation of volume % data for crude oil

PROVEN COMPLIANCY

Compliant with ASTM D7169, IP 545, IP 601 and EN 15199-3:

- AC Crude Oil Analyzer (ASTM D7169) is the official standard for determination of the boiling point distribution and cut point intervals of crude oils and residues by using high temperature gas chromatography
- Optional unique combi inlet allows analysis of both light end in crude oil (DHA FE) and light petroleum streams (naphtha/gasoline) conform ASTM D6729, D6730, D6733 and D5134



Recovered mass%	BP °C	Recovered mass%	BP °C	Recovered mass%	BP °C	Recovered mass%	BP °C
IBP	-5.4	25.0	162.0	50.0	302.4	75.0	454.2
5.0	42.8	30.0	188.4	55.0	329.6	80.0	492.6
10.0	96.2	35.0	222.8	60.0	357.8	85.0	540.2
15.0	119.6	40.0	250.6	65.0	390.2	90.0	603.4
20.0	143.0	45.0	276.0	70.0	421.8	94.3	706.2

Merged DHA-SIMDIS analysis of a crude oil

SPECIFICATIONS

Ordering Information	
CCG4200A	AC CRUDE OIL ANALYZER SYSTEM ON 120V, INCL DHA FE
CCG4200C	AC CRUDE OIL ANALYZER SYSTEM ON 230V, INCL DHA FE
CCG4200A.001	AC CRUDE OIL ANALYZER SYSTEM ON 120V, INCL. FAST DHA COMBI
CCG4200C.001	AC CRUDE OIL ANALYZER SYSTEM ON 230V, INCL. FAST DHA COMBI
CCG4200A.002	AC CRUDE OIL ANALYZER SYSTEM ON 120V, INCL. DHA D6729 COMBI
CCG4200C.002	AC CRUDE OIL ANALYZER SYSTEM ON 230V, INCL. DHA D6729 COMBI
CCG4200A.003	AC CRUDE OIL ANALYZER SYSTEM ON 120V, INCL. DHA D6730 COMBI
CCG4200C.003	AC CRUDE OIL ANALYZER SYSTEM ON 230V, INCL. DHA D6730 COMBI
Utility Requirements	
Carrier gas	Helium (99.999%), hydrogen (99.999%) for Fast DHA
Detector gas	Hydrogen (99.999%) and air
System power	110 – 230 Volts
Cryogenic oven cooling	Liquid nitrogen or liquid CO2 - (6850 based systems only LCO2)
Standard Methods	
ASTM D7169, IP 545, IP601, EN 15199-3	

DHA FE

- Incorporates the principle of IP 344 to determine individual hydrocarbons (C1-nC9) in stabilized crude oils
- Used for straight naphtha, reformate, alkylate and crude oil (gasolines and FCC naphtha excluded)
- Reports C10+, Maximum FBP 270°C
- Concentration range: 0.01 – 30 % (m/m)
- Maximum concentration 2% (v/v) olefins
- No separation of oxygenates
- Uses a 50m column, runtime of 118 minutes

HT SIMDIS

- According D7169 for crude oils
- FBP >720°C (1328°F)

Continuing research and development may result in specifications or appearance changes at any time

ABOUT PAC

PAC develops advanced instrumentation for lab and process applications based on strong **Analytical Expertise** that ensures **Optimal Performance** for our clients. Our analyzers help our clients meet complex industry challenges by providing a low cost of ownership, safe operation, high performance with fast, accurate, and actionable results, high uptime through reliable instrumentation, and compliance with standard methods.

Our solutions are from industry-leading brands: AC Analytical Controls, Advanced Sensors, Alcor, Antek, Herzog, ISL, Cambridge Viscosity, PSPI, and PetroSpec. We are committed to delivering superior and local customer service worldwide with 16 office locations and a network of over 50 distributors. PAC operates as a unit of Roper Technologies, Inc., a diversified technology company and a constituent of S&P 500, Fortune 1000, and Russell 1000 indices.

HEADQUARTERS

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