



Analytical Solutions

for the Gas and Petrochemical Industry



Introducing Da Vinci

Da Vinci Laboratory Solutions (DVLS) was formed as a laboratory support provider in 2000. Today Da Vinci has become the versatile partner to laboratories in the global petrochemical industry.

Our team of experts develops, assembles and supplies chromatography and innovative solutions that are based upon the Agilent Technologies chromatography platform.

Our headquarters are located in Rotterdam, the Netherlands and offer an extensive application and test laboratory, a well-equipped training room, assembly facilities, an R&D office and a warehouse. Through a network of sales & support offices and our distributors we are able to supply & support our chromatography solutions on a global scale.

In this brochure you will find an overview of our solutions for the Gas and Petrochemical Industry. Please contact us or your local representative for any questions or support.

Our Product Range

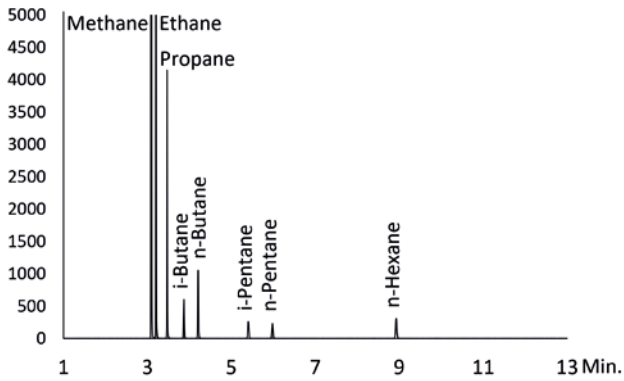
As a channel partner of Agilent Technologies Da Vinci offers solutions that comprise of:

- Systems for GC, LC & MS
- Software
- Service & Support
- Supplies

The chromatography systems are configured to comply with the standard test methods of ASTM, DIN, EN, GPA, IP, ISO and UOP. Each analyzer is tested according to the inhouse testing procedures to check the system performance and to verify the analyzer specification by a reference sample test. Factory Acceptance Test will be scheduled upon request.



DVLS Natural Gas Analyzer

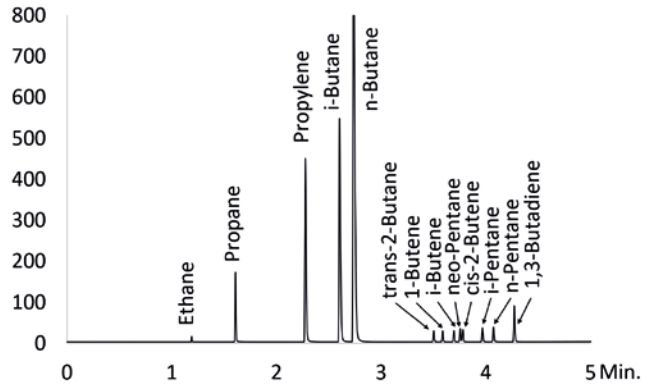


- ASTM D1945, D3588
- GOST 22667
- GPA 2172, GPA 2177, GPA 2186, GPA 2261, GPA 2286
- IP 345
- ISO 6974, ISO 6975, ISO 6976

- Hydrocarbons
- Non-condensable gases: Hydrogen, Nitrogen, Carbon Monoxide, Carbon Dioxide, Oxygen, Hydrogen Sulphide
- BTEX

- Liquefied natural gas
- Natural gas
- Natural gas condensate

DVLS LPG Analyzers



- ASTM D2163, DIN 51666, EN 27941, ISO 7941
- ASTM D2593
- ASTM D2712
- ASTM D4424
- ASTM D6159
- DIN 51619
- UOP 983, UOP 1014

- Hydrocarbon composition
- Traces of hydrocarbon impurities
- Optional channel for Traces of sulfur compounds, CO/CO₂ or permanent gases

- 1,3-Butadiene
- Butylenes
- Crude C4 streams
- Dimethyl ether (DME)
- Ethylene
- LPG
- Propylene
- Raffinate
- Vinyl chloride monomer (VCM)

Solution

Method

Analysis of

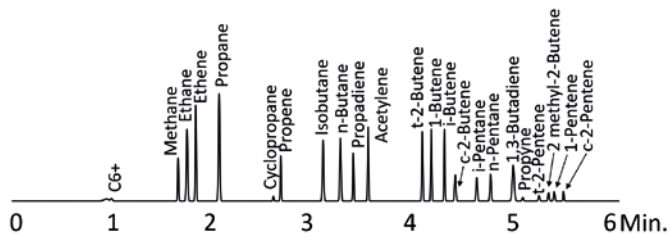
Application Range



Analysis of Gas & LPG

Solution

DVLS Refinery Gas Analyzer



DVLS Gas Sampling Station

Time	Event	Set Point	Action	Description
0:00:00	Label		Start Sample Process	
0:00:00	i2Chrom Connect Instrument To Project		Gas Analyzer	
0:00:00	Label		Man Lines	Initiate System
0:00:00	ValueBox: Close All Values			
0:00:00	1. Use Low H2S Pressure max 1 bar		Deactivated / Disabled	
0:00:00	2. Use Low H2S Pressure 1 - 100 bar		Deactivated / Disabled	
0:00:00	3. Use High H2S Pressure max 1 bar		Deactivated / Disabled	
0:00:00	4. Use High H2S Pressure 1 - 100 bar		Deactivated / Disabled	
0:00:00	5. Use Purge		Deactivated / Disabled	
0:00:00	6. Use Standby		Activated / Enabled	
0:00:00	Label		Sample Selection	Match Sample bonded and press required button
0:00:00	1. Use H2S Pressure max 1 bar		On High Gate action	Start fraction sample 1
0:00:00	2. Use H2S Pressure max 1 bar		On High Gate action	Start fraction sample 2
0:00:00	3. High H2S Pressure max 1 bar		On High Gate action	Start fraction sample 3
0:00:00	4. High H2S Pressure 1 - 100 bar		On High Gate action	Start fraction sample 4
0:00:00	5. Purge Button		On High Gate action	Purge System
0:00:00	Get To Label		Sample Selection	If Purge button pressed start cleaning system
0:00:00	Label		Sample Selection	Start process operation of sample Low H2S under low
0:00:00	Label		Sample Selection	Start fraction sample 1

Method

- ASTM D1946, D2163, D2504, D2593, D4424, D7833
- DIN51666
- EN 15984, EN 27941
- IP 405
- ISO 7941
- UOP539, UOP603



Analysis of

- Gas composition
- Permanent gases: Hydrogen, Oxygen, Nitrogen, Carbon Monoxide, Carbon Dioxide
- Hydrogen Sulfide
- Calorific Value, Carbon Emission Factors
- Extended refinery gas analysis up to BTEX (optional)

- Sampling of Gas Streams with various pressures

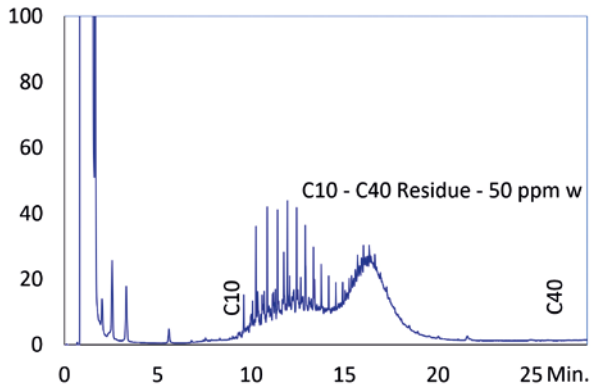
Application Range

- Biogas
- Butane
- Flue gas
- Gaseous fuels
- LPG
- Refinery gas
- Propane
- Syngas

- Sulfur containing samples



DVLS Oily Residues in LPG Analyzer



- ASTM D7756
- EN 16423

- Residue and heavier contaminants in LPG
- Desulfurization additives in LPG: DIPA, MEA & DEA
- Residue in DME

- Dimethyl ether (DME)
- LPG

DVLS Liquefied Gas Injector



- Direct injection of the liquefied gases into a GC

- Inhibitors, additives and dimer in 1,3-Butadiene: ACN, TBC, VCH, NMP, DEHA, BHT, DMF and residue
- Elemental sulfur in LPG
- Oxygenates in liquefied gases
- Sulfur compounds in light hydrocarbons

- 1,3-Butadiene
- Butylenes
- Crude C4 streams
- Ethylene
- LPG
- Propylene
- Raffinate
- Unstabilized condensate

Solution

Method

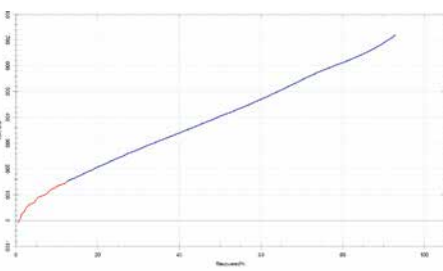
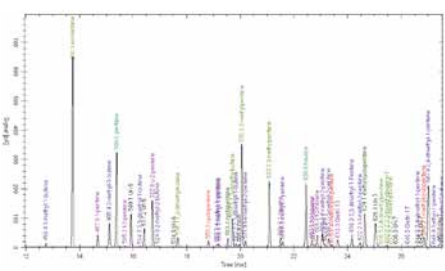
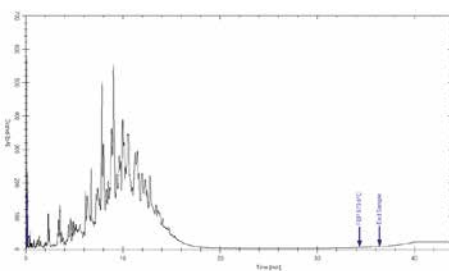
Analysis of

Application Range



Analysis of Petrochemicals

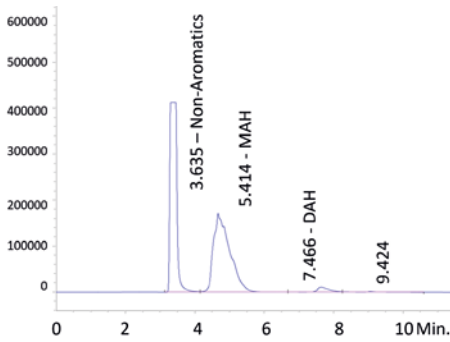
Solution	DVLS Simulated Distillation Analyzer	DVLS Detailed Hydrocarbon Analyzer	DVLS Crude Oil Analyzer
Method	<ul style="list-style-type: none"> • ASTM D2887, D3710, D5442, D6352, D7096, D7169, D7213, D7398, D7500 • DIN 51435, DIN 51581 • EN 15199 • IP 406, IP 480, IP 507, IP 545 • ISO 3924 	<ul style="list-style-type: none"> • ASTM D5134, D6729, D6730, D6733 	<ul style="list-style-type: none"> • ASTM D7169, D7900 • EN 15199-3/4
Analysis of	<ul style="list-style-type: none"> • Alkane profile (Wax) • Distillation residue • Initial Boiling Point (IBP) • Final Boiling Point (FBP) • True Boiling Point (TBP) distribution • Flash Point Correlation report • Motor Oil Volatility report • Noack Evaporation Loss report 	<ul style="list-style-type: none"> • Individual hydrocarbons & group types • PIONA analysis of gasoline & blending components • Oxygenates 	<ul style="list-style-type: none"> • ASTM D02.K crude conversion • Merged True Boiling Point (TBP) Distribution of crude oil • Individual components C1-C9 • Distillation residue • Initial Boiling Point (IBP) • Final Boiling Point (FBP) • Light ends in crude oil
Application Range	<ul style="list-style-type: none"> • Crude oil • Diesel fuel • Distillates • Fuel oil • Gasoline • Lube oils • Jet fuel • Naphtha • Reformate/platformate • Thermal cracker feed • Vacuum gas oil • Wax 	<ul style="list-style-type: none"> • Alkylate • Crude oil • Gasoline • Isomerase • Naphtha • Reformate/platformate • Pygas 	<ul style="list-style-type: none"> • Crude oil



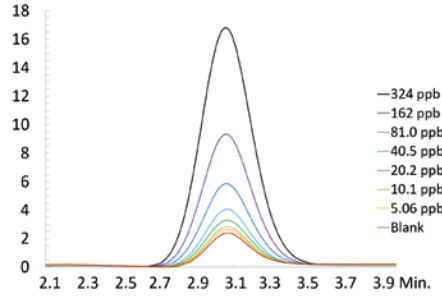
Analysis of Petrochemicals

Solution

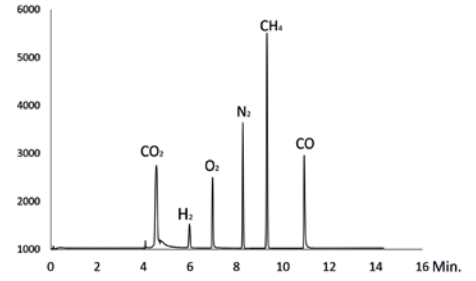
DVLS Mid Distillates Analyzer



DVLS Fast Peroxide Analyzer



DVLS Custom Applications



Method

- ASTM D6379, D6591, D8267
- IP391, IP436, IP548
- EN12916

- DVLS method
- Alternative to:
- ASTM D2340, E299
 - ASTM D3703, D6447
 - ASTM D5799

- User specified custom configuration according to ASTM, DIN, EN, IP

Analysis of

- Mono-Aromatics
- Di-Aromatics
- Tri-Aromatics

- Hydrogen peroxides
- Organic peroxides

- Customized analysis based on multiple valve configuration and various detectors such as:
- MSD
 - PDHID
 - PFPD
 - SCD
 - VUV
 - XSD

Application Range

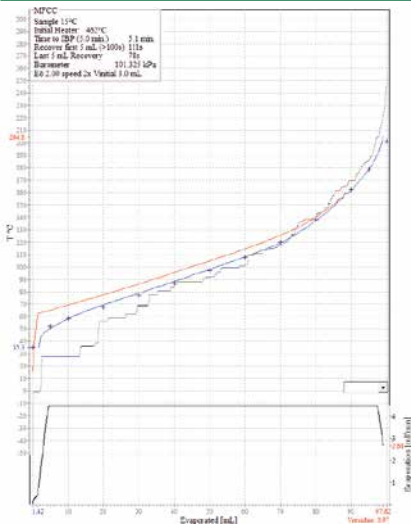
- Jet fuel
- Diesel fuel

- 1,3-Butadiene
- Alcohols & Ethers
- Aromatics
- Aqueous matrices in process streams
- Aviation turbine fuels
- Dicyclopentadiene
- Glycols
- Isoprene
- Olefinic hydrocarbon streams
- Styrenes & Vinyl pyridines

- Natural gas
- LPG
- Refinery gas
- Petrochemical streams



DVLS DHA to D86 Analyzer

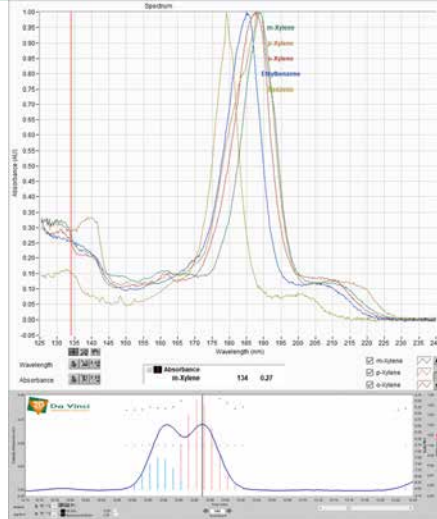


- ASTM D86 distillation modelling based on Fugacity

- ASTM D86 distillation modelling

- Alkylate
- Isomate
- FCC Naphtha
- Gasoline
- Reformate

DVLS PIONA Analyzer

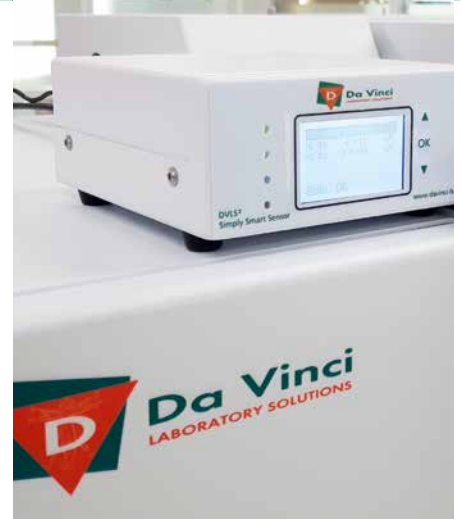


- ASTM D8071, ASTM D8267

- Hydrocarbons
- Oxygenates

- Gasoline
- Jet fuel

DVLS³ Simply Smart Sensor



- Sensor for detecting hydrogen leaks in GC systems

- Switch from Helium to Hydrogen as GC carrier gas

Solution

Method

Analysis of

Application Range



Data Processing & Reporting

The DVLS PetroReporter is an universal software tool that automates data processing and reporting of petroleum samples ranging from gases up to and including crude oil for DHA, Simdist, Gas Calculation and custom applications.

Application range

- ASTM, DIN, EN, IP, ISO applications for Simulated Distillation (SimDist)
- ASTM D5134, D6729, D6730, D6733, D7900 applications for Detailed Hydrocarbon Analysis (DHA)
- ASTM, DIN, EN, GPA and ISO gas calculation modules
- Custom applications

Multi CDS Compatibility

DVLS PetroReporter is compatible with following chromatographic data systems of major suppliers including:

- OpenLAB 2.x
- OpenLAB Chemstation
- OpenLAB EZChrom

Client/Server or Standalone Configuration

PetroReporter can be used either stand-alone or in a network configuration. The client/server architecture of the software allows to process the analysis data from any PC workstation.

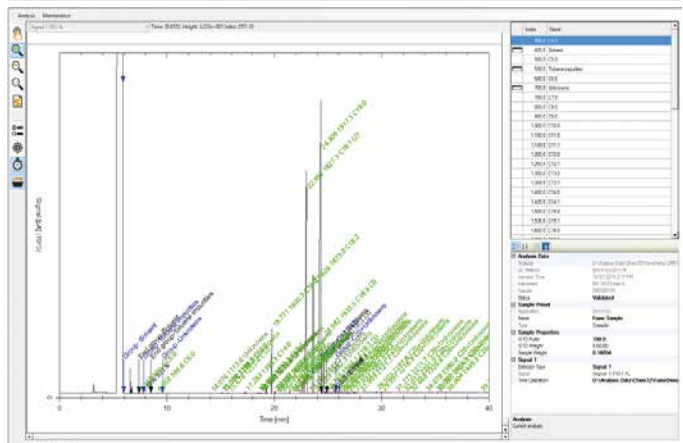
Report of

PetroReporter for Gas Calculation

- ASTM, DIN, EN, GPA, ISO and UOP standard method calculations
- Compressibility
- Carbon content
- Carbon emission factor
- Density
- Heating value, calorific value and BTU
- Liquid gallons per cubic feet of gas (GPM)
- Liquid volume (LPG)
- Molecular weight
- Motor octane number
- Oxygen correction
- Relative density
- Real specific gravity
- Vapour pressure (LPG)
- Wobbe index
- Custom calculations

PetroReporter for Custom Application

- EN 14103: ester content of FAME or - EN 15779: Polyunsaturated fatty acid methyl esters (PUFA) content of FAME
- EN 15779: Polyunsaturated fatty acid methyl esters (PUFA) content of FAME



Custom EN 15984-2011 / ISO 8973 19200588_RGA_LPG
DVLS Gas
22-Feb-19 10:38:33AM

C:\ChemStation\31\Data\REP\2019-02-22_002_DVLS Gas.D

Sample Preset: Floating Sample Cal. Std:

Method: DEF_GC.M

Analyst: SYSTEM Cal. Set: Cal 20190304 12:24:37

Description: Sample Cylinder

Detailed Peak Report

Signal 1 FID1 A, Front Signal

Time	Area	Conc	Norm	Name
3.4070	1.008E+003	42.466	42.478	Methane
3.6266	4.078E+002	9.009	9.012	Ethane
4.3519	1.688E+002	2.489	2.490	Propane
5.7209	4.440E+001	0.497	0.498	n-Butane
5.8879	4.433E+001	0.496	0.496	n-Butane

Signal 2 TCD2 B, Back Signal

Time	Area	Conc	Norm	Name
1.1800	4.027E+003	4.977	4.979	Carbon Dioxide
3.6334	2.795E+002	0.494	0.495	Oxygen
4.0913	1.503E+004	24.687	24.695	Nitrogen
5.6879	3.031E+003	4.954	4.955	Carbon Monoxide

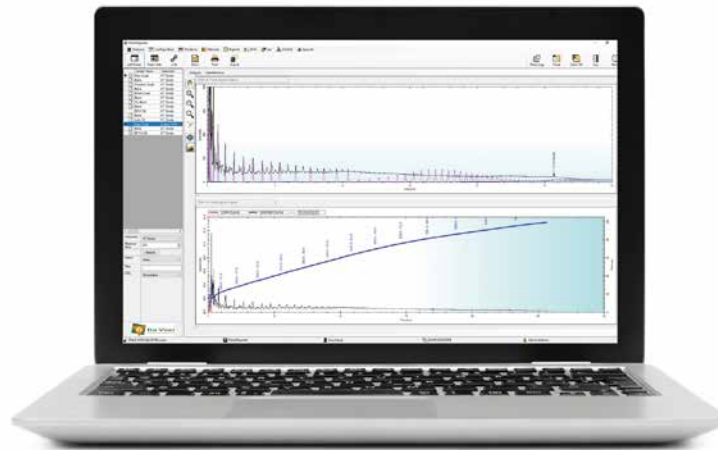
Signal 3 TCD3 C, Aux Signal

Time	Area	Conc	Norm	Name
1.1348	4.369E+003	9.901	9.903	Hydrogen
		99.97	100.00	

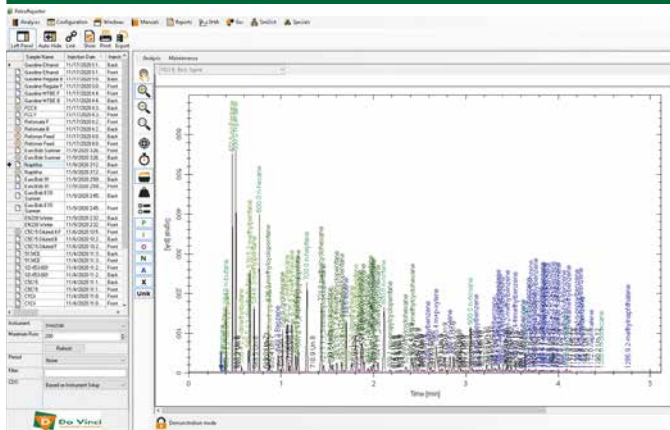
Component Report

Name	Mol%	Mass%	Gas Vol%	
Carbon Dioxide	4.979	9.935	4.964	
Carbon Monoxide	4.955	6.293	4.966	
Ethane	9.012	12.287	8.960	
Hydrogen	9.903	0.905	9.936	
n-Butane	0.498	1.311	0.483	
Methane	42.478	30.900	42.509	
n-Butane	0.496	1.306	0.480	
Nitrogen	24.695	31.366	24.754	
Oxygen	0.495	0.718	0.496	
Propane	2.490	4.978	2.452	
		100.00	100.00	100.00

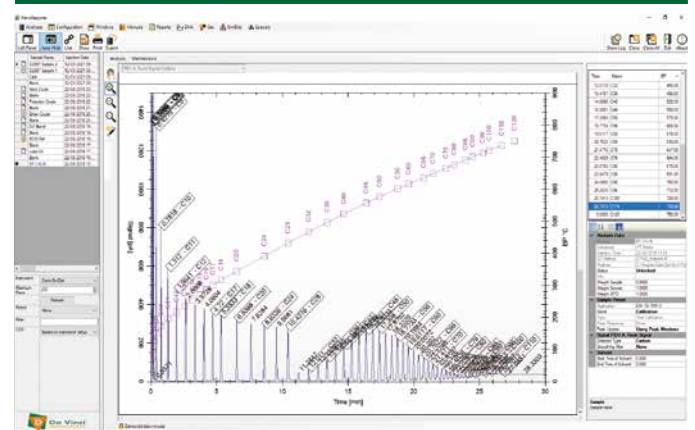




PetroReporter for DHA

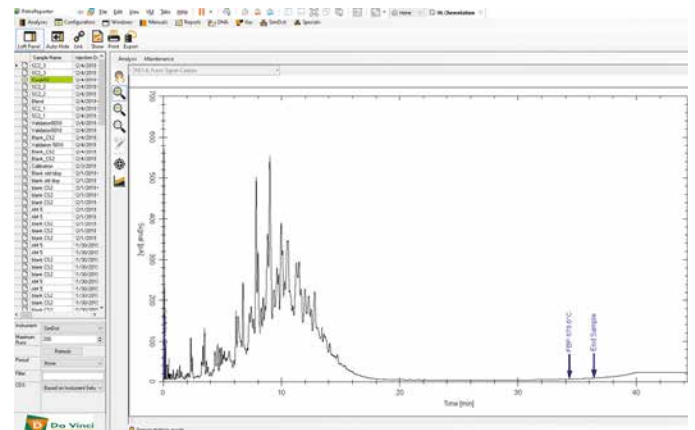
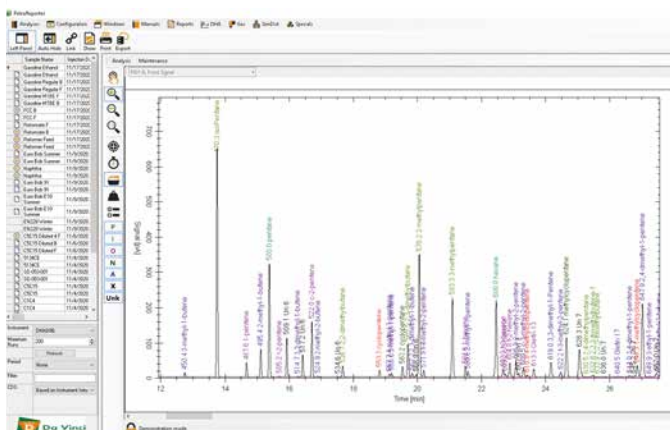


PetroReporter for SimDist



- Bromine number
- DHA/SimDist merge data
- Gross and nett heat of combustion of liquid
- Individual hydrocarbons & group types
- Oxygenates
- PIONA
- Reid vapor pressure
- RON and MON values
- Specific gravity
- True Boiling Point (TBP) distribution

- Alkanes Profile Report (Wax)
- Cut point distribution
- Distillation Percent report
- Distillation Boiling Point report
- Flash point correlation
- Motor oil volatility (MOV)
- Noack evaporation loss
- True Boiling Point (TBP) distribution
- Volume correlation
- Volume correlation report for (customizable) ASTM D86, ASTM D86/STP 577
- Volume cut point report (customizable)



Solution

Report of



Da Vinci
LABORATORY SOLUTIONS

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