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CNS SIMDIS: FAST QUANTITATIVE BOILING POINT DISTRIBUTION DATA FOR CARBON, SULPHUR AND NITROGEN FOR CRUDE OIL

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PAC

Wed Nov 29th, 1.30 - 2.00 pm, Room 3.

OUTLINE

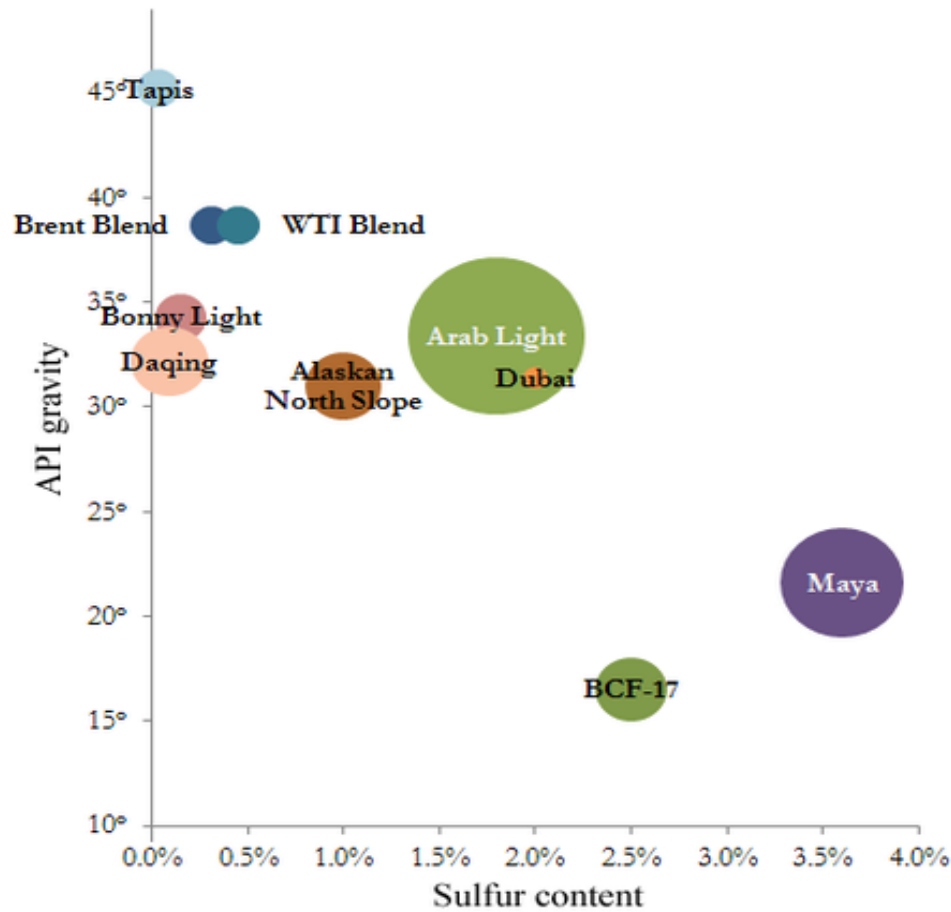


- Crude Value (Why CNS)?
- CNS SIMDIS Solution
- Scope & Performance
- Benefits
- Example data
- Q&A



THE VALUE IN CRUDE

NO CRUDE IS THE SAME...



THE VALUE IN CRUDE

CRUDE PRICE DIFFERENTIALS

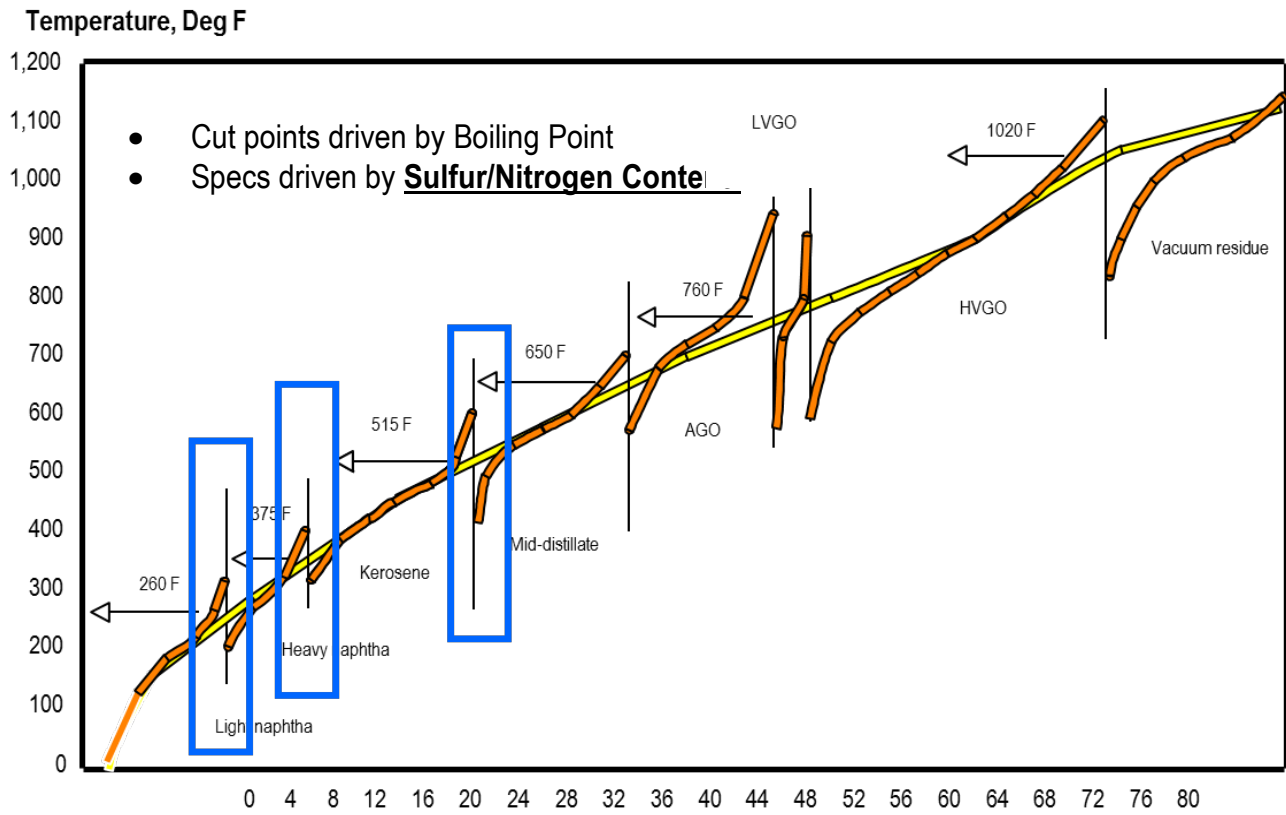
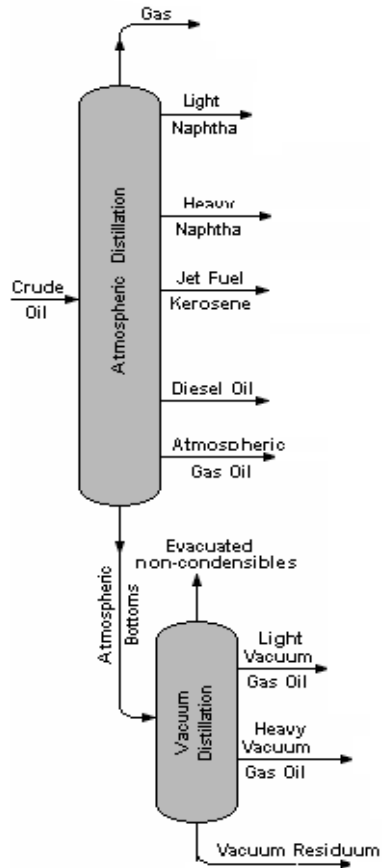


Differentiator	Δ	Price effect*
API	+1°	0.007 US\$/ \$ Brent
Sulphur	+1%	-0.056 US\$/ \$ Brent
TAN	+1 unit	-0.051 US\$/ \$ Brent
Example		
1 barrel Crude Brent price level = 50 US\$/barrel	+1% Sulphur (All other parameters identical)	Exp price delta -2.8 US\$ → 47.2 US\$ (-5.6%)

- *Crude intake value makes a significant impact on Refining Margins!*
- *To know that value fast, allows for making that difference in Profit!*

* *Crude Oil Price Differentials and Differences in Oil Qualities: A Statistical Analysis.*
ESMAP Technical paper October 2005

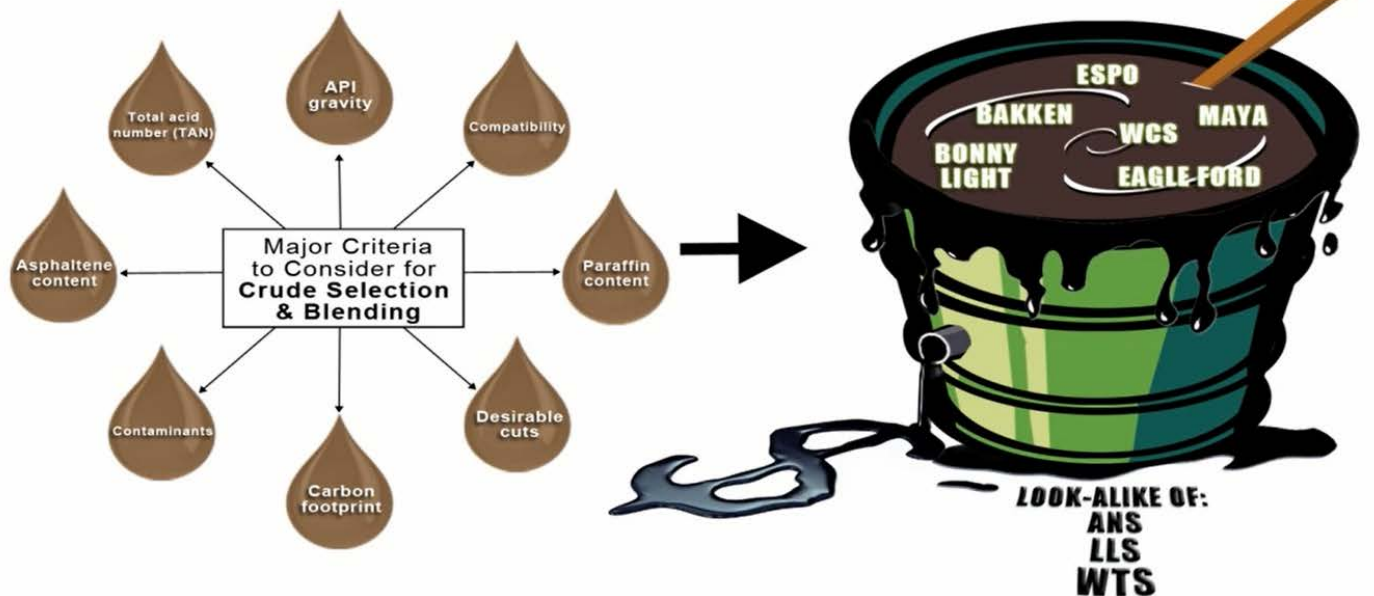
THE VALUE IN CRUDE DISTILLATION OPTIMIZATION



THE VALUE IN CRUDE

LOOK-ALIKES AND BLENDS

REFINERS MUST KNOW IMPORTANT CRITERIA



45

OPPORTUNITY CRUDES MANAGEMENT SEMINAR SERIES VIDEO #5: "WE ARE NOT COMPATIBLE" COPYRIGHT @HYDROCARBON PUBLISHING COMPANY

THE VALUE IN CRUDE REFINERY RISK & INCOMPATIBILITY



Regulations (Sulfur)

Catalyst Poisoning (Sulfur)

*FCC units catalyst
deactivation (Nitrogen)*

*Salt Formation (Nitrogen) -
heat exchanger fouling or
filter blockage*



- **Compatibility?**
- **Product Value?**
- **Up-time?**
- **Process Control?**
- **Cost of Processing?**



CNS SIMDIS

SOLUTION DESCRIPTION



CNS SIMDIS

- Delivers Quantitative data on S/N vs boiling point in 30 mins
- Can be compared to traditional Crude Assay (for BP, S & N)
- Provides Better understanding on Crude Oil input quality, modeling & Blending

- Lowers down-times
- Decreases Cost of Labor
- Optimizes product value within specification

→ **Improve Refinery Profit**

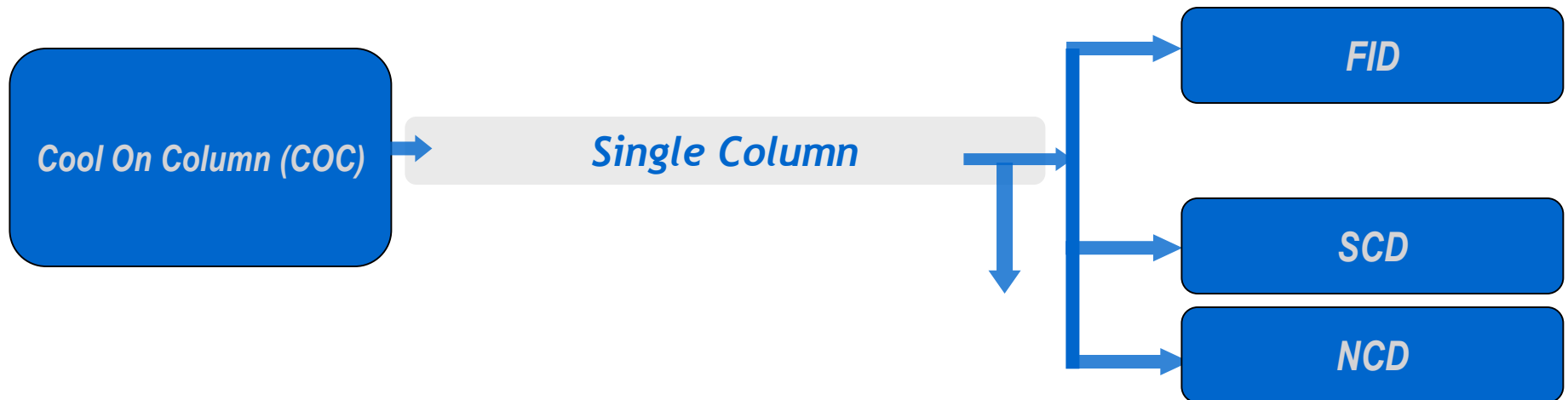


CNS SIMDIS

SOLUTION DESCRIPTION

CNS SIMDIS

- Proven SIMDIS & SeNse Chemiluminescence Detector Technology
- Post-column Vent, Microfluidics splitter
- DHA FE optional for <C9 information
- Low Temp (middle Distillates) or High Temp Solution (Crude)
- Complies to D7807, Analog to other key SIMDIS methods



BENEFITS



- Fast decision making: <30 minutes analysis time
- Less sample required: <10 ml
- Accuracy / Precision <10% RSD
- High Resolution Sulfur and Nitrogen data by boiling point or carbon number easily accessible
- Typical SIMDIS Reporting w. export functions.
- Minimal technician/chemist training required
- Automation.
- Safety! No CS₂ is used.

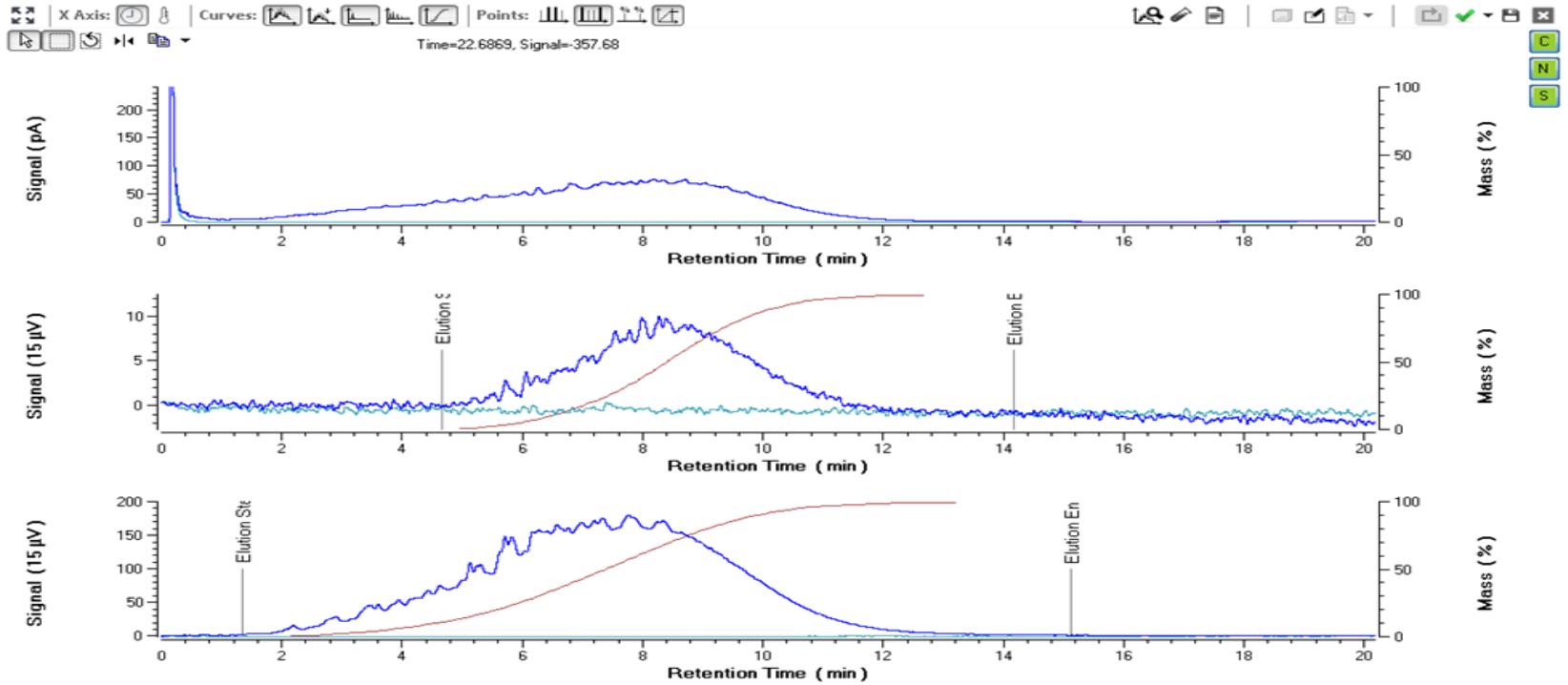


CNS SIMDIS Application Range

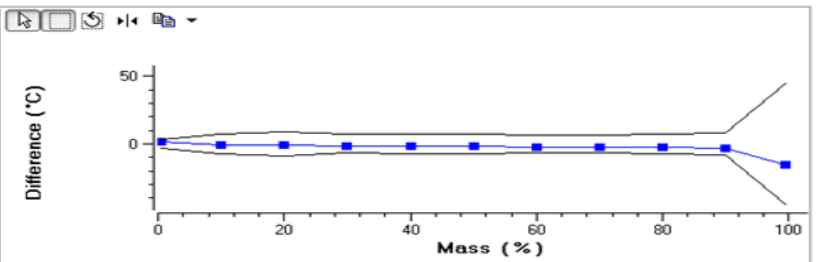
Method	Low Temp D2887 / ASTM D7807-12	High Temp - D6352 , D7500, D7169 and others
Carbon Number Range	C5 - C44	C2 - C90*
Sample Range	Jet Fuel, Diesel	Crudes as such Distillates, Base Oils, Lubricating Base Stocks,
Sample Boiling Range	FBP < 538 °C (1000 °F)	IBP > 151 °C (212 °F)* FBP < 700 °C (292 °F)
Sample Injection	Neat	1-3%



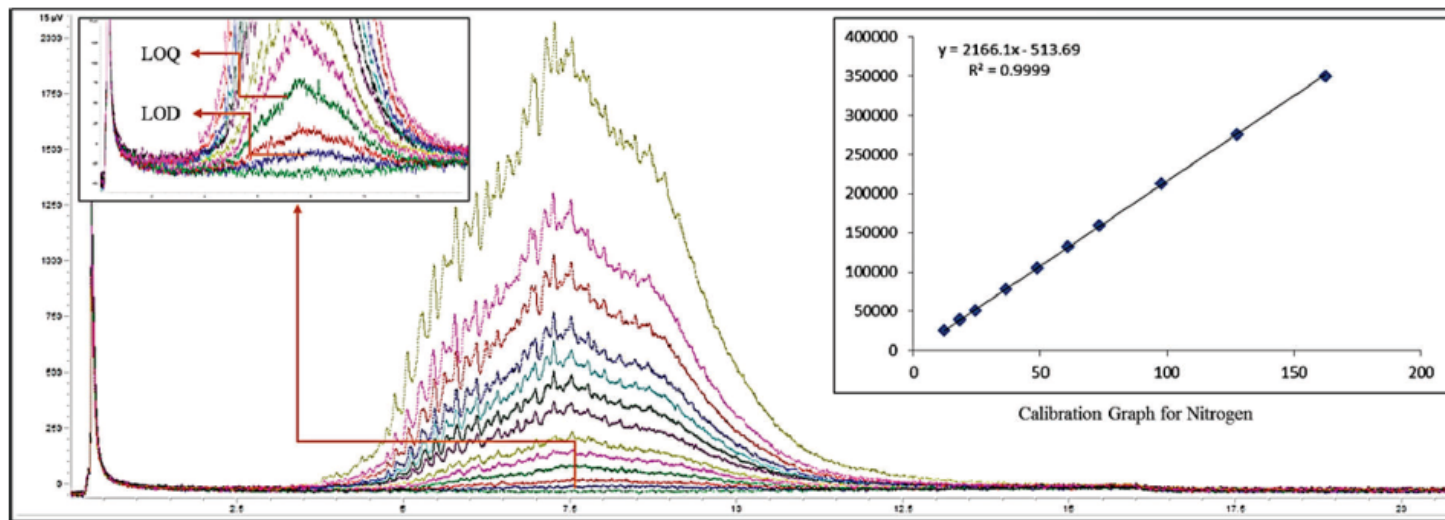
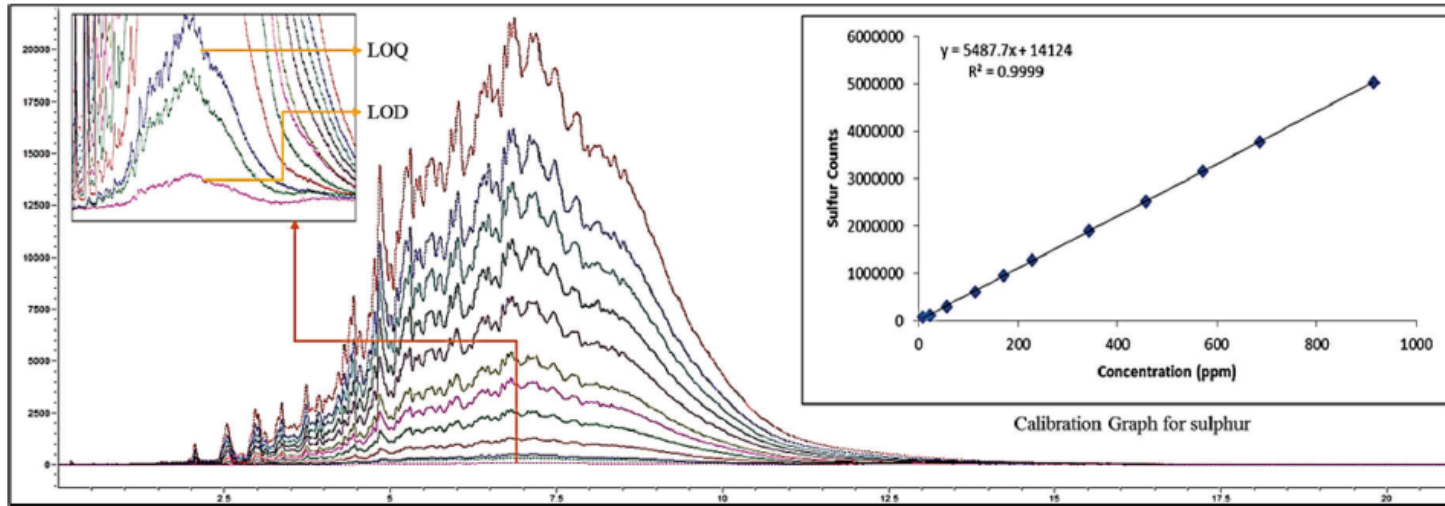
EXAMPLE DATA TYPICAL RESULTS



Recovered Mass (%)	Target (°C)	Limit (°C)	Actual (°C)	Difference (°C)
IBP	223.50	3.20	225.18	1.68
10.00	293.50	7.40	293.04	-0.46
20.00	323.00	8.60	322.34	-0.66
30.00	344.00	6.90	342.27	-1.73
40.00	360.50	7.40	358.77	-1.73
50.00	376.00	7.10	374.34	-1.66
60.00	392.00	6.80	389.72	-2.28
70.00	408.00	6.80	405.37	-2.63
80.00	425.50	7.00	422.93	-2.57



CALIBRATION /LINEARITY



Repeatability

Crude Oil 1	S	N
1	1399	797
2	1373	855
3	1426	885
4	1424	901
5	1428	874
Average	1410	862.4
SD	23.8	40.2
RSD	1.7%	4.7%

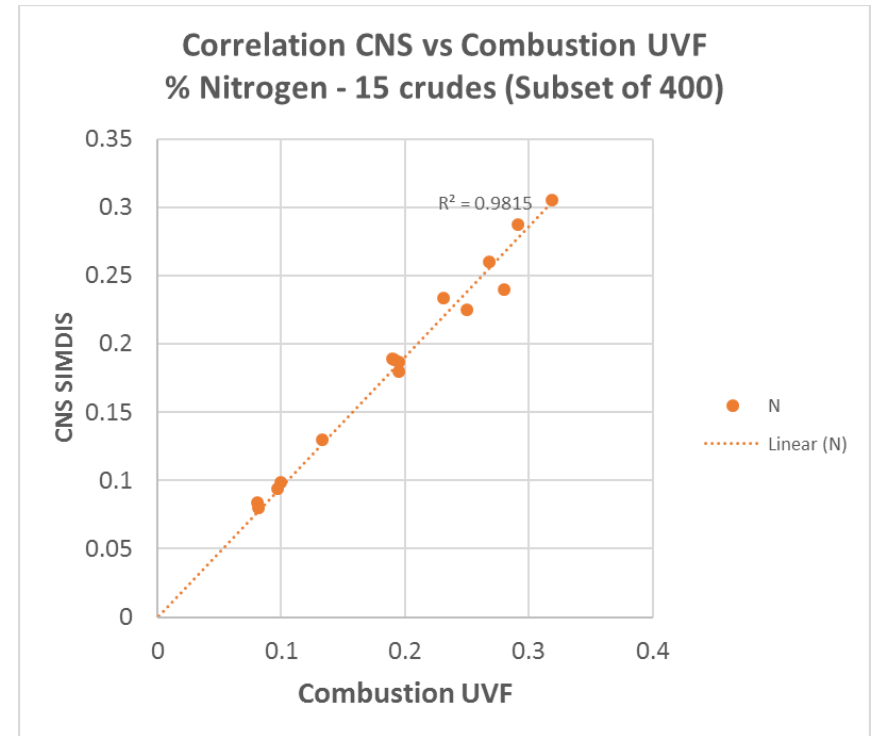
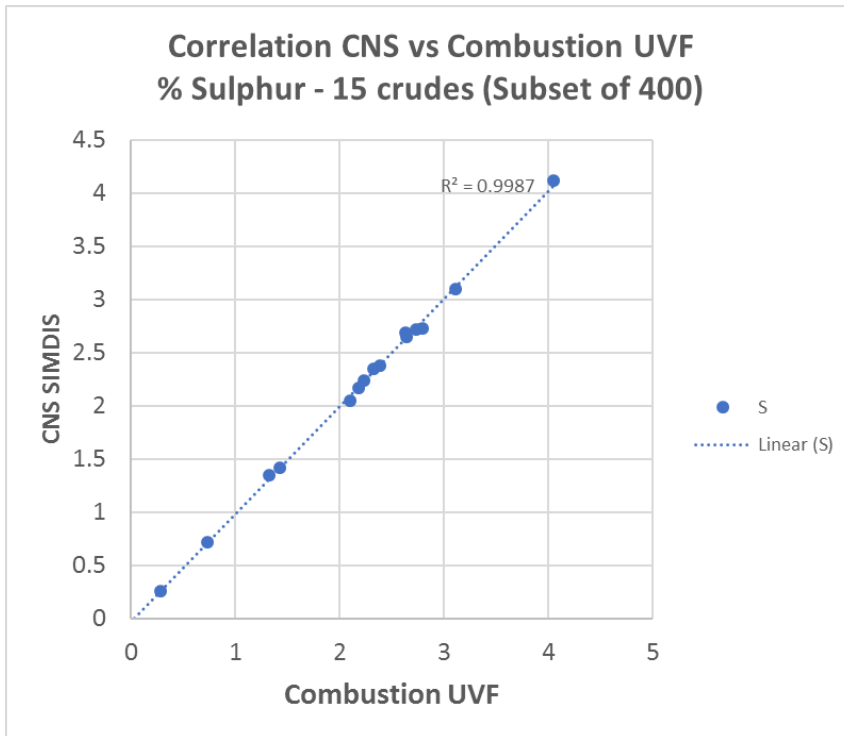
Crude Oil 2	S	N
1	6861	1435
2	6780	1591
3	6701	1416
4	6773	1427
5	6756	1494
Average	6774.2	1472.6
SD	57.6	72.8
RSD	0.8%	4.9%

Reproducibility

Crude Oil 1	S	N
1	1427	847
2	1421	822
3	1493	831
4	1470	788
5	1526	861
Average	1467	830
SD	44	28
RSD	3.0%	3.3%

Crude Oil 2	S	N
1	7070	1548
2	7134	1583
3	7292	1493
4	7332	1544
5	7352	1494
Average	7236	1532
SD	126	39
RSD	1.7%	2.5%

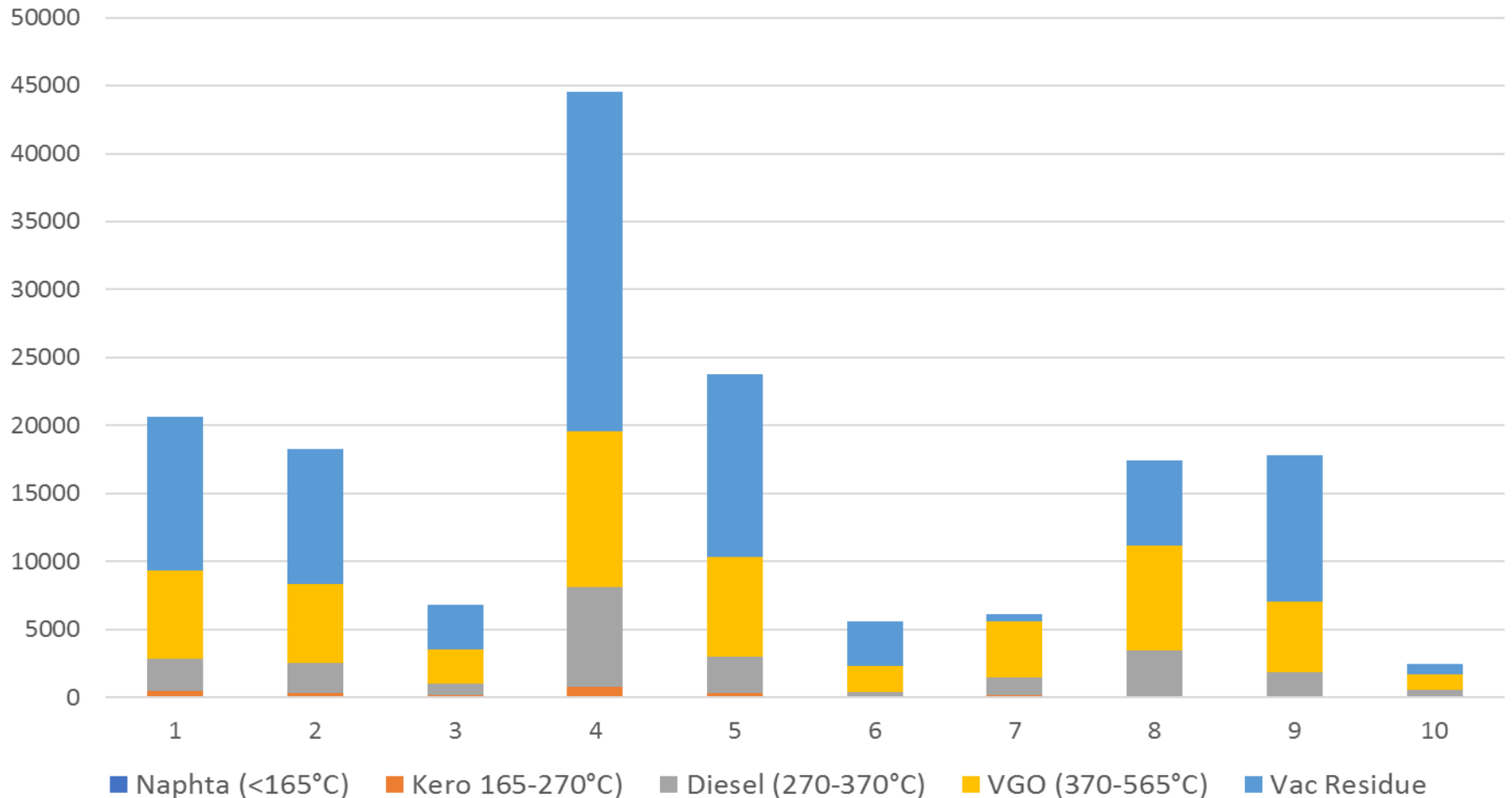
CNS VS COMBUSTION UVF



CNS SIMDIS Compares very well with Combustion UVF.

CRUDE COMPOSITION

Distribution Of Sulphur by BP Fraction by CNS SIMDIS/XRF
10 different Crudes



Efficient
Reliable
Actionable Information
Proven Technology



Turnkey
Easy to use
Fast /
Automated

- Optimize Crude Input Understanding/Blending
- Fast, Low cost, Easy Crude Assay Alternative
- Improve Refinery Profit
- Final Product Quality Control



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