

Fast group type analysis of gasoline and gasoline blend streams
using multi-dimensional gas chromatography


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Reformulyzer[®] M4



ac[®]
ANALYTICAL CONTROLS
by **PAC**

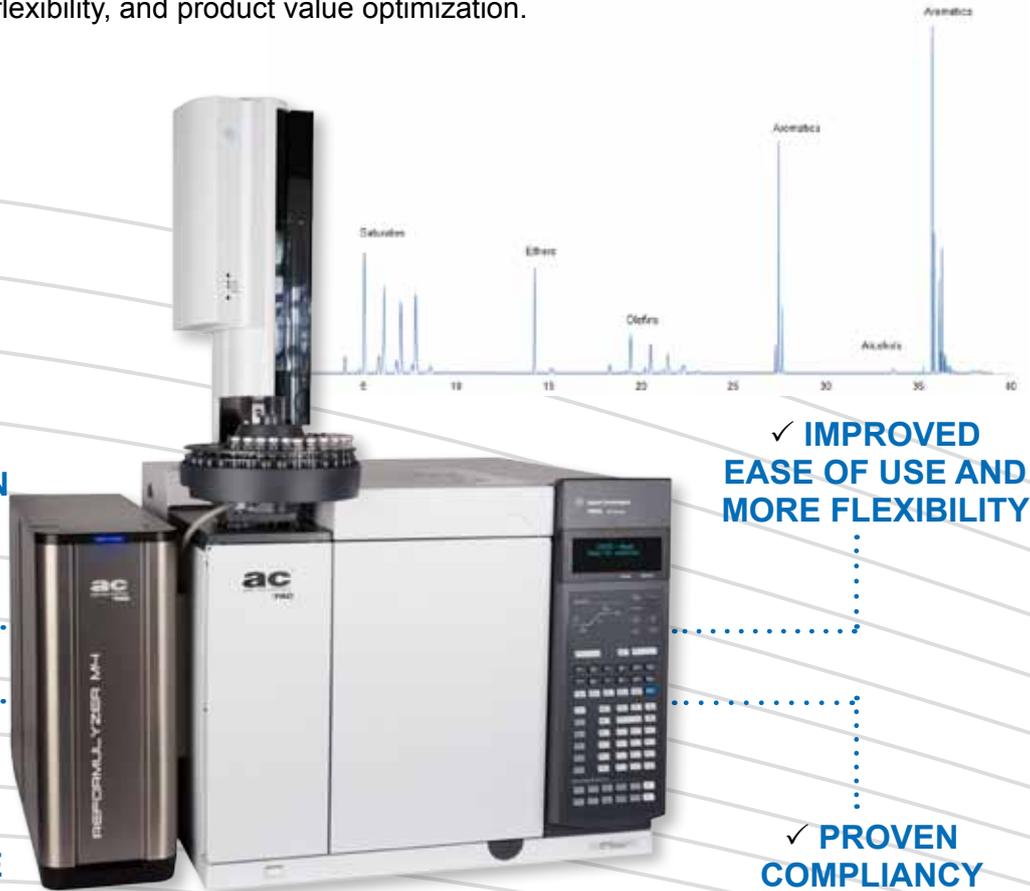
State-of-the-art Solution for Hydrocarbon Group Type Analysis meeting Today's Industry Needs

- Robust and Intelligent Design contributes to Maximum Instrument Uptime
- Increases Profits with Fast and Accurate Analysis
- In Compliance with Worldwide Leading Standards - EN ISO 22854, ASTM D6839

Reformulyzer® M4

STATE-OF-THE-ART SOLUTION FOR GASOLINE GROUP TYPE ANALYSIS IN 39 MINUTES

The Reformulyzer® M4 is the most significant advancement in full group type analysis of gasoline and gasoline blend streams using multi-dimensional gas chromatography. It is the fastest and most flexible analyzer on the market to combine analysis for Paraffins, Olefins, Naphthenes, Oxygenates, and Aromatics in one instrument. The Reformulyzer is the only solution that truly meets today's challenges in terms of time-savings, flexibility, and product value optimization.



✓ **EXCELLENT PERFORMANCE FOR HIGH RETURN ON INVESTMENT**

✓ **IMPROVED EASE OF USE AND MORE FLEXIBILITY**

✓ **MAXIMUM INSTRUMENT UPTIME**

✓ **PROVEN COMPLIANCY**

ROI STUDY

INCREASE REVENUE

The Reformulyzer M4's short analysis time allows to run up to 100% more samples per day and it enables labs to comply to the significant in-tank and in-ship blending time constraints related to key-point analysis.

CASESTUDY - Assumptions:

- 100% system utilization: ~36 samples per day
- Revenue per sample is 200 USD
- 2 QC samples per day

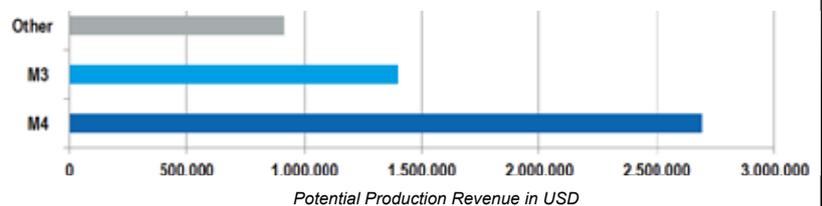
REDUCE OPERATIONAL COST

The Reformulyzer M4's advanced technology significantly reduces maintenance and system down-time. In combination with the improved sample capacity the total operational cost per sample is reduced with 50%.

CASESTUDY - Assumptions:

- 90% system utilization: ~32 samples per day
- Operational cost: spares, consumables, service visits, technician cost, cost on down-time

Fast Analysis increases Revenue with ~90%
Upto 100% increase of daily sample capacity leads to significantly higher revenue potential



Robust design reduces Operational Cost per Sample with ~50%
Advanced technology reduces cost on maintenance



EXCELLENT PERFORMANCE FOR HIGH RETURN ON INVESTMENT

Increases Profits with Fast and Accurate Analysis

- Analysis results in 39 minutes for fast decision-making on product specification
- Robust design reduces operational cost per sample
- Excellent precision and accuracy contribute to higher profitability
- Extensive analysis scope from one single instrument

MAXIMUM INSTRUMENT UPTIME

Robust and Intelligent Design contributes to Maximum Instrument Availability

- Excellent olefin trap robustness for superior trap lifetime
- Nitrogen carrier saves cost and avoids helium supply chain risks
- Diagnostic Tool™ and certified AC quality control samples for system performance verification

IMPROVED EASE OF USE AND MORE FLEXIBILITY

Meets Today's Industry Needs

- Standard olefin method covers entire concentration upto 75%
- User-friendly design allows easy preventive maintenance by operator
- Intuitive Reformulyzer software includes extensive range of methods and pre-programmed modes
- Unique Reformulyzer User Group with interlaboratory comparison contributes to high confidence level and a strong QC program

PROVEN COMPLIANCY

M4 is the worldwide leading standard EN ISO 22854 & ASTM D6839

- Fully compliant with leading standard test methods ASTM D6839, EN ISO 22854, ASTM D5443, IP 566, SH/T 0741, GB/T 28768-2012
- EN 228 includes the EN ISO 22854 (Multidimensional GC, Reformulyzer) as Referee Method for Hydrocarbon content (Olefins & Aromatics), Benzene, Oxygenates and Oxygen content. Reformulyzer replaced EN15553 (FIA) for Hydrocarbon content and EN1601 for Oxygenates

MEETING TODAY'S CHALLENGES

MORE TIME-SAVINGS

- M4 is capillary/micropacked, M3 is partially packed
- M4 is 2x faster in every mode (Winterspec/Gasoline mode is 39 minutes for M4, M3 is 75 minutes)

EASIER TO USE

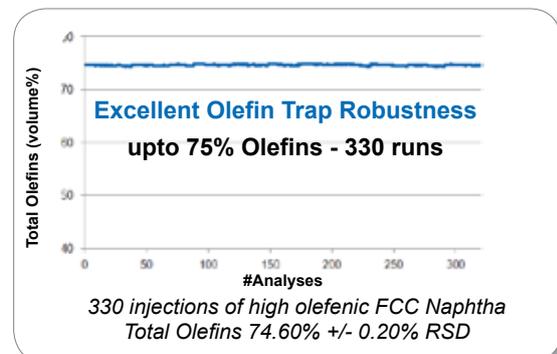
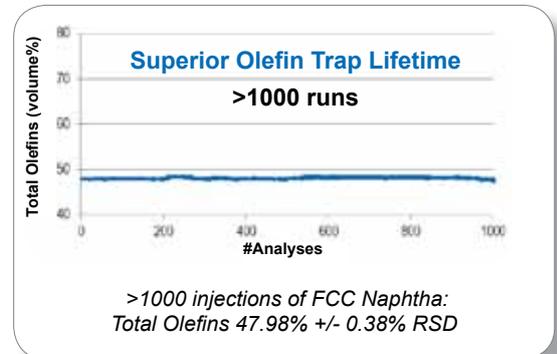
- M4 has dedicated modes to report the same components sets as ASTM D4815, D5580 and D3606
- M4: easy accessible integrated modular electronics, M3: ACI
- M4 has no needle valves and less connections than M3

IMPROVED PERFORMANCE

- M4 has Split inlet, M3 has TPI
- M4 has next generation trap technology with integrated heating
- M4 Olefin Trap Lifetime is significantly improved
- M4 has an extended range for various component groups and can analyze olefins up to 75%. M3 has separate modes for high olefins in combination with dilution
- M4 has new E85 mode, OPIONA and Fast group Type modes

COST-SAVINGS

- M4 has Nitrogen carrier, M3 uses Helium





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SPECIFICATIONS

Ordering Information											
CCG3500A	Reformulyzer M4 110V										
CCG3500B	Reformulyzer M4 200V										
CCG3500C	Reformulyzer M4 230V										
Standard Methods											
EN ISO 22854, ASTM D6839, ASTM D5443, IP566, SH/T 0741											
Analysis Range											
Sample Scope	Sample Range				Concentration Range						
<ul style="list-style-type: none"> Finished gasoline Reformer feed Reformate Straight naphtha FCC naphtha/Olefins Isomerates Alkylate E20+/E85 	<ul style="list-style-type: none"> n-Paraffins C4-C11 Isoparaffins C4-C11 Olefins C4-C11 Naphthenes C5-C11 Aromatics C6-C11 Oxygenates C1-C6, includes: <ul style="list-style-type: none"> Methanol Ethanol n-Propanol i-Propanol t-Butanol i-Butanol 2-Butanol tert-amylalcohol MTBE, ETBE, DIPE, TAME 				<ul style="list-style-type: none"> Total Aromatics 0.03 - >95% Benzene 0.01 - 70% Individual Aromatics 0.01 - 70% Total Olefins 0.03 - 75% Ethanol 0.01 - >95% All Ethers 0.01 - 30% All Alcohols (except Ethanol) 0.01 - 20% 						
Typical modes used											
	PNA	OPNA	PIPNA	PONA	PIONA	PIANO	OPIONA	GASOLINE	FAST GROUP TYPE	E85	
Light Straight Run Naphtha	x		x			x					
Heavy Straight Run Naphtha	x		x			x					
Depentanized Bottom Reformate	x		x			x					
FCC Light/Med/Heavy				x	x						
Visbreaker				x	x						
Alkylate / Isomerate			x								
Gasoline Blend							x	x	x		
Gasoline with Oxygenates		x					x	x			
E85, E20+											x
Analysis Time in Minutes	25	30	30	30	55	40	60	39	15	39	

ABOUT PAC

In our complex industry, you need to balance safety and efficiency, while maximizing profits. Keeping the process running at its peak – with minimal maintenance costs and controlled operation costs – has never been more important. PAC has a long history of focusing on both the laboratory and process environments. By using the same technologies in both environments, we offer tighter data correlation, which translates into better process control. Our solutions include industry-leading brands such as AC Analytical Controls®, Alcor, Antek, Herzog, ISL, Cambridge Viscosity, PSPI, and PetroSpec. We manufacture a wide range of multivariable instruments that provide actionable information and diagnostics capabilities, while requiring little operator intervention. They are easy to use and maintain, and safe to operate. Our commitment to our customers is demonstrated in our global service and support organization. Reliable instruments, accurate data, reduced downtime, around-the-clock service, and a passionate customer commitment.

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