GLOBAL™ ANALYSER SOLUTIONS

G·A·S

- Robust
- Highest uptime: > 99%
- Small footprint

APPLICATION NOTE 204WA0712E

Oxygenates Analysers

EN 13132
ASTM D4815

G·A·S offers custom configured GC analysers for complex separations, data processing and reporting. We have over 35 years of experience in designing and building turnkey analysers for many application fields. Our analysers are designed to meet many accepted standard methods (like GPA, ASTM, UOP, ISO, etc.) in the Oil and Gas industry. The efficient configurations are based on proven GC technology, resulting in robust instruments with an optimal return on investment.

Automobile emission is reduced nowadays by replacing the usual anti-knock components with oxygenated additives like ethers and alcohols. The type and concentration of these various oxygenates are specified and regulated to ensure acceptable commercial gasoline quality. The analysis of these compounds is described in standardised methods ASTM D4815 and EN 13132.

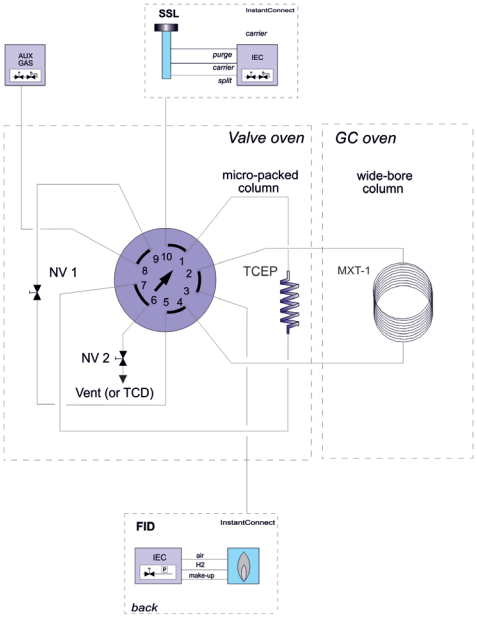
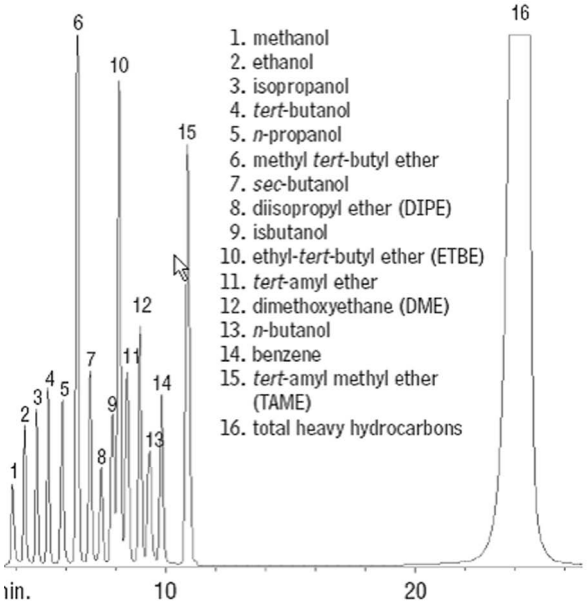


Diagram ASTM D4815 analyser

ASTM D4815

ASTM method D4815 describes the use of 2 separation columns, a 10-port column switching valve, liquid injection using SSL, and FID detection. The first separation column (a highly polar micro-packed TCEP column) retains the oxygenates and the heavy hydrocarbons, while the light hydrocarbons are directed to a vent. The oxygen containing components are subsequently injected onto a non-polar wide-bore column by switching the valve, and separated according to their boiling point order. After eluting TAME (tert-amyl methyl ether), the valve is switched back and the heavy hydrocarbon fraction is backflushed to the detector. Siltek®/Sulfinert® treated tubing is used to prevent adsorption of oxygenates in the sample pathway. The 10-port diaphragm valve is located in an independently heated isothermal valve oven, mounted on top of the GC, avoiding any cold spots and ensuring long valve life time.



Chromatogram ASTM D4815

Robust diaphragm valve

G·A·S diaphragm valve

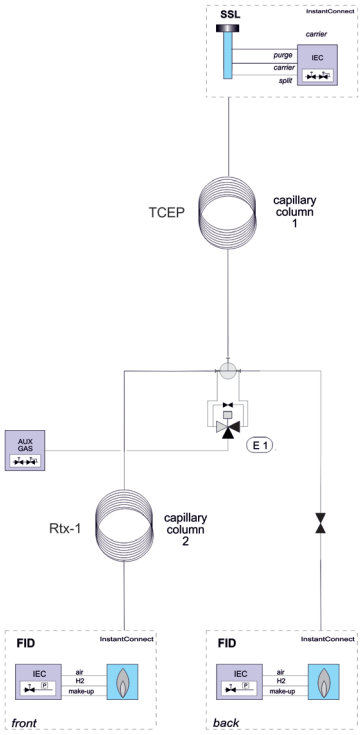
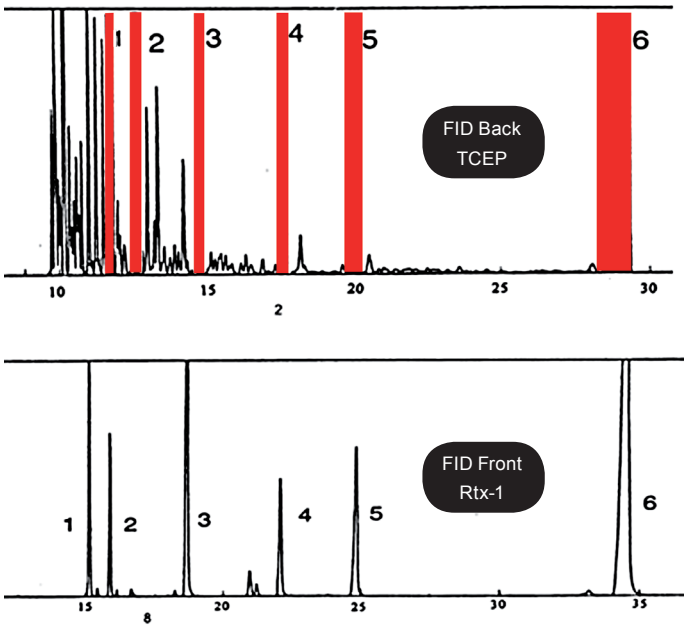


Diagram EN 13132



Chromatograms EN 13132. Red areas: cutting windows containing oxygenates

EN 13132

Standardised method EN13132 is an alternative to ASTM D4815. Two narrow bore capillary columns are used for enhanced selectivity for oxygenated components. In contrast to D4815, multiple fractions are transferred from the first to the second column using a Deans Heartcut configuration, see the chromatogram (red windows). This results in even higher selectivity, since many hydrocarbon components are excluded from entering the second column, and therefore cannot cause false positive results.

Trace 1310 GC with optional AS1310 autosampler for liquid samples

Trace 1300 GC

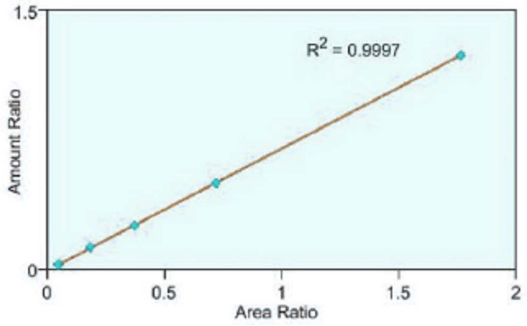
GAS offers ASTM D4815 and EN 13132 on Thermo Trace 1300 GC series. InstantConnect injector and detector modules guarantee high uptime and easy maintenance.

InstantConnect injector and detector technology

Specifications

ASTM D4815

Application:	Analysis of oxygenated components (alcohols and ethers) in liquid gasoline samples
Configuration:	Single channel instrument based on Thermo Trace 1300 GC series with SSL, valve oven and FID
Optional:	Automated liquid sample injector
Sample tubing:	Sulfinert® tubing for inert sample path
Analytes:	see chromatograms
Dynamic range:	Alcohols 0,1-12 mass%; ethers 0,1-20 mass%
Sample requirements:	Liquid sample
Analysis Time:	25 minutes
Minimum Detectability:	> 0.01% for all individual components
Repeatability:	> 2% RSD (n=10)
Data systems	Chromeleon, ChromCard, OpenLab, EZChrom, ChromQuest



Linearity MTBE (D4815)

FID Back	methanol Area	ethanol Area	iso-propanol Area	tert-butanol Area	n-propanol Area	MTBE Area	sec-butanol Area
	63270608.00	116907659.00	132222037.00	188493863.00	154701553.00	96730492.00	163275989.00
	63107282.00	115167155.00	129645627.00	184103697.00	151462471.00	94548119.00	159355677.00
	63488695.00	115711239.00	130257330.00	184986922.00	152205250.00	94785798.00	160027158.00
	61926993.00	113277238.00	127490613.00	181083453.00	149044444.00	93080557.00	156884630.00
	64983316.00	118486400.00	133795125.00	190598015.00	156237140.00	98073652.00	164676943.00
	61566054.00	112398168.00	126432574.00	179676025.00	147946145.00	92020934.00	155665435.00
	62799844.00	114292002.00	128557785.00	182513989.00	150113173.00	94106693.00	157934608.00
	63886931.00	116390923.00	130986661.00	185972432.00	152816665.00	95792708.00	160705901.00
	62407023.00	113729828.00	128163965.00	182257677.00	149680992.00	93924491.00	157716594.00
	63415742.00	115583013.00	130086503.00	184668771.00	151832433.00	94951867.00	159690391.00
Min:	61566054.00	112398168.00	126432574.00	179676025.00	147946145.00	92020934.00	155665435.00
Max:	64983316.00	118486400.00	133795125.00	190598015.00	156237140.00	98073652.00	164676943.00
Mean:	63085248.80	115194362.50	129763822.00	184435484.40	151604026.60	94801531.10	159593332.60
Std Dev:	985627.10	1828076.99	2221860.17	3326686.29	2556404.72	1746190.60	2787590.17
%RSD:	1.56	1.59	1.71	1.80	1.69	1.84	1.75

iso-butanol Area	ETBE Area	DME Area	TAA Area	n-butanol Area	benzene Area	TAM Are
187948753.00	104301002.00	213134173.00	77548694.00	172727124.00	196602543.00	196464683.0
183245406.00	101649670.00	207584855.00	75587109.00	168155405.00	192498522.00	191066018.0
183779397.00	101972250.00	208438393.00	75901233.00	168617375.00	193279798.00	191848936.0
180088586.00	100546119.00	201269247.00	74394422.00	165526128.00	189573064.00	188548990.0
188889541.00	106054778.00	216368082.00	78371451.00	173243074.00	199106415.00	199040250.0
178251549.00	100002235.00	200901944.00	73738215.00	164289728.00	187670455.00	186426030.0
181006617.00	101787268.00	205269188.00	75039952.00	166483876.00	191553999.00	190112580.0
183856608.00	103719848.00	208635343.00	76471452.00	169071195.00	195033347.00	193549997.0
180762820.00	101849101.00	204971301.00	74951308.00	166232712.00	190865845.00	190199882.0
183379319.00	102309018.00	206613902.00	75894519.00	168083444.00	193591466.00	192092415.0
178251549.00	100002235.00	200901944.00	73738215.00	164289728.00	187670455.00	186426030.0
188889541.00	106054778.00	216368082.00	78371451.00	173243074.00	199106415.00	199040250.0
183120859.60	102419128.90	207318642.80	75789835.50	168243006.10	192977545.40	191934978.1
3342965.94	1805204.68	4792903.33	1402742.08	2908088.92	3364341.67	3689983.4
1.83	1.76	2.31	1.85	1.73	1.74	1.9

Repeatability D4815

EN 13132

Application:	Analysis of oxygenated components (alcohols and ethers) in liquid gasoline samples
Configuration:	Single channel instrument based on Thermo Trace 1300 GC series with SSL and double FID
Optional:	Automated liquid sample injector
Analytes:	see chromatograms
Sample requirements:	Liquid sample
Analysis Time:	35 minutes
Minimum Detectability:	> 0.01% for all individual components
Repeatability:	> 2% RSD (n=10)
Data systems	Chromeleon, ChromCard, OpenLab, EZChrom, ChromQuest

Trace 1310 GC with auxiliary oven

Optional:
Combining methods like ASTM D4815, D3606, D5580 in a single instrument. Investments are reduced and bench space is saved in this way.

GLOBAL™ ANALYSER SOLUTIONS G·A·S

G·A·S is an INTERSCIENCE company

G·A·S is the preferred solution partner of Thermo SCIENTIFIC

P.O. Box 2148, 4800 CC Breda, The Netherlands
T: +31 (0)76 5411800 F: +31 (0)842 206757 info@gas-site.com www.gas-site.com