



# **Oxygenates analyser**

- ASTM D4815, EN 13132
- optional D5580 / D3606 integration
- highest uptime

#### AN 204WA0520F

GAS offers custom configured GC analysers for many application fields for over 40 years. GAS analysers are designed to meet many standardised methods from GPA, ASTM, UOP, ISO, EN and others. The efficient configurations are based on proven GC technology, resulting in robust instruments with an optimal return on investment. Oxygenated components like ethers and alcohols are used as additives to reduce engine knocking and increase fuel's octane rating. Anti-knock agents 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.

#### **ASTM D4815**

ASTM method D4815 describes the use of 2 separation columns, 10port switching valve, liquid sample injection and FID detection (figure 1). The first separation column (a highly polar micro-packed TCEP column) retains oxygenates and heavy hydrocarbons, while light hydrocarbons are vented. Then the oxygen containing components are 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 (see figure 2). 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, avoiding any cold spots and ensuring long valve life time.



Figure 1. Diagram ASTM D4815 analyser



Figure 2. Chromatogram ASTM D4815



Figure 3. Trace GC1300 with autosampler for liquid samples

#### EN 13132

Standardised method EN13132 is an alternative to ASTM D4815. Two narrow bore capillary columns are used for enhanced selectivity for oxygenated components (figure 5). In contrast to D4815, multiple heartcut fractions are transferred from the first column (TCEP) to the second column (Rtx-1) using a Deans Heartcut switch configuration (see figure 4; each green windows represents a heartcut). The result is a highly selective separation, since many hydrocarbon components are excluded from entering the second column, offering reliable component identification.

#### 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 (figure 3, 6).



Figure 4. Chromatograms EN 13132. Green windows: multiple heartcut fractions containing oxygenated components.



Figure 5. Diagram EN 13132



Figure 6. InstantConnect injector and detector technology



Figure 7. Trace GC1300 with XXL valve oven and 4 detectors

### Combine methods: highly efficient!

Standardised methods can efficiently be combined in a single instrument, taking full advantage of GC1300's potential (figure 7). Integrating for instance ASTM D4815, D3606 and D5580 offers small footprint and low purchase costs, providing small bench space requirement and short return on investment.

# **Specification**

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				
	Integrate 1-4 standardised methods in a single instrument (like ASTM D4815, D3606 and D5580)				
Sample tubing:	Sulfinert <sup>®</sup> tubing for inert sample path				
Analytes:	see figure 2				
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, OpenLab				

FID Back	methanol	ethano	iso-propanol	tert-butanol	n-propanol	MTBE	sec-butanol	DIPE
	Area	Area						
	63270608.00	116907659.00	132222037.00	188493863.00	154701553.00	96730492.00	163275989.00	103948218
	63107282.00	115167155.00	129645627.00	184103697.00	151462471.00	94548119.00	159355677.00	101323061
	63488695.00	115711239.00	130257330.00	184986922.00	152205250.00	94785798.00	160027158.00	101459211
	61926993.00	113277238.00	127490613.00	181083453.00	149044444.00	93080557.00	156884630.00	99751325.00
	64983316.00	118486400.00	133795125.00	190598015.00	156237140.00	98073652.00	164676943.00	105471776
	61566054.00	112398168.00	126432574.00	179676025.00	147946145.00	92020934.00	155665435.00	98601285.00
	62799844.00	114292002.00	128557785.00	182513989.00	150113173.00	94106693.00	157934608.00	100944516
	63886931.00	116390923.00	130986661.00	185972432.00	152816665.00	95792708.00	160705901.00	102649199
	62407023.00	113729828.00	128163965.00	182257677.00	149680992.00	93924491.00	157716594.00	100864102
	63415742.00	115583013.00	130086503.00	184668771.00	151832433.00	94951867.00	159690391.00	101682148
Min:	61566054.00	112398168.00	126432574.00	179676025.00	147946145.00	92020934.00	155665435.00	98601285.00
Max	64983316.00	118486400.00	133795125.00	190598015.00	156237140.00	98073652.00	164676943.00	105471776
Mean:	63085248.80	115194362.50	129763822.00	184435484.40	151604026.60	94801531.10	159593332.60	101669484
Std Dev:	985627.10	1828076.99	2221860.17	3326686.29	2556404.72	1746190.60	2787590.17	1973200.34
%RSD:	1.56	1.59	1.71	1.80	1.69	1.84	1.75	1.94
	iso-butanol	ETBE	DIME	TAA	n-butanol	benzene	TAM	E
	Area	Area	Area	Area	Area	Area	Are	а
	187948753.00	104301002.00	213134173.00	77548694.00	172727124.00	196602543.00	196464683.00	)
	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	191848936.00	)
	180088586.00	100546119.00	201269247.00	74394422.00	165526128.00	189573064.00	188548990.00	)
	188889541.00	106054778.00	216368082.00	78371451.00	173243074.00	199106415.00	199040250.00	)
	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	190112580.00	)
	183856608.00	103719848.00	208635343.00	76471452.00	169071195.00	195033347.00	193549997.00	)
	180762820.00	101849101.00	204971301.00	74951308.00	166232712.00	190865845.00	190199882.00	)
	183379319.00	102309018.00	206613902.00	75894519.00	168083444.00	193591466.00	192092415.00	)
	178251549.00	100002235.00	200901944.00	73738215.00	164289728.00	187670455.00	186426030.00	0
	188889541.00	106054778.00	216368082.00	78371451.00	173243074.00	199106415.00	199040250.00	0
	183120859.60	102419128.90	207318642.80	75789835.50	168243006.10	192977545.40	191934978.10	0
	3342965.94	1805204.68	4792903.33	1402742.08	2908088.92	3364341.67	3689983.4	5
	1.83	1.76	2.31	1.85	1.73	1.74	1.9	2



Figure 8. Repeatability D4815

## EN 13132

Analysis of oxygenated components (alcohols and ethers) in liquid gasoline samples			
Single channel instrument based on Thermo Trace 1300 GC series with SSL and double FID			
Automated liquid sample injector			
Organic oxygenates components, see EN 13132			
Liquid sample			
35 minutes			
> 0.01% for all individual components			
> 2% RSD (n=10)			
Chromeleon, OpenLab			



GAS is an Interscience company

#### WWW.GASSITE.COM