NEW ENVIRONMENTAL METROLOGY ON VOC OZONE PRECURSORS IN AMBIENT AIR

Franck AMIET, Michel ROBERT
R&D departement, Chromatotec Company, 33240 Saint Antoine , France

airmOzone Cabinet : 33 U

AirmoCAL 4U: XXX922

airmoVOC C6-C12 5U : A21022 or supervisor

1U rack with mouse and key board

airmoVOC C6C12 or Chroma S 4U (option)

airmoVOC C2-C6 4U: A11000

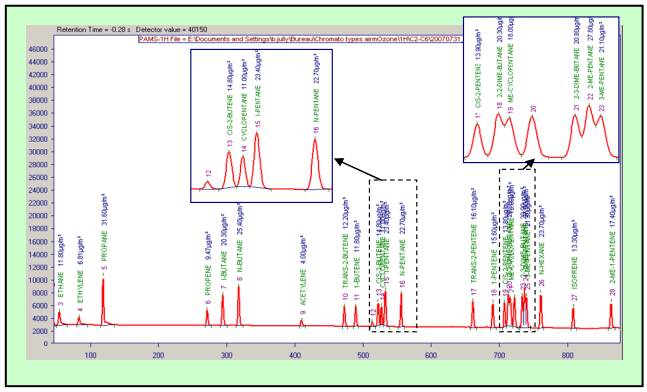
Hydroxychrom (H_2 generator) 3U: XXX916

airmoPURE (zero air generator) XXX031 and 2 sampling pumps XXX901

Abstract: *Ozone concentration, due to its constant increases from years, is more and more monitored in ambient air. Several international organizations as European community, US EPA, Korean EPA… have issued Directives and Programs that give lists of compounds known as ozone precursors (NOx and VOC) to be detected and monitored. For VOC measurement in the ambient air, Chromatotec finalized a range of industrial analyzers by gas chromatography which are able to realize measurements on-line and non-stops. They are capable of analyzing more than 80 VOC compounds precursors of ozone in the ppb/ppt range. For calibration and calculation of compound concentration, are used a Base Sensitivity determined by a standard benzene or butane and relative response factors predetermined. These devices answer high requirements of repeatability, linearity, interference, validated by European certifications TUV, CNR, (current) MCERTS based on the standard EN 14662-3 on benzene measurement. Thanks to the automated airmOzone system, measurement campaign can be performed during several months. As example, a AASQA measurement campaign in the vicinity of a large city, on 6 months period, shows typical emission profiles observed with road traffic, exploiting results on typical compounds as acetylene, ethyl benzene or xylenes.*

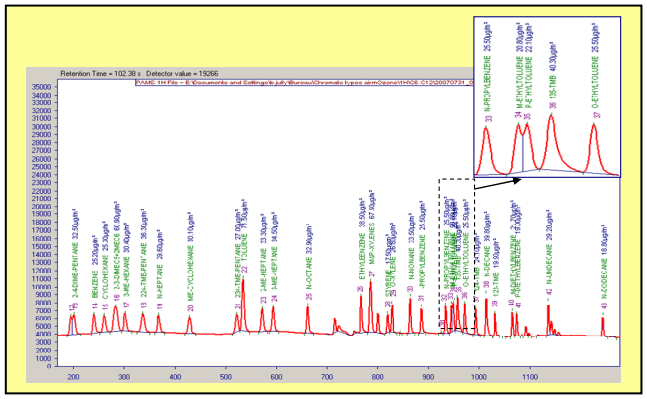
Substance Table (including RT and RF) and Chromatogram referring to 56 VOC PAMS list for C2–C6 instrument (24 compounds)

#	Name	Rt Min	Rt Max	Alarm Min	Alarm Max	Factor
1	ETHANE	51.00	61.00	0.00	9999.00	1.00
2	ETHYLENE	80.00	90.00	0.00	9999.00	0.96
3	PROPANE	115.00	125.00	0.00	9999.00	1.00
4	PROPENE	268.00	278.00	0.00	9999.00	0.96
5	I-BUTANE	290.00	300.00	0.00	9999.00	1.00
6	N-BUTANE	314.00	324.00	0.00	9999.00	1.00
7	ACETYLENE	405.00	415.00	0.00	9999.00	0.96
8	TRANS-2-BUTENE	465.00	475.00	0.00	9999.00	0.96
9	1-BUTENE	483.00	493.00	0.00	9999.00	0.96
10	CIS-2-BUTENE	515.00	525.00	0.00	9999.00	0.96
11	CYCLOPENTANE	523.00	533.00	0.00	9999.00	1.00
12	I-PENTANE	530.00	540.00	0.00	9999.00	1.00
13	N-PENTANE	550.00	560.00	0.00	9999.00	1.00
14	TRANS-2-PENTENE	653.00	663.00	0.00	9999.00	0.96
15	1-PENTENE	683.00	693.00	0.00	9999.00	0.96
16	CIS-2-PENTENE	700.00	709.00	0.00	9999.00	0.96
17	2-2-DIME-BUTANE	709.00	714.00	0.00	9999.00	1.00
18	ME-CYCLOPENTANE	714.00	718.00	0.00	9999.00	1.00
19	2-3-DIME-BUTANE	728.00	734.00	0.00	9999.00	1.00
20	2-ME-PENTANE	734.00	738.00	0.00	9999.00	1.00
21	3-ME-PENTANE	736.00	748.00	0.00	9999.00	1.00
22	N-HEXANE	755.00	765.00	0.00	9999.00	1.00
23	ISOPRENE	803.00	813.00	0.00	9999.00	1.00
24	2-ME-1-PENTENE	858.00	868.00	0.00	9999.00	1.00

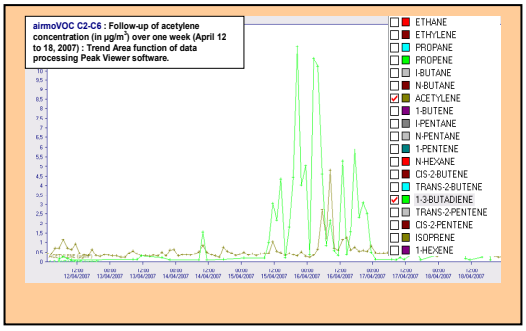


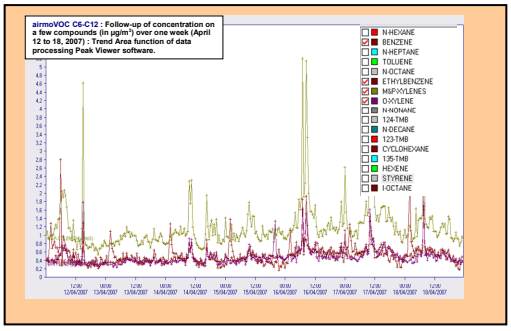
Substance Table (including RT and RF) and Chromatogram referring to 56 VOC PAMS list for C6–C12 instrument (31 compounds)

#	Name	Rt Min	Rt Max	Alarm Min	Alarm Max	Factor
1	2-4-DIME-PENTANE	196.00	205.00	0.00	9999.00	1.06
2	BENZENE	238.00	248.00	0.00	9999.00	1.00
3	CYCLOHEXANE	255.00	265.00	0.00	9999.00	1.00
4	2-3-DIMEC5+2MEC6	280.00	285.00	0.00	9999.00	1.10
5	3-ME-HEXANE	297.00	307.00	0.00	9999.00	1.10
6	224-TME-PENTANE	333.00	343.00	0.00	9999.00	1.10
7	N-HEPTANE	363.00	373.00	0.00	9999.00	1.10
8	ME-CYCLOHEXANE	425.00	430.00	0.00	9999.00	1.10
9	234-TME-PENTANE	520.00	530.00	0.00	9999.00	1.10
10	TOLUENE	530.00	540.00	0.00	9999.00	1.05
11	2-ME-HEPTANE	572.00	582.00	0.00	9999.00	1.10
12	3-ME-HEPTANE	593.00	603.00	0.00	9999.00	1.10
13	N-OCTANE	660.00	670.00	0.00	9999.00	1.10
14	ETHYLBENZENE	767.00	775.00	0.00	9999.00	1.10
15	M&P-XYLENES	785.00	793.00	0.00	9999.00	1.10
16	STYRENE	817.00	826.00	0.00	9999.00	1.10
17	O-XYLENE	826.00	836.00	0.00	9999.00	1.10
18	N-NONANE	860.00	870.00	0.00	9999.00	1.10
19	I-PROPYLBENZENE	884.00	894.00	0.00	9999.00	1.09
20	N-PROPYLBENZENE	930.00	940.00	0.00	9999.00	1.08
21	M-ETHYLTOLUENE	940.00	947.00	0.00	9999.00	1.04
22	P-ETHYLTOLUENE	947.00	953.00	0.00	9999.00	1.04
23	135-TMB	955.00	965.00	0.00	9999.00	1.14
24	O-ETHYLTOLUENE	970.00	980.00	0.00	9999.00	1.06
25	124-TMB	990.00	1000.00	0.00	9999.00	1.15
26	N-DECANE	1010.00	1020.00	0.00	9999.00	1.10
27	123-TMB	1030.00	1040.00	0.00	9999.00	1.14
28	M-DIETHYLBENZENE	1060.00	1070.00	0.00	9999.00	1.17
29	P-DIETHYLBENZENE	1070.00	1080.00	0.00	9999.00	1.18
30	N-UNDECANE	1130.00	1140.00	0.00	9999.00	1.20
31	N-DODECANE	1240.00	1250.00	0.00	9999.00	1.20



AASQA measurement campaign. Follow up of Acetylene, 1,3 butadiene (C2-C6 instrument) and BTEX (C6-C12 instrument) shows emission profile by road traffic.





Conclusion : Thanks to performance specificities (linearity, repeatability, no interference, no memory effect) and running specificities (data traceability, autonomy), the airmOzone cabinet offers a really innovative system for the analysis of the COV in situ. AirmOzone is able to achieve measurements campaign in order to monitor during months for example road traffic at the vicinity of large cities or fence line of petrochemical industries.