VOC Analyser

using CompactGC$^{4.0}$ and thermal desorption pre-concentrator

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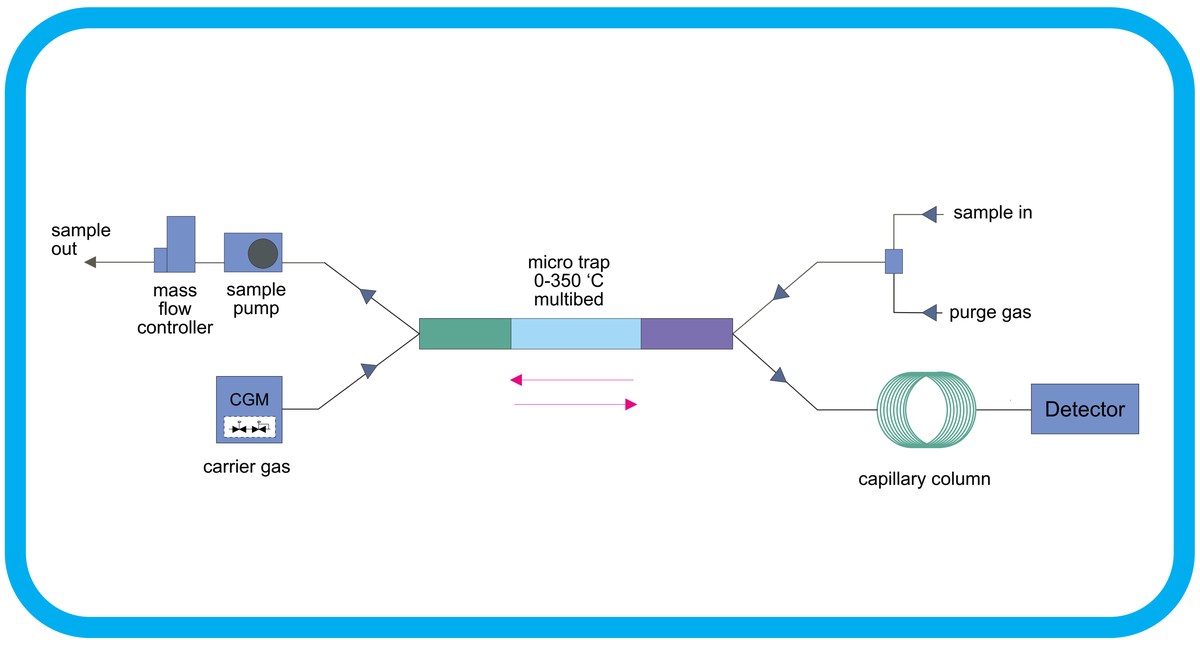
Volatile Organic Compounds (VOCs) are present in virtually every atmosphere. Many are toxic and subject to strict regulatory limits, while others, even at very low concentrations, may cause nuisance or irritation due to their low odour threshold levels. Thermal desorption (TD) is the technique of choice for air monitoring in applications such as indoor and outdoor environments, workplaces, vehicle interiors, and breath analysis. It is an invaluable tool when sample preconcentration is required to achieve the very low detection limits demanded by modern analytical standards.



The GAS CompactGC$^{4.0}$ concept:

- 19" gas analyser
- Robust diaphragm valves
- 4 parallel analytical channels
- TCD, FID, PFPD, PDD, MS, LUMA
- Cycle time 10 sec – 2 minutes
- Exchangeable columns
- TD Pre-Concentrator option
- Many applications available

PRINCIPLE

At the heart of the CompactGC$^{4.0}$ -TD is an integrated, Peltier-cooled adsorption trap that delivers highly efficient pre-concentration of target compounds. A precisely controlled sample volume - from 25 mL up to 1 litre - is introduced using an internal pump and mass flow controller, ensuring accuracy and repeatability. After sampling, the trap is automatically purged with inert gas to remove air and moisture, protecting the adsorbent and guaranteeing optimal chromatographic performance. The trap is then rapidly heated (up to 100 °C per second), instantly releasing the concentrated analytes and transferring them to the analytical column for fast, reliable analysis.

MULTI-BED

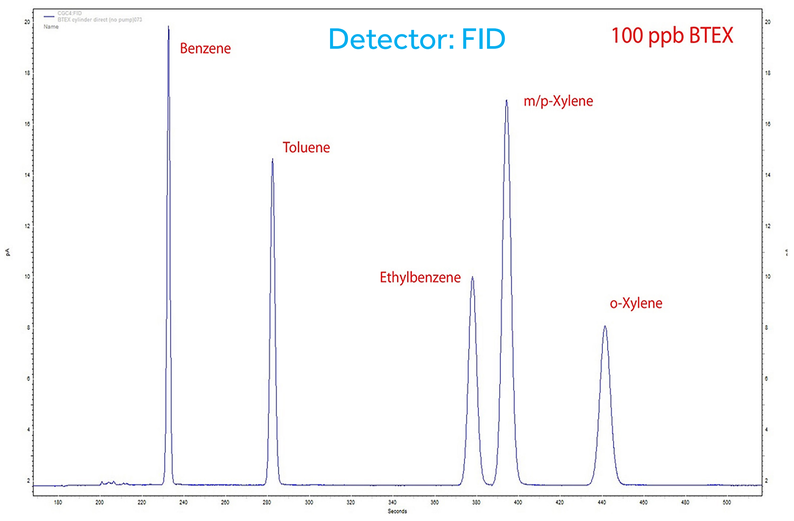
The CompactGC$^{4.0}$ -TD supports advanced multi-bed trap configurations, combining two or three adsorbents with increasing adsorption strength. This enables efficient trapping of compounds across a wide boiling point range in a single run. Typical trap temperatures range from 0 to 350 °C. Rapid heating ensures a very narrow injection band - essential for the fast GC analysis that defines the CompactGC$^{4.0}$ platform. During thermal desorption, the flow direction is automatically reversed relative to sampling, maximizing desorption efficiency and analytical performance.

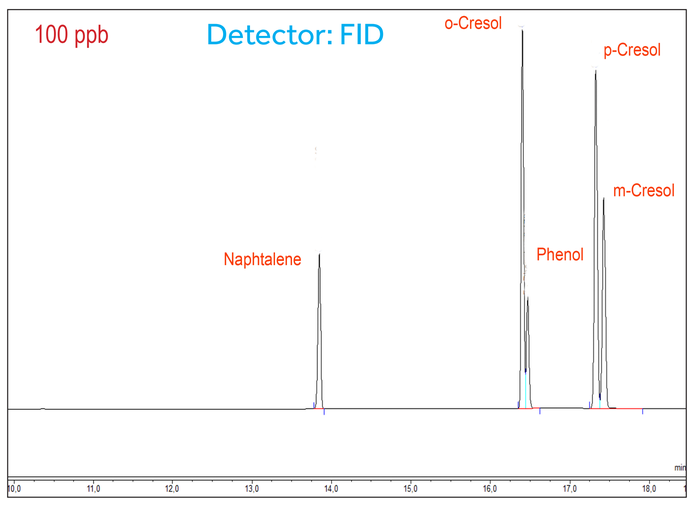
ELECTRICALLY COOLED

Fully electrical cooling eliminates the need for consumables such as CO_2 or liquid nitrogen. This allows completely unattended operation, reduces operating costs, and simplifies installation - delivering true plug-and-play convenience. A general-purpose trap covers a wide range of components, while specific (multi-bed) adsorbent traps are available for dedicated applications. The matrix components and water are selectively purged to reduce interference. The traps are easily exchangeable by the user.

easy exchangeable muti-bed traps

APPLICATIONS



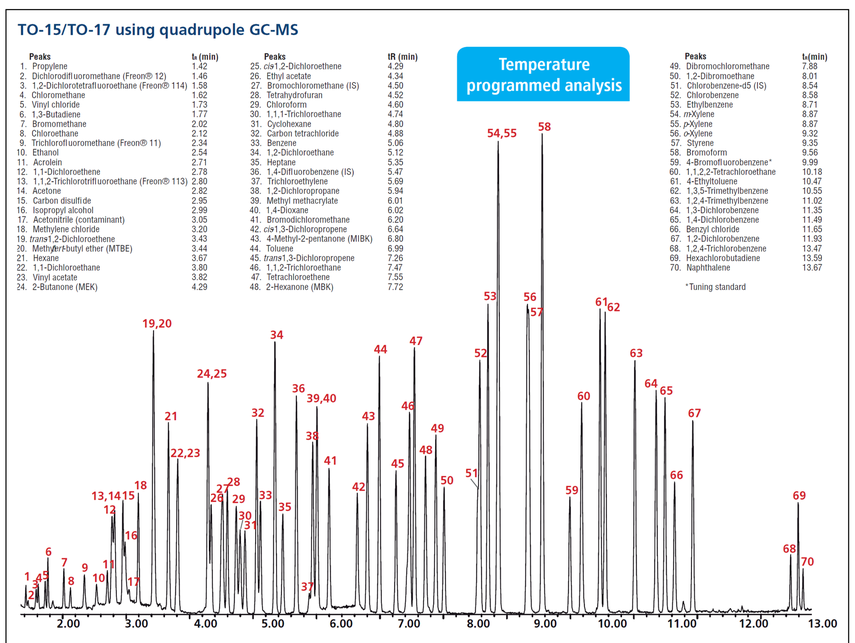


TO-15/TO-17 using quadrupole GC-MS

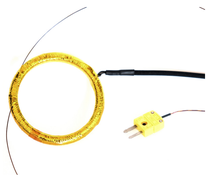
Peaks	tR (min)
1. Propylene	1.42
2. Dichlorodifluoromethane (Freon® 12)	1.46
3. 1,2-Dichlorotetrafluoroethane (Freon® 114)	1.58
4. Chloromethane	1.62
5. Vinyl chloride	1.73
6. 1,3-Butadiene	1.77
7. Bromomethane	2.02
8. Chloroethane	2.12
9. Trichlorofluoromethane (Freon® 11)	2.34
10. Ethanol	2.54
11. Acrolein	2.71
12. 1,1-Dichloroethene	2.78
13. 1,1,2-Trichlorotrifluoroethane (Freon® 113)	2.80
14. Acetone	2.82
15. Carbon disulfide	2.95
16. Isopropyl alcohol	2.99
17. Acetonitrile (contaminant)	3.05
18. Methylene chloride	3.20
19. *trans*1,2-Dichloroethene	3.43
20. Methyl*tert*-butyl ether (MTBE)	3.44
21. Hexane	3.67
22. 1,1-Dichloroethane	3.80
23. Vinyl acetate	3.82
24. 2-Butanone (MEK)	4.29
25. *cis*1,2-Dichloroethene	4.29
26. Ethyl acetate	4.34
27. Bromochloromethane (IS)	4.50
28. Tetrahydrofuran	4.52
29. Chloroform	4.60
30. 1,1,1-Trichloroethane	4.74
31. Cyclohexane	4.80
32. Carbon tetrachloride	4.88
33. Benzene	5.06
34. 1,2-Dichloroethane	5.12
35. Heptane	5.35
36. 1,4-Diffuorobenzene (IS)	5.47
37. Trichloroethylene	5.69
38. 1,2-Dichloropropane	5.94
39. Methyl methacrylate	6.01
40. 1,4-Dioxane	6.02
41. Bromodichloromethane	6.20
42. *cis*1,3-Dichloropropene	6.64
43. 4-Methyl-2-pentanone (MIBK)	6.80
44. Toluene	6.99
45. *trans*1,3-Dichloropropene	7.26
46. 1,1,2-Trichloroethane	7.47
47. Tetrachloroethene	7.55
48. 2-Hexanone (MBK)	7.72
49. Dibromochloromethane	7.88
50. 1,2-Dibromoethane	8.01
51. Chlorobenzene-d5 (IS)	8.54
52. Chlorobenzene	8.58
53. Ethylbenzene	8.71
54. *m*Xylene	8.87
55. *p*Xylene	8.87
56. *o*-Xylene	9.32
57. Styrene	9.35
58. Bromoform	9.56
59. 4-Bromofluorobenzene*	9.99
60. 1,1,2,2-Tetrachloroethane	10.18
61. 4-Ethyltoluene	10.47
62. 1,3,5-Trimethylbenzene	10.55
63. 1,2,4-Trimethylbenzene	11.02
64. 1,3-Dichlorobenzene	11.35
65. 1,4-Dichlorobenzene	11.49
66. Benzyl chloride	11.65
67. 1,2-Dichlorobenzene	11.93
68. 1,2,4-Trichlorobenzene	13.47
69. Hexachlorobutadiene	13.59
70. Naphthalene	13.67

*Tuning standard

Temperature programmed analysis



Detector: Mass spectrometer (external)



temperature programmable column

robust diaphragm valve

	Area pA*min						
FID_Ch1							
	Benzene	Toluene	Ethylbeaze	p-Xylene	m-Xylene	Pyridine	o-Xylene
	0.469	0.538	0.619	0.620	0.619	0.300	0.651
	0.463	0.537	0.618	0.618	0.619	0.296	0.652
	0.470	0.538	0.620	0.622	0.621	0.299	0.654
	0.463	0.538	0.619	0.620	0.619	0.303	0.649
	0.470	0.539	0.620	0.622	0.620	0.297	0.656
	0.471	0.540	0.620	0.622	0.620	0.298	0.659
	0.470	0.539	0.621	0.623	0.622	0.297	0.659
	0.470	0.538	0.621	0.622	0.621	0.303	0.653
	0.469	0.538	0.619	0.621	0.620	0.303	0.650
	0.471	*0.540*	*0.621*	*0.623*	*0.621*	*0.299*	*0.656*
	0.4709	0.5396	0.6213	0.6227	0.6223	0.3030	0.6586
	0.4695	0.5386	0.6197	0.6213	0.6202	0.2994	0.6538
	0.4677	0.5369	0.6179	0.6193	0.6186	0.2960	0.6497
%RSD	0.0011	0.0009	0.0011	0.0013	0.0012	0.0027	0.0034
	0.23%	0.17%	0.18%	0.21%	0.19%	0.89%	0.52%

Repeatability < 1% RSD

COMPACT INSTRUMENT

All components, including the collection trap and mass flow controller, are integrated inside a standard 19" enclosure, resulting in a compact design. CompactGC$^{4.0}$ is based on proven GC technology, using standard columns and diaphragm valves for high reliability and low operational costs. Sulfinert® tubing ensures an inert sample path.

AVAILABLE APPLICATIONS

Thermal Desorption covers application fields such as environmental monitoring, material emissions, defense, forensic, and food analysis. Typical applications include BTEX, TO-14/15/17, fermentation headspace analysis, low level sulfur compounds, and more.

PROGRAMMABLE COLUMN

For components with a wide boiling range, temperature programming is applied. A low-mass nickel wire-wrapped column enables heating rates up to 500 °C/min, resulting in short analysis times.

ABOUT GAS

Global Analyser Solutions provides GC & GC-MS solutions for Energy, Refinery, Chemical and Environmental markets. Our analysers address a broad spectrum of measuring requirements with high precision and reliability. Please reach out for more information on our website.

www.gas-site.com