REFERENCE GUIDE

Hydrocarbons, halogenated: NIOSH method 1003

Sampling on a charcoal sorbent tube and gas chromatography of 17 halogenated hydrocarbons, restated from NIOSH NMAM method 1003, Issue 3 (15 March 2003). Source: CDC/NIOSH. Not an official version; NIOSH does not endorse Analyt-MTC or its products.

AMTC-RF-0010

About this guide

Note

Source: CDC/NIOSH. This guide restates *Hydrocarbons, halogenated*, method 1003 of the NIOSH Manual of Analytical Methods (NMAM), Fourth Edition, Issue 3 of 15 March 2003 (Issue 1: 15 February 1984). It is not an official version of the method. NIOSH does not endorse Analyt-MTC or its products. Where this guide and the original differ, the original applies: www.cdc.gov/niosh/docs/2003-154/pdfs/1003.pdf.

The method collects 17 halogenated hydrocarbons from workplace air on a charcoal sorbent tube and measures them by gas chromatography with a flame ionization detector. This guide keeps every step, value and limit of the original; only the wording and the layout are Analyt-MTC's. The original's step numbers are kept, so a step can be quoted by its number in either document.

Method summary (p. 5) gives the sampling and measurement conditions at a glance. Procedure (p. 7) holds the reagents, the equipment, the precautions and the steps from sampling to calculation. Evaluation of the method (p. 10) gives the validation results and the original's references. Compound tables (p. 12) holds the original's Tables 1 to 4: the compounds and their exposure limits, their physical properties, the sampling limits and the measurement parameters. Each of these tables opens with how to read it: its units and the conventions of the original.

The edition restated here is the one cdc.gov publishes for method 1003 as of 13 November 2026: NMAM Fourth Edition, Issue 3. NIOSH states that Fourth Edition methods remain valid unless it marks them otherwise. Check cdc.gov for a later issue before you rely on this guide.

How this guide marks information

WARNING

A hazardous situation which, if not avoided, could result in death or serious injury.

Note

Information that helps understanding; never a hazard.

Document information

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1	November 2026	First issue.

Restated from NIOSH NMAM method 1003, Issue 3 (15 March 2003). Source: CDC/NIOSH. The original is a work of the U.S. Government. Layout and wording © 2026 ANALYT-MTC Messtechnik GmbH.

Abbreviations and symbols

Abbreviation	Meaning
ACGIH	American Conference of Governmental Industrial Hygienists (exposure limit: TLV)
BP	Boiling point
C	Ceiling limit, in an exposure limit
Ca	NIOSH: potential occupational carcinogen, in an exposure limit
CAS	Chemical Abstracts Service registry number
CC, OC	Closed cup, open cup (flash point test)
CS_2	Carbon disulfide
d	Density, g/mL
DE	Desorption efficiency
FID	Flame ionization detector
FP	Freezing point
GC	Gas chromatography, gas chromatograph
LOD	Limit of detection
LOQ	Limit of quantitation
MP	Melting point
MW	Molecular weight
NIOSH	National Institute for Occupational Safety and Health (exposure limit: REL)
NTP	Normal temperature and pressure
OSHA	Occupational Safety and Health Administration (exposure limit: PEL)
P	Peak limit, in an exposure limit
PEL, REL, TLV	Permissible exposure limit (OSHA), recommended exposure limit (NIOSH), threshold limit value (ACGIH)
REL/PEL	The NIOSH or OSHA exposure limit, as the original writes it
RTECS	Registry of Toxic Effects of Chemical Substances number
(skin)	Skin notation: the compound can also be taken up through the skin
$\hat{S}_r$	Measurement precision (relative standard deviation)
$\hat{S}_{rT}$	Overall precision of sampling and measurement (relative standard deviation)
STEL	Short-term exposure limit
VP	Vapour pressure
[n]	Reference n of the original, listed in References (p. 10)

Contents

1 **Method summary** 5

Sampling 5

Measurement 5

Accuracy 6

Applicability 6

Interferences 6

Other methods 6

2 **Procedure** 7

Reagents 7

Equipment 7

Special precautions 7

Sampling 7

Sample preparation 8

Calibration and quality control 8

Measurement 8

Calculations 9

3 **Evaluation of the method** 10

References 10

4 **Compound tables** 12

Table 1: General information 12

Table 2: Physical properties 13

Table 3: Sampling limits 13

Table 4: Measurement parameters 14

CHAPTER 1

Method summary

NIOSH method 1003, Issue 3: the sampling, measurement and accuracy data the original gives on its first page. The compounds, their identifiers and their exposure limits are in Table 1 (p. 12), their molecular weights and properties in Table 2 (p. 13).

Item	Method 1003
Method	1003, Issue 3; evaluation: partial. Issue 1: 15 February 1984; Issue 3: 15 March 2003
Compounds, synonyms, CAS and RTECS numbers	Table 1 (p. 12)
Molecular weight, properties	Table 2 (p. 13)
Exposure limits (OSHA, NIOSH, ACGIH)	Table 1 (p. 12)

Sampling

Item	Condition
Sampler	Solid sorbent tube, coconut shell charcoal, 100 mg front section and 50 mg back section (Lot # 2000)
Flow rate	0.01–0.2 L/min
Sample volume, minimum and maximum	Per compound: Table 3 (p. 13)
Shipment	Routine
Sample stability	30 days for all analytes
Blanks	2 to 10 field blanks per set

Measurement

Item	Group A	Group B
Technique	Gas chromatography, flame ionization detector (FID)	
Analytes	The compounds of Table 1 (p. 12)	
Desorption	1 mL CS_2, stand for 30 min	
Injection volume	1 µL	
Temperatures	Injector 200 °C, detector 250 °C; column 35 °C for 3 min, then 8 °C/min to 150 °C	Injector 225 °C, detector 250 °C; column 35 °C for 3 min, then 8 °C/min to 190 °C
Carrier gas	Helium, 2.6 mL/min	Helium, 4.7 mL/min
Column	Capillary, fused silica, 30 m × 0.32 mm ID; 1.80 µm film diphenyl/dimethyl polysiloxane, Rtx®-502.2 or equivalent	Capillary, fused silica, 30 m × 0.53 mm ID; 3 µm film 35 % diphenyl/65 % dimethyl polysiloxane, Rtx®-35 or equivalent
Calibration	Standard solutions of the analytes in CS_2	
Range	See Evaluation of the method (p. 10)	
Estimated LOD	Table 4 (p. 14)	
Precision ($\hat{S}_r$)	Table 4 (p. 14)	

Each compound belongs to group A or group B (Table 1 (p. 12)); the conditions of its group apply.

Accuracy

Item	Value
Range studied	See Evaluation of the method (p. 10) [1]
Bias	See Evaluation of the method (p. 10) [1]
Overall precision ($\hat{S}_{rT}$)	See Evaluation of the method (p. 10) [1]
Accuracy	See Evaluation of the method (p. 10) [1]

Applicability

The working ranges are in Table 3 (p. 13). Two or more of the analytes can be determined at the same time, either with both of the capillary columns above or with modified analytical parameters, such as the temperature programme. High humidity during sampling decreases the total breakthrough volume.

Interferences

None have been identified. The more different analytes are sampled together, the greater the chance of an interference. To get around one, choose another capillary column or modify the analytical parameters.

Other methods

This issue updates NMAM method 1003, Issue 1 of 15 February 1984 [2], and takes in trichloroethylene, formerly NIOSH method 1022 [3]. Its improvements: higher recoveries at the lower sample levels, lower LOD and LOQ values, capillary column chromatography, and acceptable recoveries in a 30-day storage stability study.

CHAPTER 2

Procedure

Reagents, equipment, precautions and steps 1 to 14 of the original, with its step numbers.

Reagents

1. Carbon disulfide, chromatographic quality (see Special precautions (p. 7)).
2. Analytes, reagent grade.
3. Nitrogen or helium, purified.
4. Hydrogen, prepurified.
5. Air, filtered.

Equipment

1. Sampler: glass tube, 7 cm long, 6 mm OD, 4 mm ID, with flame-sealed ends and plastic caps. It holds two sections of 20/40 mesh coconut shell charcoal activated at 600 °C: front section 100 mg, back section 50 mg, separated by a 2 mm urethane foam plug. A silylated glass wool plug comes before the front section; a 3 mm urethane foam plug follows the back section. The pressure drop across the tube at an airflow of 1 L/min must be below 3.4 kPa. Such tubes are sold commercially (for example SKC #226-01, Lot # 2000, or equivalent).
2. Personal sampling pump, 0.01–0.2 L/min, with flexible connecting tubing.
3. Gas chromatograph with FID, integrator and the columns of the method summary (p. 5).
4. Vials, 2 mL, glass, with PTFE-lined septum crimp caps.
5. Volumetric flasks, 10 mL.
6. Syringes, 10 µL to 1 mL, readable to 0.1 µL.
7. Pipette, 1 mL, with pipette bulb.

Special precautions

⚠ WARNING

Carbon disulfide is toxic and a serious fire and explosion hazard: its flash point is −30 °C. Work with carbon disulfide in a fume hood only.

⚠ WARNING

Several of the analytes are suspect carcinogens (Table 1 (p. 12)). Wear suitable protective clothing and work with these compounds in a well-ventilated fume hood.

Sampling

1. Calibrate each personal sampling pump with a representative sampler in line.

2. Break the ends of the sampler immediately before sampling. Connect the sampler to the personal sampling pump with flexible tubing.
3. Sample at an accurately known flow rate between 0.01 and 0.2 L/min, for a total sample volume within the limits of Table 3 (p. 13).[1]
4. Cap the samplers. Pack them securely for shipment.

[1] The original's step 3 refers to Table 2 here; the sample volume limits are in its Table 3, to which its method summary also refers.

Sample preparation

5. Place the front and the back sorbent section of the sampler in separate vials. Include the glass wool plug in the vial with the front section. Discard the glass wool and foam plugs.[2]
6. Add 1.0 mL CS_2 to each vial. Cap each vial.
7. Let the vials stand for 30 min, agitating them now and then.

[2] As in the original, which names the glass wool plug in both sentences of this step.

Calibration and quality control

8. Calibrate daily with at least six working standards over the appropriate range, from below the LOD to 10 times the LOQ or higher if required (see Table 3 (p. 13)).
   a. Add known amounts of neat analyte or of calibration stock solution to CS_2 in 10 mL volumetric flasks and dilute to the mark.
   b. Analyse them together with the samples and blanks (steps 11 and 12).
   c. Prepare a calibration graph: peak area against µg analyte.
9. Determine the desorption efficiency (DE) at least once for each lot of charcoal used for sampling, in the range of interest. Prepare three tubes at each of five concentrations, plus three media blanks.
   a. Remove the back sorbent section of a blank sampler and discard it.
   b. With a microlitre syringe, inject a known amount (2–20 µL) of pure analyte or of calibration stock solution directly onto the front sorbent section.
   c. Cap the tube. Let it stand overnight.
   d. Desorb (steps 5 to 7) and analyse together with the working standards (steps 11 and 12).
   e. Prepare a graph of DE against µg analyte recovered.
10. Analyse three quality control blind spikes and three analyst spikes to make sure that the calibration graph and the DE graph are in control.

Measurement

11. Set up the gas chromatograph as its manufacturer recommends and to the conditions of the method summary (p. 5). Inject a sample aliquot manually with the solvent flush technique or with an autosampler.

> **Note**
> If a peak area lies above the linear range of the working standards, dilute the sample with CS_2, analyse it again and apply the dilution factor in the calculations.

12. Measure the peak area.

Calculations

13. Determine the mass in µg, corrected for DE, of analyte found in the front (W_f) and back (W_b) sorbent sections of the sample, and in the front (B_f) and back (B_b) sorbent sections of the average media blank.

> **Note**
> If $W_b > W_f/10$, report breakthrough and possible sample loss.

14. Calculate the concentration C of analyte in the air volume sampled, V (L):

$$C = (W_f + W_b - B_f - B_b) / V, \text{ mg/m}^3$$

CHAPTER 3

Evaluation of the method

The current laboratory evaluation of the analytes of this method added capillary column chromatography, improved the LOD and LOQ values, studied the desorption efficiency from about 3 to 5 times the LOQ up to 0.1 times the REL/PEL, and added a 30-day storage stability study. Most of the analytes showed acceptable recoveries over this range [4]. Four analytes had unacceptable recoveries at the lowest level evaluated [4]: benzyl chloride, chloroform, carbon tetrachloride and chlorobenzene. Their LOQ was adjusted accordingly. Every analyte in the storage stability study was stable after 7, 14 and 30 days of storage [4]; bromoform was marginally stable at 30 days [4].

The initial laboratory evaluation used spiked samples and generated atmospheres, with SKC Lot 105 coconut shell charcoal as the collection medium [1]. Its results:

Results of the initial laboratory evaluation

Compound	Range (mg/m³)	Sample size (L)	Bias (%)	Precision		Accuracy (± %)	Desorption efficiency	Ref.
				Overall	Measurement			
Benzyl chloride	2–8	10	−8.4	0.096	0.031	25.6	94 % at 96–303 µg	4
Bromoform	3–10	10	−1.3	0.071	0.043	14.0	94 % at 35–111 µg	4
Carbon tetrachloride	65–299	15	−1.6	0.092	0.037	18.0	93 % at 32–4800 µg	4, 5
Chlorobenzene	183–736	10	0.3	0.056	0.025	11.0	92 % at 111–7100 µg	4, 6
Chlorobromomethane	640–2655	5	3.4	0.061	0.051	14.0	98 % at 39–13 000 µg	4, 7
Chloroform	100–416	15	1.3	0.057	0.047	11.6	97 % at 24–7400 µg	4, 8
o-Dichlorobenzene	150–629	3	−1.9	0.068	0.013	13.7	94 % at 19–1900 µg	4, 9
p-Dichlorobenzene	183–777	3	−4.3	0.052	0.022	12.5	98 % at 25–2700 µg	4, 10
1,1-Dichloroethane	212–838	10	2.6	0.057	0.011	12.4	101 % at 20–8000 µg	4, 11
1,2-Dichloroethylene*	475–1915	3	−2.9	0.052	0.017	11.3	101 % at 19–9500 µg	4, 12
Ethylene dichloride	195–819	3	−2.0	0.079	0.012	15.7	94 % at 2.5–2500 µg	4, 13
Hexachloroethane	5–25	10	−6.6	0.121	0.014	25.4	98 % at 34–756.8 µg	4
1,1,1-Trichloroethane	904–3790	3	−0.6	0.054	0.018	10.6	100 % at 23–11 000 µg	4, 14
Tetrachloroethylene	655–2749	3	−7.2	0.052	0.013	15.1	95 % at 8–8000 µg	4, 15
1,1,2-Trichloroethane	26–111	10	−9.0	0.057	0.010	17.5	100 % at 18–1200 µg	4, 16
1,2,3-Trichloropropane	163–629	10	2.1	0.068	0.027	14.2	99 % at 21–6000 µg	4, 17

* Mixed isomers (cis and trans) were used.

References

The references of the original, as it lists them.

1. NIOSH [1977]. Documentation of the NIOSH Validation Tests, S101, S110, S113, S114, S115, S122, S123, S126, S133, S134, S135, S281, S314, S328, S335, S351. U.S. Department of Health, Education, and Welfare, Publ. (NIOSH) 77-185, available as Stock No. PB 274-248 from NTIS, Springfield, VA 22161.
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5. NIOSH [1977]. Carbon tetrachloride: Method S314. NIOSH manual of analytical methods, 2nd ed., Vol. 1. Cincinnati, OH: U.S. Department of Health, Education, and Welfare, (NIOSH) Publication 77-157-A.
6. Ibid., S133.
7. Ibid., S113.
8. Ibid., Vol. 3, S351, (NIOSH) Publication 77-157-C.
9. Ibid., S135.
10. Ibid., S281.
11. Ibid., Vol. 2, S123, (NIOSH) Publication 77-157-A.
12. Ibid., S110.
13. Ibid., S122.
14. Ibid., Vol. 3, S328, (NIOSH) Publication 77-157-C.
15. Ibid., S335.
16. Ibid., Vol. 2, S134, (NIOSH) Publication 77-157-A.
17. Ibid., S126.

Method revised by Stephanie M. Pendergrass, NIOSH/DART.

CHAPTER 4

Compound tables

Tables 1 to 4 of the original, with its numbering and its order of compounds. Group A and group B decide the gas chromatographic conditions (Method summary (p. 5)).

Table 1: General information

The exposure limits are in ppm and read OSHA/NIOSH/ACGIH, as the original prints them; a dash means the original lists no value. The RTECS numbers are as printed in the original. The exposure limits shown are reproduced from the 2003 original and are not updated here. Check the limits currently applicable at the sampling location.

Compound (formula)	RTECS	Synonyms	CAS	OSHA/NIOSH/ACGIH (ppm)
Group A				
Bromoform ($CHBr_3$)	PB5600000	tribromomethane	75-25-2	0.5 (skin)/0.5 (skin)/0.5 (skin)
Carbon tetrachloride[a, b] (CCl_4)	FG4900000	tetrachloromethane	56-23-5	10, C 25/STEL 2 (1 h)/5 (skin)
Chlorobenzene (C_6H_5Cl)	CZ0175000	monochlorobenzene; phenyl chloride	108-90-7	75/–/10
Chloroform[a, b] ($CHCl_3$)	FS9100000	trichloromethane	67-66-3	C 50/STEL 2/10
1,1-Dichloroethane (CH_3CHCl_2)	KI0175000	ethylidene chloride	75-34-3	100/100/100
Ethylene dichloride[a, b] ($ClCH_2CH_2Cl$)	KI0525000	1,2-dichloroethane	107-06-2	50, C 100/1, STEL 2/10
Tetrachloroethylene[a, b] ($Cl_2C=CCl_2$)	KX3850000	perchloroethylene	127-18-4	100, C 200, P 300/0.4 (LOQ)/25, STEL 100
Trichloroethylene[a] ($ClCH=CCl_2$)	KX4550000	ethylene trichloride; trichloroethene	79-01-6	100 ppm (Ca 200 ppm)/Ca 50 ppm[1]
1,1,1-Trichloroethane (CH_3CCl_3)	KJ297500	methyl chloroform	71-55-6	350/C 350/350, STEL 450
Group B				
Benzyl chloride[a] ($C_6H_5CH_2Cl$)	XS8925000	(chloromethyl) benzene; α-chlorotoluene	100-44-7	1/C 1.0/1
Chlorobromomethane (CH_2BrCl)	PA5250000	bromochloromethane; Halon 1011	74-97-5	200/200/200
o-Dichlorobenzene[c] (1,2-$C_6H_4Cl_2$)	CZ4500000	1,2-dichlorobenzene	95-50-1	50/C 50/25 (skin); STEL 50
p-Dichlorobenzene[a, c] (1,4-$C_6H_4Cl_2$)	CZ45500000	1,4-dichlorobenzene	106-46-7	75/1.7 (LOQ)/75, STEL 110
1,2-Dichloroethylene ($ClCH=CHCl$)	KV9360000	acetylene dichloride; 1,2-dichloroethene	540-59-0	200/200/200
Hexachloroethane[a, c] (CCl_3CCl_3)	KI4025000	perchloroethane	67-72-1	1 (skin)/1/1 (skin)
1,1,2-Trichloroethane[a, d] (Cl_2CHCH_2Cl)	KJ3150000	vinyl trichloride	79-00-5	10 (skin)/10 (skin)/10 (skin)
1,2,3-Trichloropropane[a] ($CH_2ClCHClCH_2Cl$)	TZ9275000	allyl trichloride; glycerol trichlorohydrin	96-18-4	50/10 (skin)/10 (skin)

[a] Suspect carcinogen; the original cites references 20, 21 and 22 here, which its reference list does not contain. [b] Group I pesticide. [c] Group II pesticide. [d] Group III pesticide.

[1] The original gives two values for trichloroethylene, not three; it is reproduced as printed.

Table 2: Physical properties

Molecular weight, the mass concentration equal to 1 ppm at normal temperature and pressure, and the properties of each compound, as the original gives them. Temperatures of FP, MP and flash point are in °C.

Compound (formula)	MW	mg/m³ = 1 ppm at NTP	Synonyms	Properties
Group A				
Bromoform ($CHBr_3$)	252.75	10.33	tribromomethane	liquid; d 2.887; BP 148 °C; nonflammable
Carbon tetrachloride (CCl_4)	153.84	6.29	tetrachloromethane	liquid; d 1.585; BP 76.7 °C; FP −23.0 °C; VP 91.3 mm at 20 °C; vapour density (air = 1) 5.3
Chlorobenzene (C_6H_5Cl)	112.56	4.60	monochlorobenzene; phenyl chloride	liquid; d 1.105 at 25 °C; BP 131.6 °C; MP −45 °C; flash point 29.4 °C (CC)
Chloroform ($CHCl_3$)	119.39	4.88	trichloromethane	liquid; d 1.485 at 20 °C; BP 61.2 °C; FP −63.5 °C
1,1-Dichloroethane (CH_3CHCl_2)	98.95	4.05	ethylidene chloride	liquid; d 1.174 at 20 °C; BP 57–59 °C; FP −98 °C
Ethylene dichloride ($ClCH_2CH_2Cl$)	98.96	4.05	1,2-dichloroethane	liquid; d 1.2554 at 20 °C; BP 83.5 °C; FP −35.5 °C; flash point 13 °C; explosive limits in air 6–16 %
Tetrachloroethylene ($Cl_2C{=}CCl_2$)	165.83	6.78	perchloroethylene	liquid; d 1.625 at 20 °C; BP 121 °C; FP −22.4 °C
1,1,1-Trichloroethane (CH_3CCl_3)	133.42	5.45	methyl chloroform	liquid; d 1.325; BP 75 °C; FP −30.4 °C; nonflammable
Trichloroethylene ($ClCH{=}CCl_2$)	131.40	5.37	ethylene trichloride; trichloroethene	liquid; d 1.459 at 20 °C; BP 87.2 °C; FP −72.8 °C; VP 58 mm Hg at 20 °C (9.9 kPa); explosive range 11–41 % v/v in air
Group B				
Benzyl chloride ($C_6H_5CH_2Cl$)	126.58	5.17	(chloromethyl) benzene; α-chlorotoluene	liquid; BP 179 °C; MP −48 to −43 °C; d 1.100 at 20 °C; flash point 67 °C
Chlorobromomethane (CH_2BrCl)	129.39	5.29	bromochloromethane; Halon 1011	liquid; d 1.93 at 20 °C; BP 68 °C; MP −88 °C; nonflammable
o-Dichlorobenzene (1,2-$C_6H_4Cl_2$)	147.00	6.01	1,2-dichlorobenzene	liquid; d 1.284; BP 172–179 °C; FP −17 °C; flash point 65.5 °C
p-Dichlorobenzene (1,4-$C_6H_4Cl_2$)	147.00	6.01	1,4-dichlorobenzene	solid crystals; d 1.458; BP 173.7 °C; MP 53 °C; sublimes; flash point 65.5 °C
1,2-Dichloroethylene ($ClCH{=}CHCl$)	96.94	3.96	acetylene dichloride; 1,2-dichloroethene	liquid; trans isomer: d 1.257, BP 47–49 °C, MP −57 °C; cis isomer: d 1.282, BP 58–60 °C; flash point 3.9 °C; FP −80 °C
Hexachloroethane (CCl_3CCl_3)	236.74	9.66	perchloroethane	solid; d 2.091; MP 185 °C; BP: sublimes at 187 °C
1,1,2-Trichloroethane (Cl_2CHCH_2Cl)	133.41	5.45	vinyl trichloride	liquid; d 1.4432 at 20 °C; BP 113.7 °C; FP −36.4 °C; VP 19 mm Hg at 20 °C
1,2,3-Trichloropropane ($CH_2ClCHClCH_2Cl$)	147.43	6.03	allyl trichloride; glycerol trichlorohydrin	liquid; d 1.3888 at 20 °C; BP 156.2 °C; FP −15 °C; flash point 82.2 °C (OC)

Table 3: Sampling limits

Air sample volumes in litres. The minimum volume is given at the concentration named with it; the working range is the one at the maximum sample volume.

Compound	Minimum (L)	Maximum (L)	Target (L)	Working range at maximum volume (ppm)
Bromoform	4 at 0.5 ppm	70	10	0.2–4
Carbon tetrachloride	3 at 10 ppm	150	15	2–105

Compound	Minimum (L)	Maximum (L)	Target (L)	Working range at maximum volume (ppm)
Chlorobenzene	1.5 at 75 ppm	40	10	10–430
Chloroform	1 at 50 ppm	50	15	2–190
1,1-Dichloroethane	0.5 at 100 ppm	15	10	4–250
Ethylene dichloride	1 at 50 ppm	50	3	16–1320
1,1,1-Trichloroethane	0.1 at 350 ppm	8	3	18–1450
Tetrachloroethylene	1.0 at 100 ppm	40	3	9–1900
Trichloroethylene	0.2 at 100 ppm	30	10	0.3–62.1
Benzyl chloride	6 at 1 ppm	50	10	0.6–5.8
Chlorobromomethane	0.5 at 200 ppm	60	5	18–450
o-Dichlorobenzene	1 at 50 ppm	10	3	16–1100
p-Dichlorobenzene	1 at 75 ppm	8	3	27–330
1,2-Dichloroethylene	0.2 at 200 ppm	5	3	16–560
Hexachloroethane	3 at 1 ppm	70	10	0.3–8.3
1,1,2-Trichloroethane	2 at 10 ppm	60	10	1.8–64
1,2,3-Trichloropropane	0.6 at 50 ppm	60	10	3–310

Table 4: Measurement parameters

LOD and LOQ in µg analyte per sample.

Compound	Limit of detection, LOD (µg)	Limit of quantitation, LOQ (µg)	Precision ($\hat{S}_r$)
Bromoform	6.0	19.3	0.051
Carbon tetrachloride	4.0	20.0	0.046
Chlorobenzene	0.6	110.0	0.025
Chloroform	0.8	15.0	0.035
1,1-Dichloroethane	2.0	5.1	0.030
Ethylene dichloride	0.7	2.3	0.026
Tetrachloroethylene	2.0	7.1	0.032
1,1,1-Trichloroethane	1.0	3.0	0.009
Trichloroethylene	0.6	1.9	0.018
Benzyl chloride	1.0	4.5	0.076
Chlorobromomethane	1.5	41.0	0.053
o-Dichlorobenzene	0.8	2.7	0.022
p-Dichlorobenzene	2.0	7.5	0.041
1,2-Dichloroethylene	2.0	5.1	0.041
Hexachloroethane	2.0	6.6	0.021
1,1,2-Trichloroethane	1.0	3.0	0.036
1,2,3-Trichloropropane	1.0	2.7	0.020

Note

For a few compounds of this method the LOQ values may look higher than in the earlier method development. The reason: the initial method development studied no recovery at a level near or above the instrumentally determined LOQ of each analyte.

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