



Application Note AN-M-015

Robust analysis with IC-MS/MS according to US EPA 557

(HAA)[1,2](EPA)EU5(HAA5: (MCAA) (MBAA) (DCAA)
(DBAA) (TCAA)) 60 ppb(60 µg/L)[3]EPA557 µg/L [4]

(IC)Agilent(MS) Metrosep A Supp 19 1 µg/L
65~115% (MRL) 0.025~0.25 µg/L IC-MS/MSEPA557

(: 360 mg/L 14 mg/L 10 mg/L 3.8 mg/L)EPA 557
(LSSM) 100 mg/L 20 mg/L 150 mg/L 250 mg/L 250

mg/L 0.1% (v/v)4 °C(MCAA-13C MBA-13C) 4 µg/L

HPLC (MS)(IC)(MS)

889 IC Sample Center – cool (HAA)4°C (1)



1. HAA889 IC Sample Center – cool Metrohm 940 Professional IC Vario Metrohm Jet Stream Technology 6475 LC/MS Agilent Dosino MS

940 Professional IC Vario (Metrosep A Supp 19 IC MB)

Agilent Jet Stream Technology Agilent 6475 LC/MS (dMRM)

Dosino MSMS

948 Continuous IC Module, CEP 15~100 mmol/L (KOH)(2)IC MagIC Net MS MassHunter 1



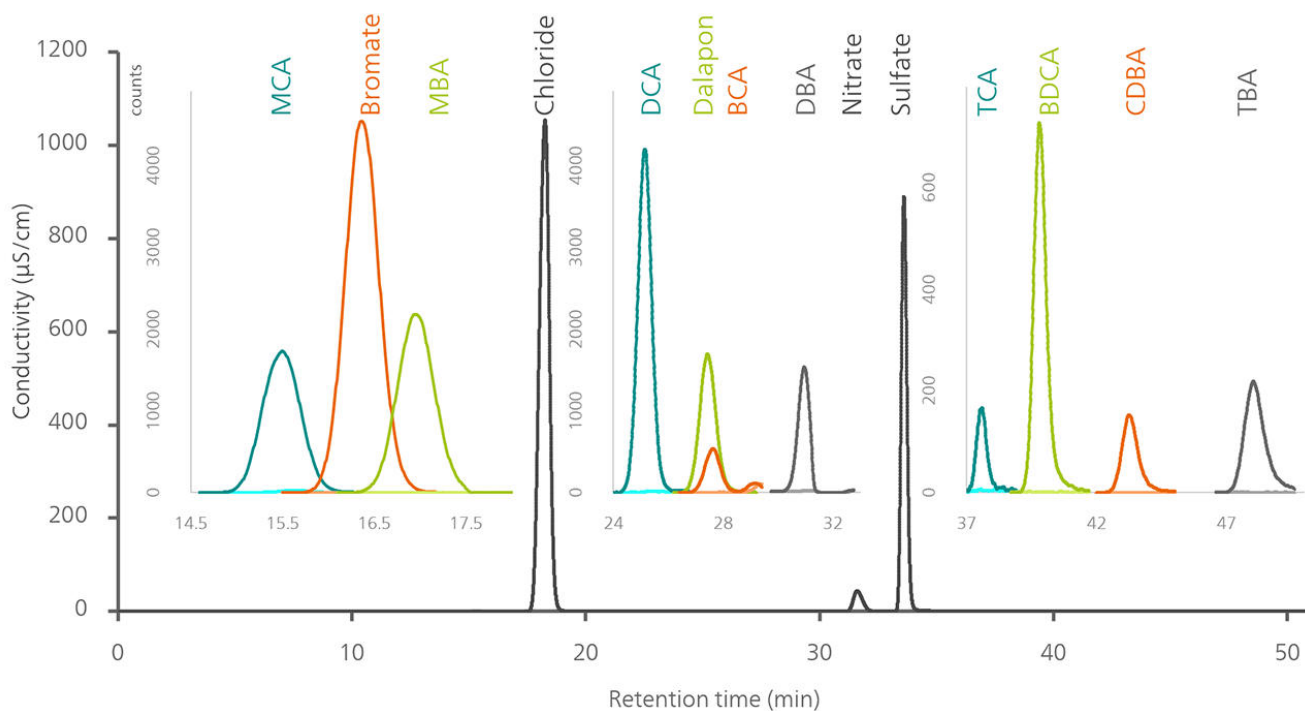
2. 948 Continuous IC Module, CEP KOH KOH

1. IC-MS/MS

IC Column	Metrosep A Supp 19 - 150/4.0
Eluent/gradient	15–100 mmol/L KOH + 10% methanol
Flow rate	0.5 mL/min
Column temperature	15 °C
Injection volume	100 µL
Suppression	sequential
Ion polarity	negative
Gas flow	12 L/min
Sheath gas flow	12 L/min
Gas temperature	150 °C
Sheath gas temperature	245 °C
Detection	dMRM (dynamic Multiple Reaction Monitoring)

EPA 557 (2)Metrosep A Supp 19 - 150/4.0 (3) MS
10% MS

0.1–40 µg/L R2 0.996–0.999 (LCMRL)EPA 557 9.2.4 (2)7PIR(50~150%)



3. EPA 557 LSSMLSSM 100 mg/L 20 mg/L 150 mg/L 250 mg/L 250 mg/L 1 µg/L LSSM 100 µL

31 µg/L LSSM 65–115% 46–112%() 87–150% (n = 7)(RSD) 0.7–6.8% ()(n = 6) LSSM(n = 7) RSD 1.6–6.3% 1.0–36.5% 5% TCAA

DBA/ TCAA/DBAA TCAA 1 4~5 (:889 IC Sample Center – cool) Metrohm CO2 (MCS)MS

2. (LCMRL)EPA 557 9.2.4 (MRL) PIR(50–150%)7 0.025 µg/L (S/N) 10

		[min]	<i>m/z</i>	<i>m/z</i>	[µg/L]	PIR [%]
	MCAA	15.8	93	34.9	0.025*	91–109
	MBAA	17.2	137	79	0.025*	88–112
	BrO ₃	16.7	127	111	0.025*	84–116
	DCAA	25.6	127	83	0.025	84–116
	DAL	28.0	141	97	0.025	74–126
	BCAA	28.0	173	81	0.05	74–126
	DBAA	31.4	217	173	0.025	75–125
	TCAA	37.9	161	117	0.25	62–131
	BDCAA	40.2	163	81	0.025	79–121
	CDBAA	43.5	207	79	0.025	52–148
	TBAA	49.1	251	79	0.025	62–138

3.3 1 µg/L IC-MS/MS ±0.1 µg/L 6

	1 µg/L [µg/L]		
	()	(Evian)	LSSM (EPA 557)
MCAA	1.12	1.41	1.15
MBAA	1.00	0.97	0.87
BrO ₃ ⁻	0.88	0.86	0.84
DCAA	0.88	1.03	0.80
DAL	0.88	0.93	0.76
BCAA	0.87	0.87	0.71
DBAA	0.88	1.22	0.79
TCAA	0.46	1.50	0.65
BDCAA	0.89	0.91	0.87
CDBAA	0.88	1.00	0.88
TBAA	0.88	1.43	0.84

EPA 557 [4] Agilent MS

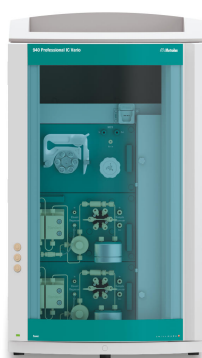
5 () µg/L EPA 557[4] EU [5]

1. Zhao, H.; Yang, L.; Li, Y.; et al. Environmental Occurrence and Risk Assessment of Haloacetic Acids in Swimming Pool Water and Drinking Water. *RSC Adv* 10 (47), 28267–28276. DOI:10.1039/d0ra02389b
2. Sinha, R.; Gupta, A. K.; Ghosal, P. S. A Review on Trihalomethanes and Haloacetic Acids in Drinking Water: Global Status, Health Impact, Insights of Control and Removal Technologies. *Journal of Environmental Chemical Engineering* 2021, 9 (6), 106511. DOI:10.1016/j.jece.2021.106511
3. US EPA, O. *National Primary Drinking Water Regulations*. <https://www.epa.gov/ground-water-and-drinking-water/national-primary-drinking-water-regulations> (accessed 2022-09-19).
4. United States Environmental Protection Agency. Method 557: Determination of Haloacetic Acids, Bromate, and Dalapon in Drinking Water by Ion Chromatography Electrospray Ionization Tandem Mass Spectrometry (IC-ESI-MS/MS). *EPA Document No. 815-B-09-012* 2009.
5. Directive - 2020/2184 - EN - EUR-Lex. <https://eur-lex.europa.eu/eli/dir/2020/2184/oj> (accessed 2024-03-11).

CONTACT

143-0006 6-1-1
null 9

metrohm.jp@metrohm.jp



940 Professional IC Vario TWO/SeS/PP/MB
940 Professional IC Vario TWO/SeS/PP (1)2IC

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-
- (2mm) (IC-MS IC-ICP/MS)

MagIC Net 4.1

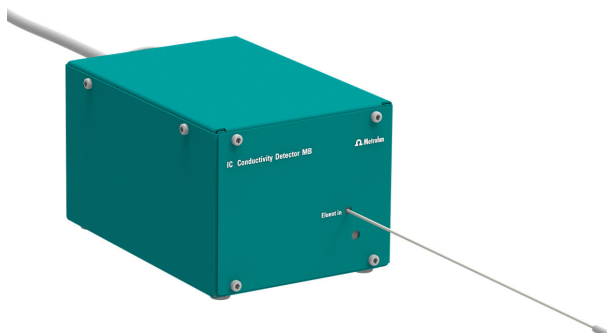


Metrosep A Supp 19 - 150/4.0

– Metrosep A Supp 19

150 mm Metrosep A Supp 19 - 150/4.0 Metrosep A Supp 19 - 150/4.0 :

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IC Conductivity Detector MB

Compact and intelligent high performance conductivity detector for intelligent IC instruments. Optimized for microbore columns. Outstanding temperature stability, the complete signal processing within the protected detector block and the latest generation of DSP – Digital Signal Processing – guarantee the highest precision of the measurement. No change of measuring ranges (not even automatic ones) is required, due to the dynamic working range. Typical areas of application: Anion or cation determinations with chemical suppression, sequential suppression or without suppression and conductivity detection; Optimized for microbore (2 mm) applications, ideally suitable for coupling techniques (IC-MS or IC-ICP/MS); Specification at a glance: 0–15000 $\mu\text{S}/\text{cm}$ without range switching; Cell volume: 0.3 μL ; Ring-shaped electrodes made of stainless steel X2CrNiMo17-12-2 (316 L), compatible with MSA; Maximum operating pressure: 10.0 MPa (100 bar); Cell temperature: 20–50 °C in increments of 5 °C; Temperature stability: 0.001 °C; Baseline noise: 0.2 nS/cm typical for sequential suppression; Capillaries: ID 0.18 mm; Supported with MagIC Net 4.1 and higher



889 IC Sample Center – cool

889 IC – cool 889 IC