

Foreword

Adding liquid chlorine to tap-water is an effective means of sterilization and disinfection, which is used by more than 80% of the world's water plants. However, it will produce large amounts of chloride in water, which will increase the risk of cancer. Chlorite and chlorate are two common disinfection by-products, which can be detected by ion chromatography. One way is to use hydroxide eluent, SH-AC-11 column (with guard column) and gradient elution.



1. Instruments



CIC-D120 ion chromatograph



SH-AC-11 column

2. Analysis conditions

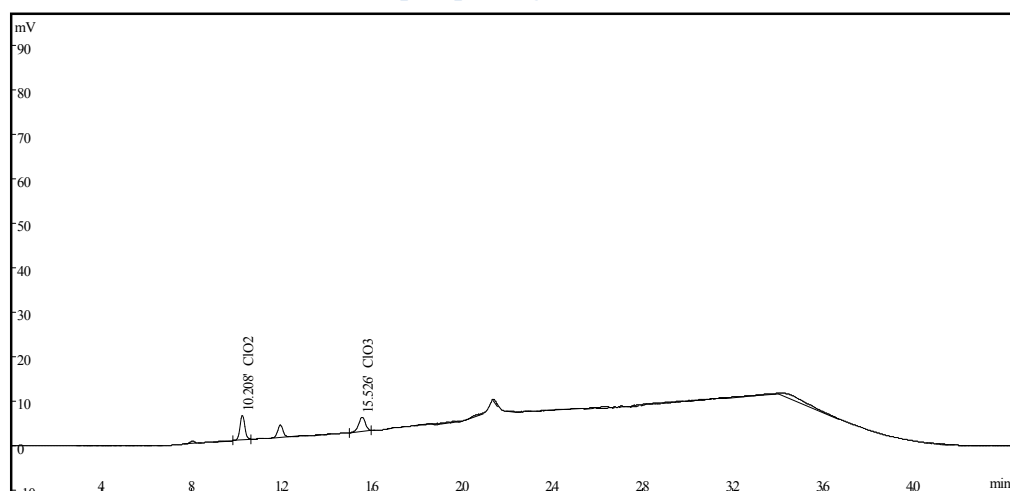
- IC type: CIC-D120
- Analysis column: SH-AC-11
- Guard column: SH-G-1
- Eluent: Gradient elution
(0-30min : 5-28mmol ,30-35min : 28-5mmol,35-45min : 5mmol)
- Flow rate: 1.0 mL/min
- Column temperature: 35°C
- Column pressure: 5.0 MPa
- Room temperature: 21°C

- Humidity: 65% RH
- Range: 2
- Noise : 10 μ V
- Injection volume: 25 μ L
- Detection method: Suppressed conductivity detection

Remarks: The analysis time of each sample is 45min, current 100mA.

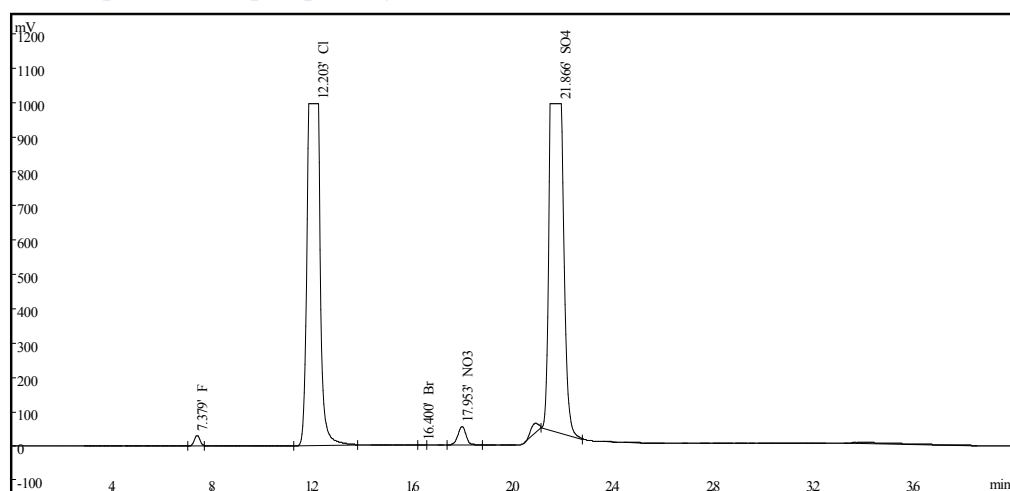
3.Spectrogram

3.1 ClO₂⁻、ClO₃⁻ standard sample spectrogram

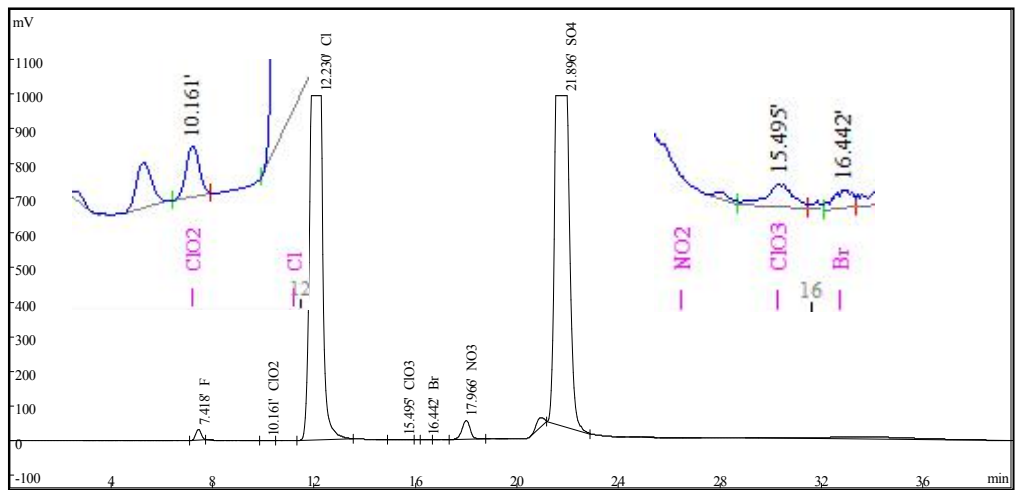


NO.	Ret.time	Name	Concentration	Area	Height
1	10.208	ClO2	0.5	72696	5366
2	15.526	ClO3	0.5	60176	3171

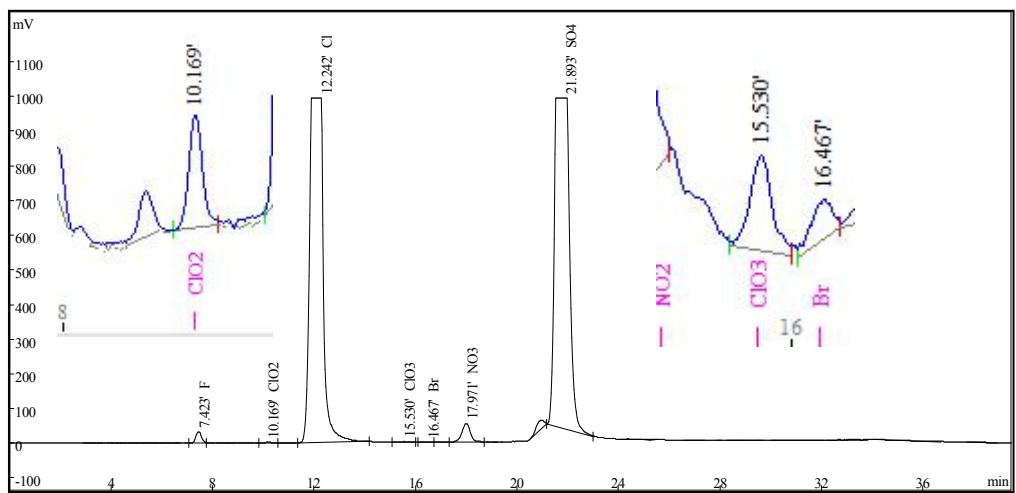
3.2 Tap-water sample spectrogram



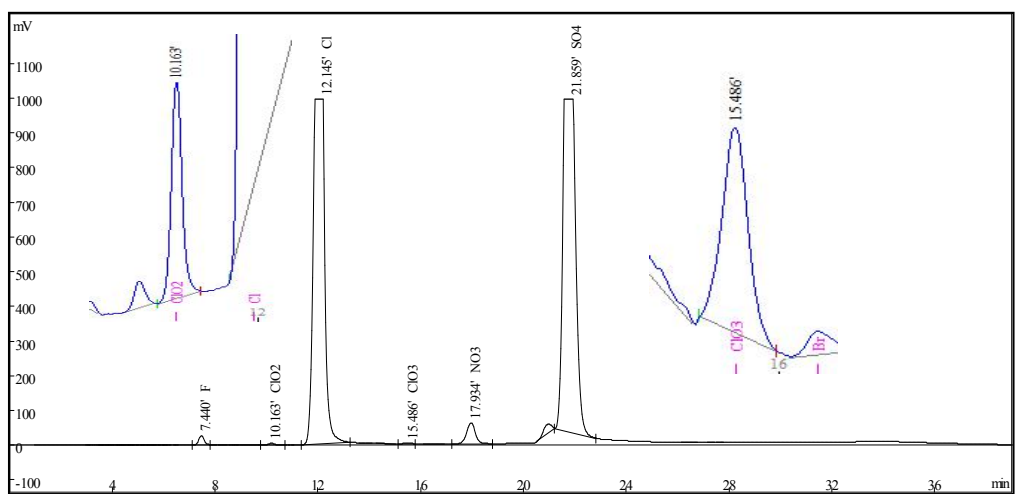
3.3 Spectrogram of added samples for tap-water -1



3.4 Spectrogram of added samples for tap-water-2



3.5 Spectrogram of added samples for tap-water-3



4. Data analysis

4.1 Linear data of standard sample

	Ion	Retention Time min	Linear Range (mg/L)	Equation of Linear Regression	Correlation Coefficient
SH-AC-11	ClO ₂ ⁻	10.184	0~0.5	Y= -1801+146500X	0.9990
	ClO ₃ ⁻	15.505	0~0.5	Y= -1063+120800X	0.9993

4.2 Stability of standard samples (ClO₂⁻、ClO₃⁻ 0.05mg/L)

Ion		1	2	3	4	5	6	Standard Deviation	RSD %
ClO ₂ ⁻	Area	5517	5334	5644	4694	5062	5307	341	6.48
	Height	443	559	620	577	534	426	77	14.58
ClO ₃ ⁻	Area	4737	5328	5306	5238	5011	4774	265	5.24
	Height	250	340	513	319	381	367	87	24.12

4.3 Sample addition

Sample	Ion	Adding Standard Amount mg/kg	Actual Value mg/L	Percent Recovery %
Tap- water	ClO ₂ ⁻	0	0.00	/
		0.1	0.08239	82.39
		0.2	0.1849	92.45
		0.5	0.4803	96.06
	ClO ₃ ⁻	0	0.00	/
		0.1	0.09646	96.46
		0.2	0.1930	96.50
		0.5	0.4936	98.72

5.Points for attention

It is easy to be polluted in the process of experiment, and requires the experimenters to operate strictly according to the operation rules.

6.Conclusion

In this solution, ClO₂⁻, ClO₃⁻ ions can be separated from other anions by using SH-AC-11 column with 8 mmolL gradient elution by an eluent generator.

Appendix

The method of isocratic elution of SH-AC-11 is verified at the same time. The separation degree reached the requirement under 10 mmol NaOH isocratic elution.



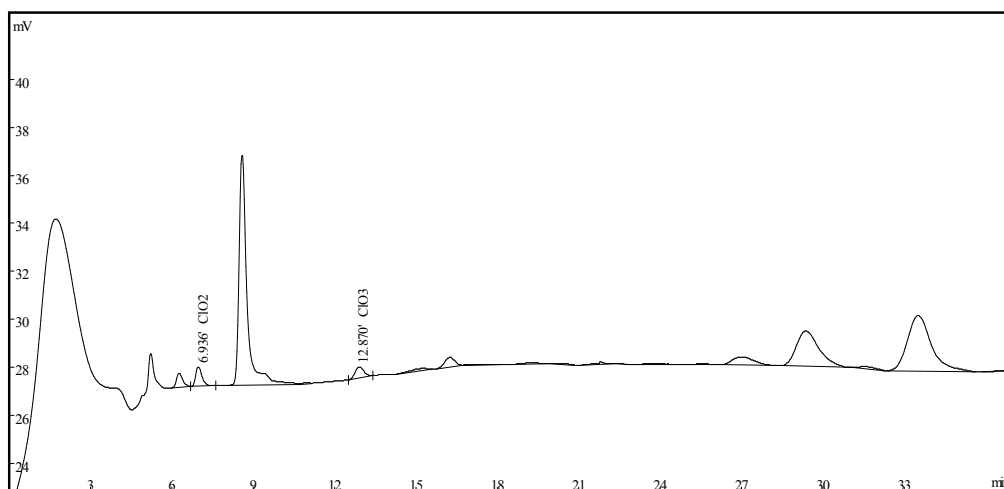
1. Analysis conditions

- IC type : CIC-D120
- Analysis column : SH-AC-11
- Guard column : SH-G-1
- Eluent : 10mmol NaOH
- Flow rate : 1.0 mL/min
- Column temperature: 35°C
- Column pressure: 5.0 MPa
- Room temperature: 21°C
- Humidity: 65% RH
- Range: 2
- Noise : 10 μ V
- Injection volume : 25 μ L
- Detection method : Suppressed conductivity detection

Remarks: The analysis time of each sample is 45min, current 100mA.

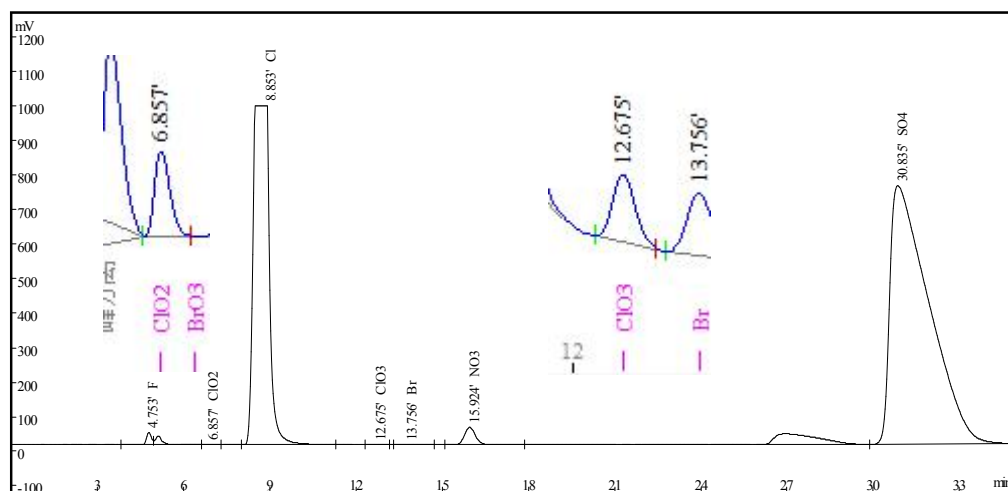
2. Spectrogram

2.1 ClO_2^- 、 ClO_3^- standard sample spectrogram

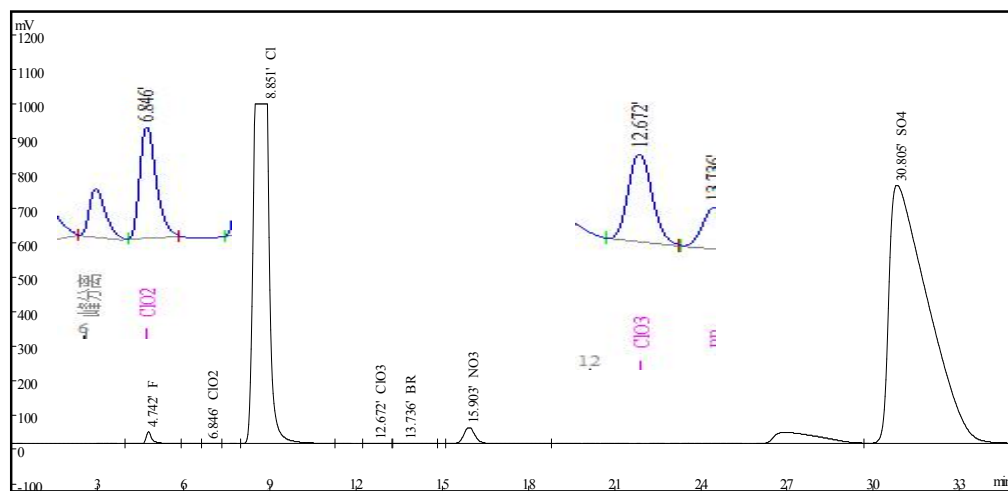


NO.	Ret.time	Name	Concentration	Area	Height
1	6.936	ClO2	0.1	11827	809
2	12.870	ClO3	0.1	9915	460

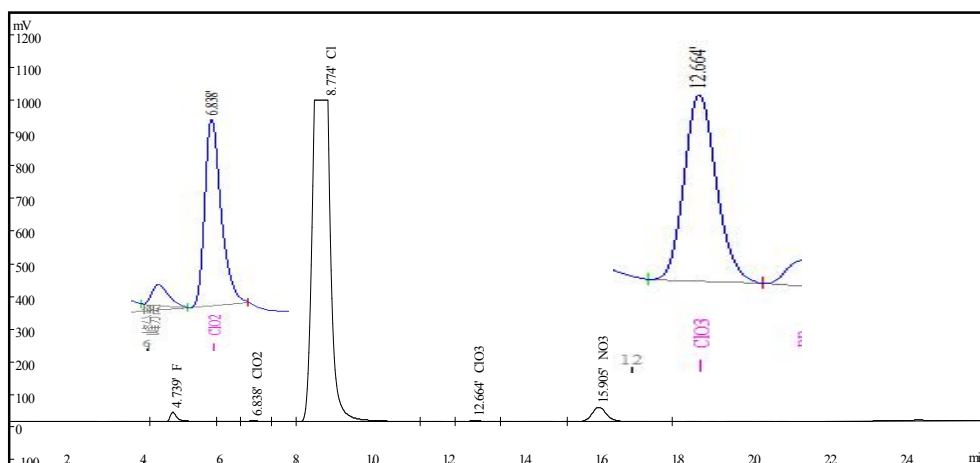
2.2 Spectrogram of added samples for tap-water -1



2.3 Spectrogram of added samples for tap-water -2



2.4 Spectrogram of added samples for tap-water -3



3.Data analysis

3.1 Sample addition

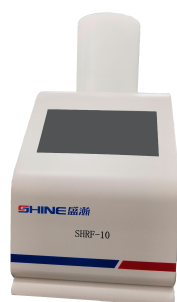
Sample	Ion	Adding Standard Amount mg/kg	Actual Value mg/L	Percent Recovery %
Tap- water	ClO ₂ ⁻	0	0.00	/
		0.1	0.09784	97.84
		0.2	0.2021	101.0
		0.5	0.5006	100.1
	ClO ₃ ⁻	0	0.00	/
		0.1	0.09847	98.47
		0.2	0.1936	96.80
		0.5	0.4525	90.50

4.Points for attention

It is easy to be polluted in the process of experiment, and requires the experimenters to operate strictly according to the operation rules.

5.Conclusion

In this solution, ClO₂⁻, ClO₃⁻ ions can be separated from other anions by using SH-AC-11 column with 8 mmol/L isocratic elution by an eluent generator.



Eluent generator