Detection of sulfate and sulfite in wastewater

Introduction:

The industrial wastewater from chemical plants has complex components. This article determines the degree of wastewater pollution by measuring sulfate and sulfite ions in the wastewater. Ion chromatography has a unique advantage in anion detection

Table 1: Detection items

Anion	Sulfate	Sulfite

Keywords: Sulfate and sulfite,wastewater, Ion Chromatograph.

Instruments and equipment

- **Ion chromatograph**: CIC-D160^{+}
- **Ultra pure water machine**:EU-20

Qingdao Shenghan Chromatograph Technology Co., Ltd

Requirements

Reagents

Unless otherwise specified, all reagents used are superior grade. Commercially available certified standard solutions for sulfate and sulfite (1000 mg/L).

Deionized Water

When preparing standard samples manually or diluting real samples, please use ASTM filtration and deionization requirements that meet the specifications listed in the table 2.

Table 2: Deionized water specification.

Specification	
Ions Resistivity	≥18.25MΩ·cm
Organics-TOC	<10ppb
Iron/Transition Metals	<1ppb
Pyrogens	<0.03Eu/mL
Particulates（>0.2μm）	<1unit/mL
Colloids-Silica	<10ppb
Bacteria	<1cfu/mL

Chromatography conditions

Table 3: Analysis conditions

Instrument	CIC-D160^{+}
Eluent	15 mM KOH
Flow rate	1.0 mL/min
Injection volume	25 μL
Analytical column	SH-AC-23
Column oven temperature	35℃
Conductivity detector temperature	35℃
Suppressor current	50 mA

Sample preparation

After diluting the sample, analyze it on the machine after passing through a 0.22um filter membrane.
(Note: Dilute waste ammonia water 1 by 100 times, desulfurization wastewater 2 by 1000 times, and desulfurization wastewater 3 by 10000 times).

Standard chromatogram

Standard chromatogram, As shown in below:

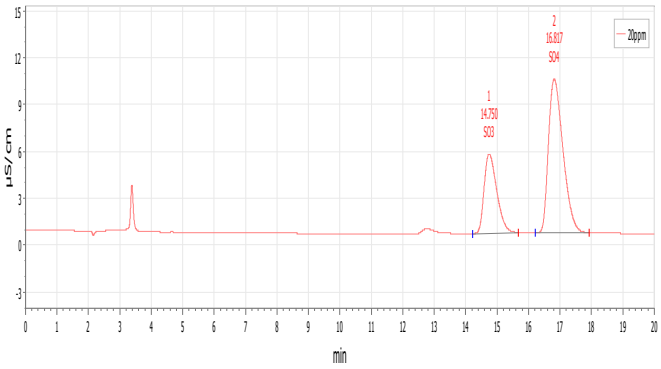

Figure 1. Chromatogram of standard sample.
(20mg/L SO_3^{2-} and SO_4^{2-})

Sample chromatogram

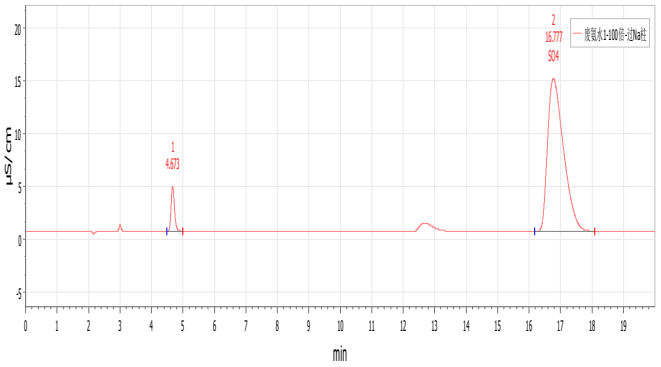

Figure 2. Chromatogram of sample 1#
(Waste ammonia water 1-100 times)

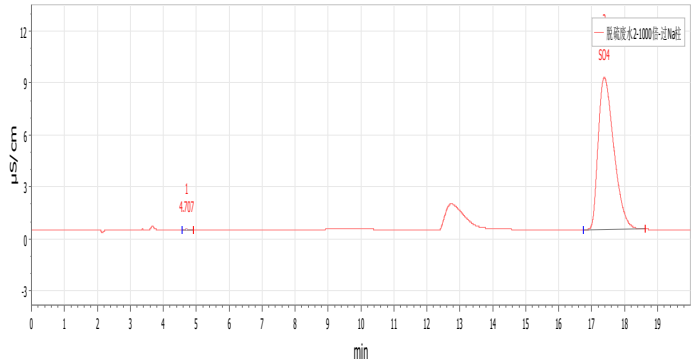

Figure 3. Chromatogram of sample 2#
(Desulfurization wastewater 2-1000 times)

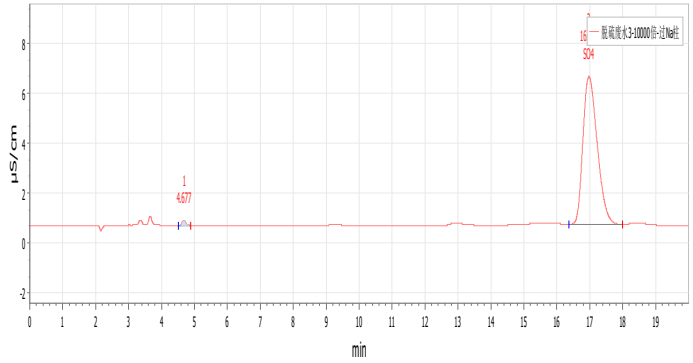

Figure 4. Chromatogram of sample 3#
(Desulfurization wastewater 3-10000 times)

Results and calculations

Table 4: Sample test result (Unit: mg/L)

Sample	SO_3^{2-}	SO_4^{2-}
Waste ammonia water 1	ND	3207.68
Desulfurization wastewater 2	ND	18357.48
Desulfurization wastewater 3	ND	112885.40

Remarks: ① ND indicates not detected or below the detection limit.②During the experiment, it is easy to be contaminated, and experimental personnel are required to strictly follow the operating procedures.

Feasibility analysis and conclusion

The above experiments prove that the detection method has good resolution and is suitable for the determination of the content of the components to be measured in the sample.