Detection of sulfate in microbial culture medium

Introduction:

During microbial cultivation, inorganic salts in the culture medium help maintain the osmotic balance of cells. This experiment is used to verify the determination of sulfate in microbial culture medium.

Detection items (Table 1):

Anion	SO_4^{2-}

Keywords: Ion chromatography, Culture medium, Sulfate

Instruments and equipment

- **Ion chromatograph**: CIC-D180
- **Autosampler**: SHA-18
- **Ultra pure water machine**:ECO-S15

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Requirements

Reagents

Unless otherwise specified, all reagents used are superior grade. SO_4^{2-} anions standard solution (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 (Anions):

Table 3: Anions analysis conditions

Instrument	CIC-D180
Eluent	15 mM KOH
Flow rate	0.7 mL/min
Injection volume	25 μL
Analytical Column	SH-AP-1
Column oven temperature	35℃
Conductivity cell temperature	35℃
Suppressor current	45 mA

Sample preparation

Transfer 1 mL of sample (record accurate mass to 0.0001 g), add water to 10 mL, and record the weight. Passing C18 pretreatment column, Na pretreatment column, After filtering the 0.22μm membrane in sequence , start the machine. Simultaneously conduct a blank detection.

Standard chromatogram

Standard chromatogram, As shown in below:

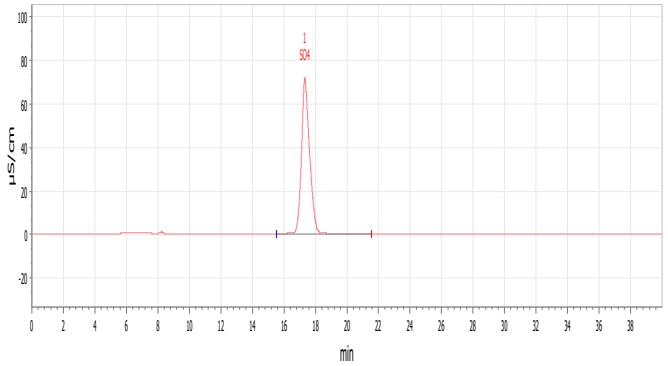

Figure 1. Chromatogram of standard sample.

Blank chromatogram

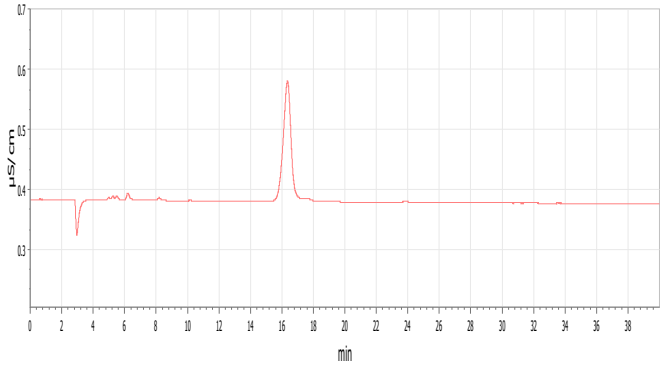

Figure 2. Chromatogram of blank

Sample chromatogram

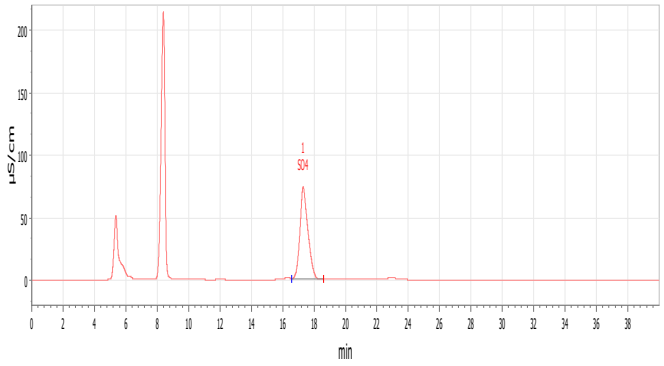

Figure 3. Chromatogram of sample 1#

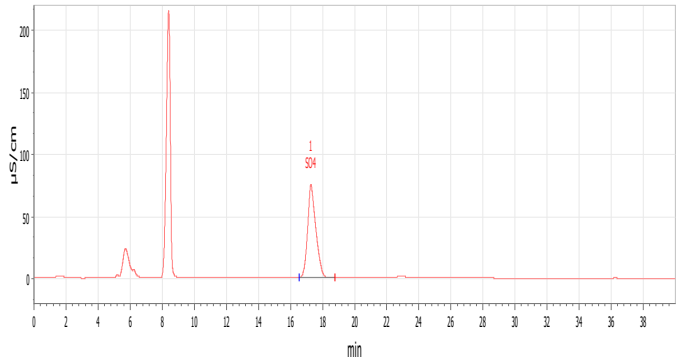

Figure 4. Chromatogram of sample 2#

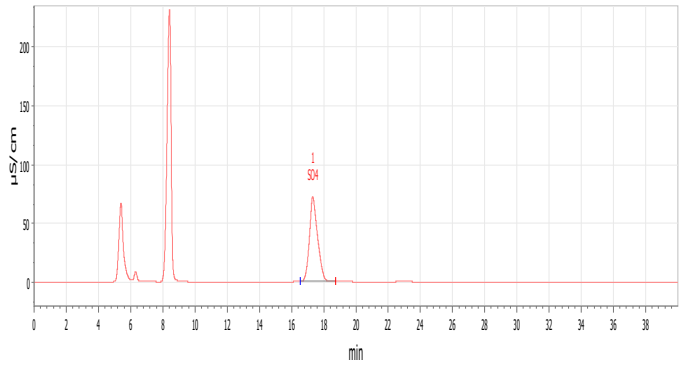

Figure 5. Chromatogram of sample 3#

Results and calculations

Table 4: Sample test result (Anions)

Sample	SO_4^{2-} Content（mg/L）		
	Test 1	Test 2	Average
Sample 1#	1.104	1.111	1.108
Sample 2#	1.100	1.112	1.106
Sample 3#	1.084	1.086	1.085

Remarks: ① ND indicates not detected or below the detection limit; ② The measured value has been deducted from the blank value; ③ There may be differences in testing results between different methods and different laboratories.

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.