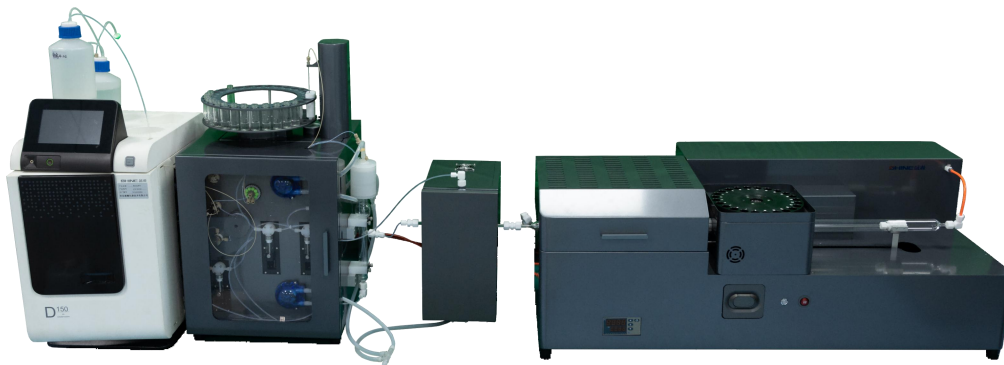




## Detection of bromine in flame retardants

### Introduction:

Bromine based flame retardants are compounds that can decompose at high temperatures and release bromine ions. They can react with free radicals to generate stable bromine compounds, thereby achieving flame retardant effects. Bromine based flame retardants have the advantages of good fire resistance, high stability, and low price, making them widely used in fields such as plastics, rubber, fibers, etc



Detection items (Table 1):

Anion	Br <sup>-</sup>
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**Keywords:** On-line ion chromatography, Bromine

### Instruments and equipment

- **Ion chromatograph:** SH-CIC-3200
- **Ultra pure water machine:** ECO-S15

Qingdao Shenghan Chromatograph Technology Co., Ltd

### Requirements

#### Reagents

Unless otherwise specified, all reagents used are superior grade. Br<sup>-</sup> 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	SH-CIC-3200
Eluent	15 mM KOH
Flow rate	1.0 mL/min
Injection volume	25 μL
Analytical Column	SH-AC-23
Column oven temperature	35°C
Conductivity cell temperature	35°C
Suppressor current	45 mA

### Sample preparation

Weigh an appropriate amount of sample into a combustion boat and perform combustion ion chromatography testing.

Table 4: Sample preparation

No.	Weight (g)	Volume (mL)	Diluting solvent
1#	0.0107	100	NaOH solution
2#	0.0102	100	NaOH solution
3#	0.0098	100	NaOH solution

### Standard chromatogram

Standard chromatogram, As shown in below:

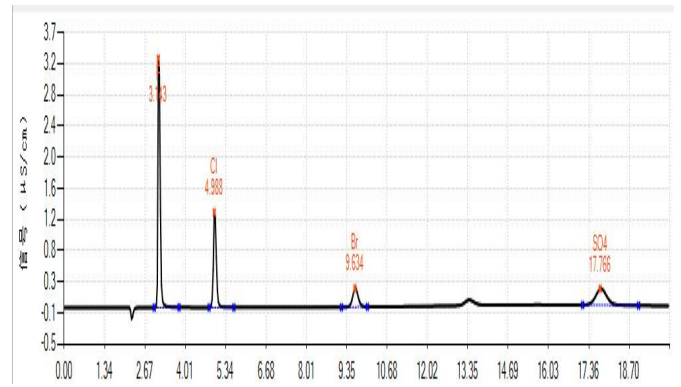


Figure 1. Chromatogram of standard sample.

### Blank chromatogram

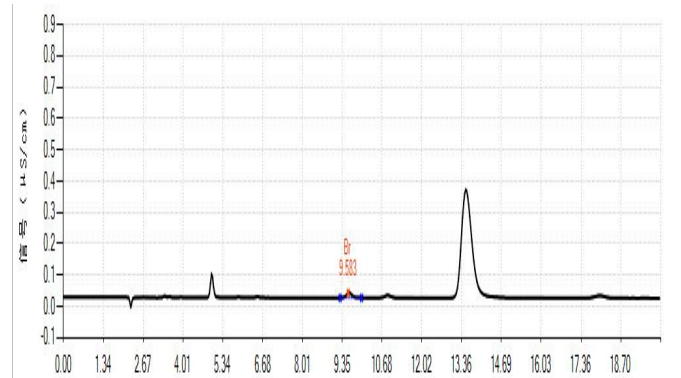


Figure 2. Chromatogram of blank

### Sample chromatogram

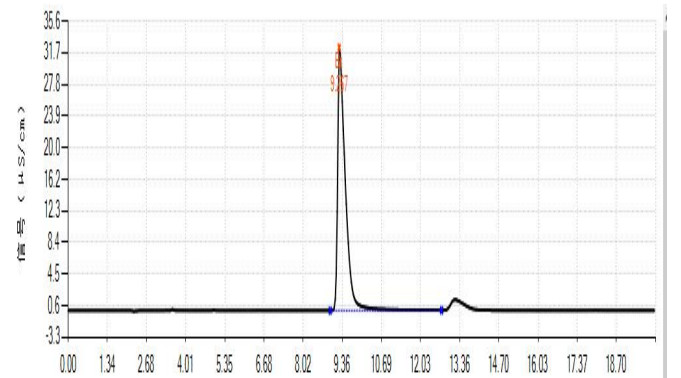


Figure 3. Chromatogram of sample 1#

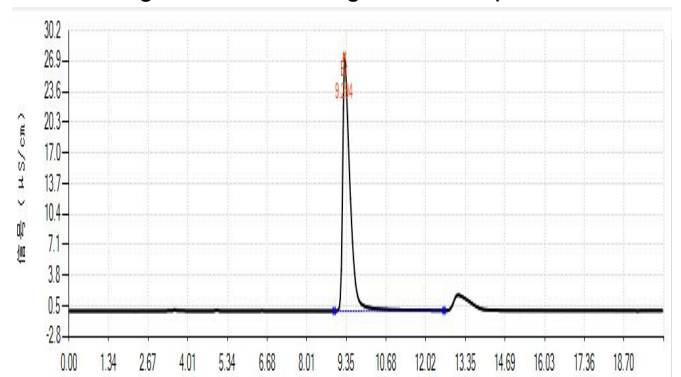


Figure 4. Chromatogram of sample 2#

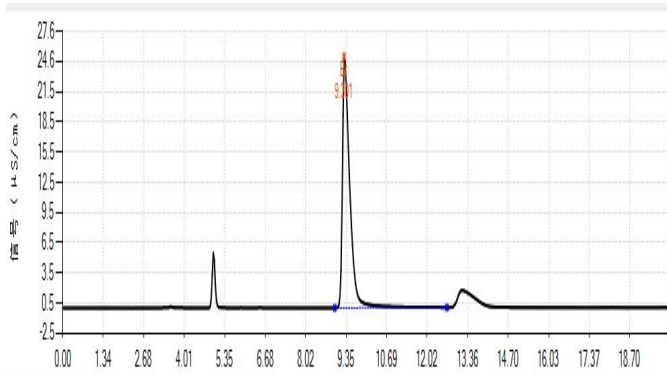


Figure 5. Chromatogram of sample 3#

## Results and calculations

Table 5: Sample test result

Sample	Br (%)
1#	82.19
2#	70.84
3#	65.26

Remarks: ① The measured value has been deducted from the blank value; ② There may be differences in testing results between different methods and 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.