# Detection of bromate and bromide in drinking water

## Introduction:

With the rapid development of the economy, the market demand for mid to high end packaged drinking water, especially for drinking natural water and drinking natural mineral water, has become increasingly prominent. Ozone disinfection is widely used in mineral water production enterprises due to its significantly lower harm of by-products compared to other gas containing disinfectants and low cost. Bromide is a substance that exists in natural water and is easily oxidized to bromate under the action of ozone. They have been recognized by the International Agency for Research on Cancer as potential carcinogens at level 2B. Therefore, it is particularly important to establish an efficient, convenient, and rapid method for detecting the content of bromate in mineral water.

Table 1: Detection items

| **Anion** | $BrO_3^-$ | $Br^-$ |
|---|---|---|

**Keywords:** Bromate, Bromide, Drinking water, Ion chromatography

## 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 bromate and bromide(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 | 13 mM KOH |
| Flow rate | 0.7 mL/min |
| Injection volume | 500 μL |
| Analytical column | SH-AP-1 |
| Column oven temperature | 35℃ |
| Conductivity detector temperature | 35℃ |
| Suppressor current | 50 mA |

## Sample preparation

Pass the sample through 0.22 μm filter membrane, then inject sample for analysis.

## Standard chromatogram

Standard chromatogram, As shown in below:

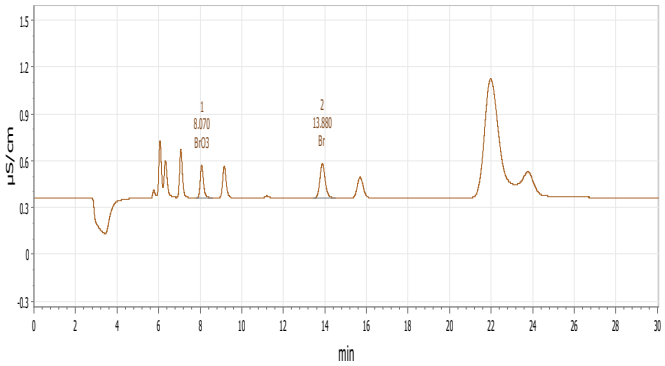


Figure 1. Chromatogram of standard sample.

Table 4: Standard sample information

| Compound | Time [min] | Concentration ug/L | Area [(μS/cm)*min] |
|---|---|---|---|
| $BrO3^-$ | 8.07 | 20.00 | 0.038938 |
| $Br^-$ | 13.88 | 20.00 | 0.066029 |

## Sample chromatogram

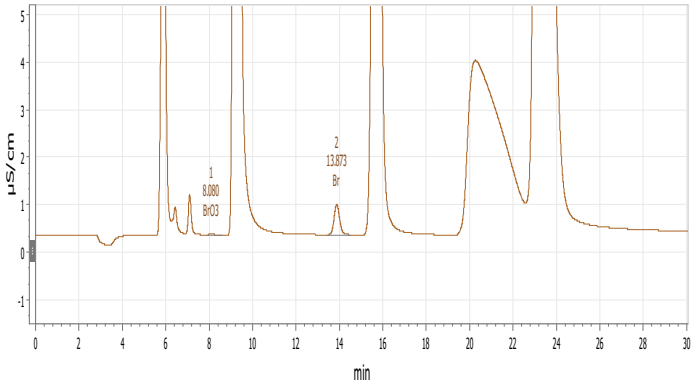


Figure 2. Chromatogram of sample

## Results and calculations

Table 5: Sample test result (Unit: ug/L)

| Sample | $BrO_3^-$ | $Br^-$ |
|---|---|---|
| 1# | 3.411 | 55.913 |

Remarks: ① The test result has deducted the blank space. 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.