Detection of total chloride in petroleum

Introduction:

In recent years, petroleum has grown rapidly, and the types of petroleum processed by refineries have become increasingly complex. The various salts contained in petroleum are not only prone to scaling in furnace tubes and heat exchangers during the processing, but also cause corrosion and catalyst poisoning in the processing equipment due to the hydrolysis of chlorides and sulfides, resulting in HCl and H_2S. This can affect the long-term safe and stable operation of refining and production equipment. Therefore, establishing a simple, fast, and accurate method for detecting chlorine content is of great significance for refining production.

Detection items (Table 1):

Anion	Cl^-

Instruments and equipment

- **Ion chromatograph**: SH-CIC3200
- **Ultra pure water machine**:ECO-S15

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Requirements

Reagents

Unless otherwise specified, all reagents used are superior grade. Commercially available certified standard solutions for Cl^- (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	SH-CIC3200
Eluent	15 mM KOH
Flow rate	1.0 mL/min
Injection volume	25 μL
Analytical Column	SH-AC-23
Column oven temperature	35℃
Conductivity cell temperature	35℃
Suppressor current	45 mA

Sample preparation

Weigh an appropriate amount of sample and place it in a sample boat for combustion ion chromatography testing.

Table 4: Sample treatment

Sample	Height（g）	Constant volume(mL)
1#	0.1482	100
2#	0.1942	100
3#	0.2543	100

Standard chromatogram

Standard chromatogram, As shown in below:

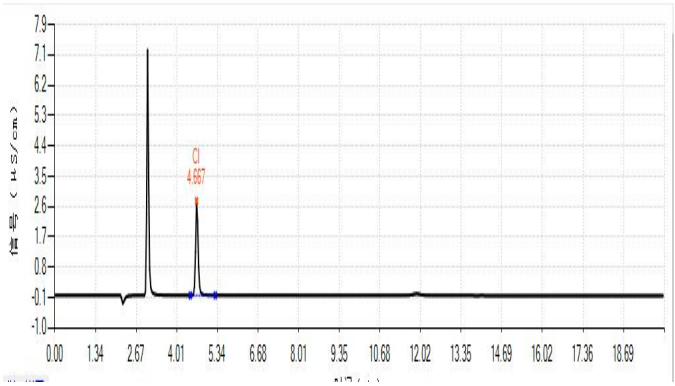

Figure 1. Chromatogram of standard sample.

Blank chromatogram

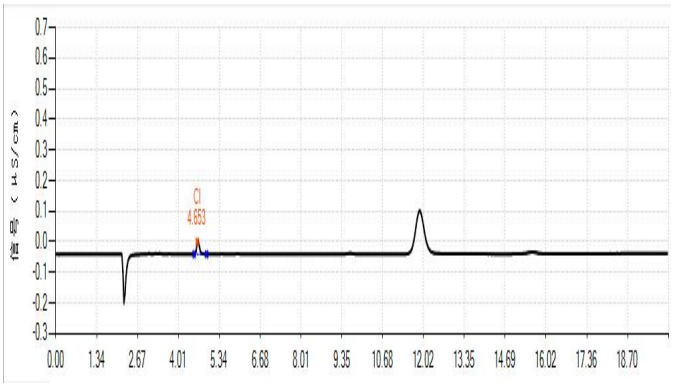

Figure 2. Chromatogram of blank

Sample chromatogram

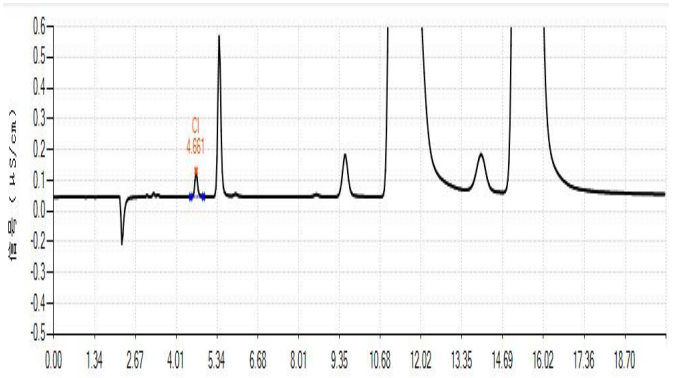

Figure 3. Chromatogram of sample

Results and calculations

Table 5: Sample test result

Sample	Cl^- mg/L
1#	6.926

Remarks: ① The test result has deducted the blank. ② The result is the average of three times. ③ There may be differences in test 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.