Detection of total chloride in epoxy resins

Introduction:

Epoxy resin refers to a type of polymer that contains two or more epoxy groups in its molecules. The most prominent feature of epoxy resin is its strong bonding ability, which is the main component of the familiar universal adhesive. In addition, epoxy resin has good chemical resistance, heat resistance, electrical insulation performance, low shrinkage rate, and better mechanical properties than phenolic resin. Epoxy resin can be used as an adhesive for both metallic and non-metallic materials, and is used to package various electronic components.Therefore, the content of impurity ions in epoxy resin will directly affect the quality of downstream products, especially in the electronics industry. Halogens in FPCB have a significant impact on the insulation performance and service life of circuit boards, so suppliers and users will consider the content of halogens as an important indicator of quality control.

Table 1: Detection items

Anion	Chloride

Keywords: Epoxy resin,Chloride, Ion Chromatograph.

Instruments and equipment

- **Ion chromatograph**: SH-CIC3200
- **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 chloride(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	0.7 mL/min
Injection volume	10 μL
Analytical column	SH-AP-1
Column oven temperature	35℃
Conductivity detector temperature	35℃
Suppressor current	45 mA

Test step

1. Supplementing ultra-pure water (ion chromatography eluent, combustion system absorbent, cleaning solution, cracking water);
2. Turn on argon and oxygen, set the combustion temperature (1000 ℃) for preheating, and turn on the ion chromatograph for equilibrium; (Note: can be turned on at a scheduled time)
3. Burn the empty boat placed on the sample tray blank; (Note: Low background empty boats can be prepared in advance)
4. Weigh an appropriate amount of sample (about 10-80 mg) into the sampling boat, set the program, and wait for the test to end.

Standard chromatogram

Standard chromatogram, As shown in below:

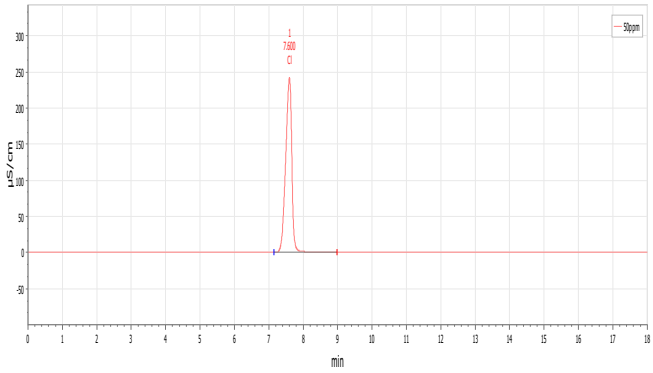

Figure 1. Chromatogram of standard sample.

Sample chromatogram

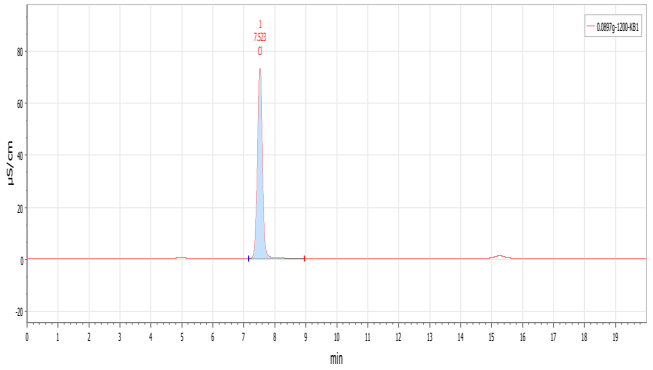

Figure 2. Chromatogram of sample 1#

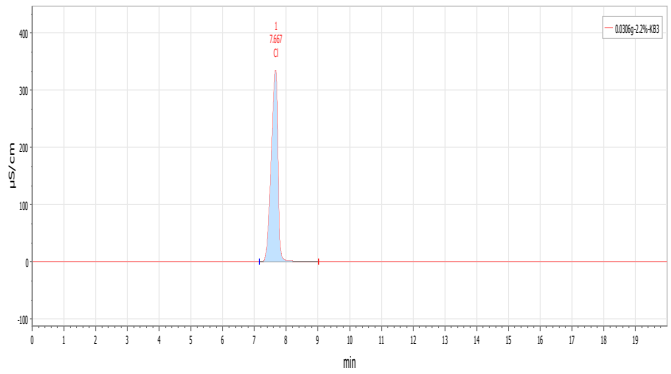

Figure 3. Chromatogram of sample 2#

Results and calculations

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

Sample	Cl^-
1#（0.0832g）	1395.3
2#（0.0306g）	24994.5

Remarks: ①ND 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.