

Application News

Gas Chromatography

No.G272

Analysis of Epichlorohydrin Dissolved from Metal Food Cans by GC

Residual organic solvents in food packaging materials are receiving attention due to the heightened concern for food safety and public health. Specific standards and specifications as well as testing methods are established for each type of material used in food packaging materials in Japan's "Food Sanitation Act-Section 3: Implements, Containers, and Packaging in the Standards and Criteria for Food and Food Additives, etc."

The inside surface of metal food cans is typically coated with synthetic resin to prevent direct contact of

the food with the metal surface of the can. Various types of resins are used for this coating material, including epoxy resin, phenolic resin, and polyvinyl chloride. Separate standards have been established for testing of phenol and formaldehyde, volatile residues, epichlorohydrin, and vinyl chloride; all of these standards rely on dissolution testing followed by gas chromatographic analysis.

This Application News introduces an example of analysis of epichlorohydrin dissolved from a resin coating on the inside of a can used for canned foods.

■ Overview of Epichlorohydrin Analysis Method

This test method provides for GC/FID measurement of epichlorohydrin, one of the raw material monomers of epoxy resin used as an internal-surface coating in metal food cans. (Cans that are used for dried foods or solid foods that make little direct contact with the can's inside surface, and foods other than oily and fatty foods are exempt from this testing. However, cans that are manufactured with the intention of

storing sterilized or pasteurized foods for a long period of time, regardless of the type of food, are subject to this testing.)

In the dissolution test, *n*-pentane is used as the dissolving solution, and the peak area value of epichlorohydrin in the test solution is checked to ensure that it is not greater than the peak area of epichlorohydrin standard solution (0.5 µg/mL).

■ Analytical Method

Sample preparation was conducted according to that specified in the "Food Sanitation Act-Section 3: Implements, Containers, and Packaging in the Standards and Criteria for Food and Food Additives, etc."

Using a commercially-available food can as the sample, the *n*-pentane dissolved solution was heated in the can at 25 °C for 1 hour to allow dissolving, and the obtained dissolved solution was used as the test solution. Since epichlorohydrin and *n*-pentane evaporate easily, the can was covered with aluminum foil and polyvinyl chloride wrapping film, and the film was fixed in place with a rubber band to seal in the solution.

A RESTEK Rtx-WAX (30 mL, 0.53 mm ID, 1 µm film thickness) was used. The carrier gas flowrate was set so that epichlorohydrin would elute in about 7 minutes. The sample preparation flow chart is shown in Fig. 1, and the analytical conditions are shown in Table 1.

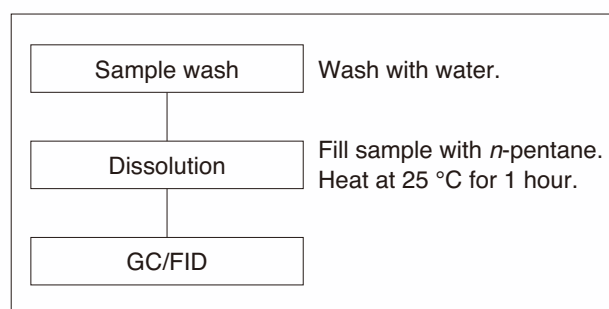


Fig. 1 Preparation of Metal Food Can

■ Analysis of Standard Solution and Test Solution

The chromatograms of the epichlorohydrin standard solution and the test solution obtained using a commercially-available metal food can are shown in Fig. 2.

The epichlorohydrin peak in the test solution chromatogram has a smaller peak area than that of the standard solution, confirming that the concentration of the sample is smaller than the reference value.

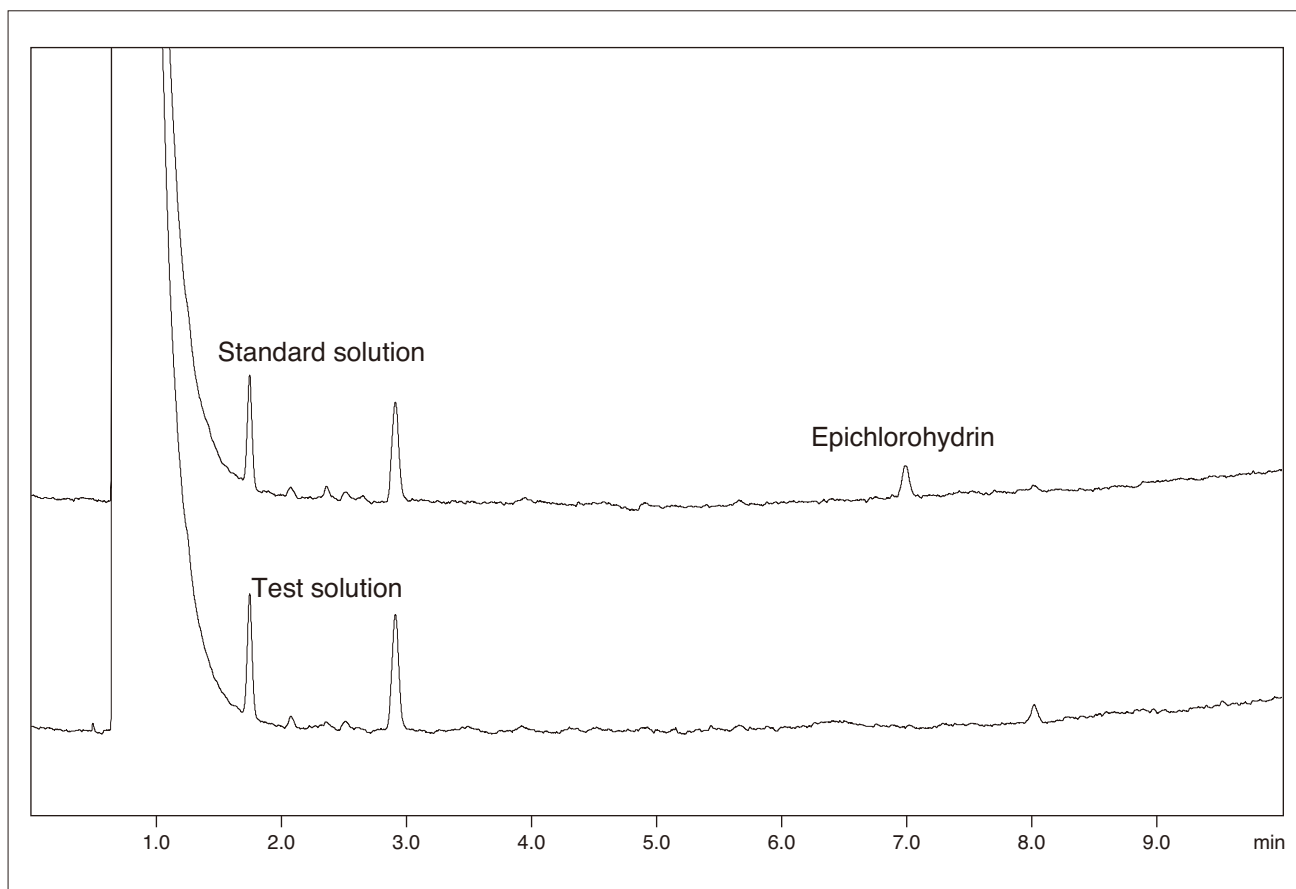


Fig. 2 Chromatograms of Epichlorohydrin Standard Solution and Test Solution

Table 1 Analytical Conditions

Model	: GC-2010PlusAF
Column	: Rtx-WAX (30 mL. × 0.53 mmI.D. df= 1 m)
Column Temperature	: 50 °C (5 min)-10 °C/min-100 °C
Injection Temperature	: 220 °C
Injection Method	: Split 1:10
Carrier Gas	: He 74 cm/sec
Detector	: FID
Detector Temperature	: 220 °C
Injection Volume	: 5 µL

[References]

March 31, 2006 Ministry of Health, Labour and Welfare Notification No. 201

Food Sanitation Act – Section 3: Implements, Containers, and Packaging in the Standards and Criteria for Food and Food Additives, etc.



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