GB

NATIONAL STANDARD OF THE

PEOPLE'S REPUBLIC OF CHINA

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National food safety standard - Food contact materials and products - Determination of migration quantity of 2,2-bis(4-hydroxyphenyl) propane (bisphenol A)

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1 Scope

This standard specifies the method for determining bisphenol A migration quantity in food contact materials and products (PVC, polycarbonate, epoxy resin and molded products).

This standard applies to liquid chromatography-mass spectrometry/mass spectrometry detection of bisphenol A migration quantity in food contact materials and products (PVC, polycarbonate, epoxy resin and molded products).

2 Principles

For the food simulants of food contact materials and products (PVC, polycarbonate, epoxy resin, and molded products),use liquid chromatography-mass spectrometry/mass spectrometry to detect; in which, water-based, acidic food, and alcoholic food simulants directly inject, the oil-based food simulant inject after being extracted through methanol solution and then use liquid chromatography-mass spectrometry/mass spectrometry to detect bisphenol A in food simulants; use the method of external standard peak area to quantify.

3 Reagents and materials

Unless otherwise indicated, the reagents used in this method are analytical grade, the water is the grade-1 water specified in GB/T 6682. The containers and transfer apparatuses in the test shall avoid using plastic materials.

3.1 Reagents

3.1.1 Water-based, acidic, alcoholic, oil-based food simulants: The reagents used are according to the provisions of GB 5009.156.

4.1.1.1 Standard working solution of water-based, acidic food and alcoholic food simulants

Accurately PIPETTE 0mL, 0.01mL, 0.05mL, 0.1mL, 0.5mL, 1.0mL of bisphenol A standard intermediate solution into 10mL volumetric flask; USE water to dilute it; OBTAIN standard working solution with bisphenol A concentration of 0.00mg/L, 0.01mg/L, 0.05mg/L, 0.1mg/L, 0.5mg/L,1.0mg/L, respectively. In the same way, USE the corresponding water-based, acidic food and alcoholic food simulants to prepare bisphenol A standard working solution with the same concentration series.

4.1.1.2 Oil-based food simulant standard working solution

Respectively WEIGH 1g (accurate to 0.01g) of oil-based food stimulant; PLACE it into 7 stoppered test tubes; USE micro-scale glass syringe which is calibrated by gravimetric method to respectively move 0mL, 0.01mL, 0.03mL, 0.05mL, 0.07mL, 0.1mL, 0.3mL of bisphenol A standard intermediate solution into test tubes; OBTAIN standard working solution with the concentration of 0.00mg/kg, 0.10mg/kg, 0.30mg/kg, 0.50mg/kg, 0.70mg/kg, 1.0mg/kg, 3.0mg/kg, respectively. ADD respectively 3mL of n-hexane into each tube; MIX it uniformly; ADD 2mL of methanol-water mixture (1+1); KEEP vortex and vibration for 2 min; LET it stand for stratification. USE glass syringe to suck up the substratum aqueous solution; FILTER it through 0.2μm nylon filter membrane for determination.

4.1.2 Preparation of food simulant test solution

4.1.2.1 General rules

This standard food simulation test uses water-based, acidic food, alcoholic, oil-based food simulants, which can include water-based, acidic food, alcoholic food, and fatty food. The required test solution is obtained by migration test and stored in a refrigerator at 4° C in dark place for a week.

4.1.2.2 Migration test

Note: The actual food simulants and migration conditions refer to the provisions of GB 5009.156.

4.1.2.2.1 Raw materials

Tightly TILE the monolayer of raw material sample on the paper of known size; CALCULATE its surface area by cuboid (thickness cannot be ignored). For each 0.06dm^2 food contact area, 10mL (or 10g) of food simulants is required, PLACE it at 40°C for 240h ± 0.5h; CONDUCT a migration test (or by weight).

4.1.2.2.2 Molded products

$$c = \frac{y - b}{a} \qquad \cdots\cdots(1)$$

Where:

c - The bisphenol A concentration in food simulant test solution, in milligrams per liter (mg/L) or milligrams per kilogram (mg/kg);

y - The peak area of bisphenol A in food simulant test solution;

b - The intercept of regression curve;

a - The slope of regression curve.

5.2 Conversion calculation of bisphenol A specific migration quantity

According to the food simulant volume used in migration experiment and the detection area of test sample and food stimulant, the bisphenol A concentration in food simulant test solution obtained in 5.1 is calculated through mathematical conversion to obtain the specific migration quantity of bisphenol A, expressed in (mg/kg) or (mg/dm^2). The specific operation refers to the provisions of GB 5009.156.

The calculation results are expressed as the arithmetic mean of the two independent determination results obtained under repeatability conditions, and the results are retained with two significant figures.

6 Precision

The absolute difference between two independent determinations obtained under repeatability conditions shall not exceed 10% of the arithmetic mean.

7 Others

The method detection limit of bisphenol A in water-based, acidic food and alcoholic food simulants is 0.001mg/L, and the method detection limit of bisphenol A in oil-based food simulant is 0.01mg/kg.

The method quantitative limit of bisphenol A in water-based, acidic food and alcoholic food simulants is 0.01mg/L, and the method quantitative limit of bisphenol A in oil-based food simulant is 0.10mg/kg.

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