



**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB 31604.8-2021

**Food safety national standard - Food contact materials and
products - Determination of total migration**

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1 Scope

This Standard specifies the methods for determination of total migration for food contact materials and products.

This Standard is applicable to the determination of total migration for food contact materials and products.

Part One -- Determination of total migration in water-based food simulants, chemical alternative solvents

2 Principle

The specimen uses water-based food simulants and chemical alternative solvents [such as n-hexane, isooctane, 95% (volume fraction) ethanol solution, n-heptane]. Perform migration test under selected migration test conditions.

Evaporate and dry the soaking liquid obtained from the migration test. After deducting the corresponding blanks, the total amount of all non-volatile substances migrated from the specimen to water-based food simulants and chemical substitute solvents is obtained.

3 Reagents and materials

Unless otherwise specified, the reagents used in this method are analytically pure, and the water is grade two water specified in GB/T 6682.

3.1.5 Isooctane (C₈H₁₈).

3.1.6 95% ethanol.

4.3 Electric heating constant temperature water bath or other electric heating equipment.

5.1 Migration test

Food contact materials and products are subjected to migration tests in accordance with the requirements of GB 31604.1 and GB 5009.156.

5.2 Determination of total migration of water-based food simulants and

chemical substitute solvents Wash and drain the evaporating dish before use. Dry for 2h in a 100°C±5°C electric heating constant temperature drying oven. Then weigh it after cooling for 0.5h in a desiccator. Repeat drying, cooling, and weighing until constant weight (that is, the difference in mass between the two weighings does not exceed 0.5mg). The last weighed mass is the mass of the empty evaporating dish.

5.3 Determination of trichloromethane extract

The determination steps are applicable to food contact materials and products that require the detection of chloroform extracts in the product standard.

Add 20mL of chloroform to the residue obtained in 5.2. Wetting the residue. Use the filter paper to filter. Collect the filtrate into an evaporating dish with constant weight. Then use 20mL of chloroform to extract the residue twice respectively.

Use a little chloroform to rinse the filter paper. The filtrate is incorporated into the

evaporating dish. Steam to dry according to step 5.2. Obtain the mass of the residue extracted with chloroform from the soaking solution for the specimen determination.

5.4 Blank test

Treat water-based food simulants, chemical alternative solvents, and chloroform that are not in contact with food contact materials and products according to 5.1, 5.2, and 5.3. Obtain the residue mass of the blank soaking solution and the residue mass of the blank soaking solution extracted with chloroform.

6.1.1.1 Food contact materials and products of non-sealed products

When the total migration of food contact materials and products other than sealed products such as lids, gaskets, and connectors (hereinafter referred to as sealing products) is expressed in mg/dm², it is calculated according to formula (1).

Where,

6.1.2.1 Food contact materials and products of non-sealed products

When the total migration amount of food contact materials and products of non-sealed products is expressed in mg/kg, it is calculated according to formula (3).

7 Precision

When the total migration result is $\leq 10.0\text{mg/dm}^2$ or 60.0mg/kg , the difference between the two independent determination results obtained under repeatability conditions and the arithmetic mean shall not exceed 1.0mg/dm^2 or 6.0mg/kg . The determination result after applying the correction factor shall also meet this requirement.

When the total migration result is $> 10.0\text{mg/dm}^2$ or 60.0mg/kg , the difference between the two independent determination results obtained under repeatability conditions and the arithmetic mean shall not exceed 10% of the arithmetic mean. The determination result after applying the correction factor shall also meet this requirement.

8 Principle

The specimen uses olive oil as a food simulant. The migration test is carried out under the selected conditions. The total migration is determined by the specimen mass reduction method. That is, use the initial mass of the specimen before the migration test to subtract the net mass of the specimen after soaking in olive oil to obtain the mass of non-volatile substances migrated from the specimen. Calculate the corresponding total migration amount according to the formula. The net mass of the specimen after soaking in olive oil is the mass of the specimen when it is taken out of the olive oil minus the mass of olive oil absorbed by the specimen plus the mass of volatile matter. The olive oil absorbed by the

specimen is extracted, saponified, and methyl esterified by the Soxhlet extractor to generate fatty acid methyl esters. Use gas chromatography to analyze. Use internal standard method to quantify.

9 Reagents and materials

Unless otherwise specified, the reagents used in this method are analytically pure, and the water is grade two water specified in GB/T 6682.

9.1.1 Olive oil. Its mass requirements shall meet the requirements of Annex A of GB 5009.156.

9.2.1 N-pentane-ethanol (95+5) mixed solution. Measure 950mL of n-pentane and mix it with 50mL of absolute ethanol.

9.2.2 Potassium hydroxide-methanol solution (11.0g/L). Weigh 5.5g of (accurate to 0.1g) potassium hydroxide and dissolve it in 500mL of methanol. Mix well.

9.2.3 Saturated sodium sulfate solution. Weigh 50g (accurate to 0.1g) of anhydrous sodium sulfate in a 250mL beaker. Add 100mL of water on the electric hot plate and boil to dissolve. After cooling to room temperature, use a funnel equipped with qualitative filter paper to filter into a breaker.

9.3 Standard product

Heptadecanoic acid triglyceride (C₅₄H₁₀₄O₆, CAS number. 2438-40-6). Purity ≥98%, or standard material certified by the country and awarded with a standard material certificate.

9.4.1 Internal standard solution (2.0mg/mL)

Accurately weigh 1.0g (accurate to 0.1mg) of heptadecanoic acid triglyceride.

Place in a 100mL beaker. Add cyclohexane to dissolve. Transfer to a 500mL volumetric flask. Wash the beaker 3 times with cyclohexane. The washing liquid is combined into the volumetric flask. Use cyclohexane to set volume. Store in a refrigerator at 4°C. The validity period is 1 month.

9.4.2 Olive oil standard stock solution (100mg/mL)

Weigh 5.0g of blank olive oil obtained from migration test (accurate to 0.1mg).