NATIONAL STANDARD OF THE

PEOPLE'S REPUBLIC OF CHINA

GB 5009.8-2023

National food safety standard - Determination of fructose, glucose, sucrose, maltose and lactose in foods

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1 Scope

This Standard specifies the methods for the determination of fructose, glucose, sucrose,

maltose and lactose in foods.

Method 1 - High performance liquid chromatography applies to the determination of fructose, glucose, sucrose, maltose and lactose in grains and grain products, milk and dairy products, fruits, vegetables and fruit and vegetable products, sweeteners, candies, beverages and infant foods.

Method 2 - Ion chromatography applies to the determination of fructose, glucose, sucrose, maltose, and lactose in foods.

Method 3 - Acid hydrolysis-Rhein-Eynon method applies to the determination of sucrose in foods.

Method 4 - Rhine-Enon method applies to the determination of lactose in infant foods and dairy products.

Method 1 - High performance liquid chromatography

2 Principle

The fructose, glucose, sucrose, maltose and lactose in the sample are extracted, and then separated by high performance liquid chromatography column, detected by a differential refractive index detector or an evaporative light scattering detector, and quantified by the external standard method.

3 Reagents and materials

Unless otherwise specified, all the reagents in this method are analytical reagents, and the water is grade-1 water specified by GB/T 6682.

4.1 High performance liquid chromatograph. equipped with a differential refractive

index detector or an evaporative light scattering detector.

5.1.3 Purification

For the above sample extract solution, use a filter paper to filter (discard the primary filtrate) or centrifuge to obtain the supernatant; then, use a 0.45 um water-based membrane syringe to filter into a sample bottle for analysis by a high-performance liquid chromatograph.

5.2 Apparatus reference conditions

Apparatus reference conditions are as below.

90 °C; nitrogen flow rate 2.5 L/min.

5.3 Preparation of the standard curve

Inject the mixed standard working solution into the high-performance liquid chromatograph in order from low to high concentration, and measure the corresponding peak areas or peak heights of fructose, glucose, sucrose, maltose and lactose. For the differential refractive index detector, use the concentration of the standard working fluid as the abscissa and the peak area or peak height as the ordinate to draw a standard curve;

5.4 Determination of sample solution

Inject the sample solution into the high-performance liquid chromatograph;

qualitatively record the peak area or peak height of the target substance based on the retention time; obtain the concentrations of fructose, glucose, sucrose, maltose and lactose in the sample solution based on the standard curve.

5.5 Blank test

Except that no sample is added, proceed according to the above steps.

6 Expression of analysis results

Calculate the contents of fructose, glucose, sucrose, maltose and lactose in the sample according to Formula (1).

7 Precision

The absolute difference of 2 independent test results obtained under repeatability cannot exceed 10% of the arithmetic mean value.

8 Others

When the weighing sample is 10 g and the fixed volume is 100 mL, the method detection limits for fructose, glucose, sucrose, maltose and lactose are all 0.2 g/100 g, and the quantification limits are all 0.5 g/100 g.

9 Principle

After extraction and purification, the fructose, glucose, sucrose, maltose and lactose in the sample are separated by an ion chromatography column, detected by a pulse ampere detector, and quantified by the external standard method.

10 Reagents and materials

Unless otherwise specified, all the reagents in this method are analytical reagents, and the

water is grade-1 water specified by GB/T 6682.

10.3.1 Fructose (C6H12O6, CAS number. 57-48-7). purity >=99%, or standard material

certified by the country and awarded a standard material certificate.

10.3.2 Glucose (C6H12O6, CAS number. 50-99-7). purity >=99%, or standard material

certified by the country and awarded a standard material certificate.

10.5 Materials

10.5.1 0.45 um water-based membrane syringe filter (except cellulose membrane).

10.5.2 Purification column. C18 solid-phase extraction cartridge (1.0 mL) or one with

equivalent performance.

12.1.1 Sample preparation

Take an appropriate amount of representative sample; for drinks and other liquid homogeneous samples, shake directly; for non-uniform samples, homogenize or crush evenly; for frozen drinks, melt at room temperature, stir thoroughly and, if necessary, heat and stir in a water batch at 30 °C ~ 40 °C; for sauces, grind or homogeneously mix;

for chocolate, heat and melt in a water bath at 50 °C ~ 60 °C, and stir thoroughly while it is hot.

12.1.3 Sample purification

The sample extraction solution can be diluted by an appropriate multiple according to the target sugar content in the sample. When detecting lactose in infant formula milk powder, dilute it 1 000 times and then purify it; when detecting high sugar content in honey and candy, dilute it 500 times and then purify it.

After filtering or centrifuging the above sample extraction solution or dilution solution to obtain the supernatant, pass it through a 0.45 um aqueous membrane syringe filter and a C18 solid phase extraction cartridge (1.0 mL) in sequence; discard the first 3 mL;

collect subsequent eluates for testing.

12.2 Apparatus reference conditions

Apparatus reference conditions are as below.