NATIONAL STANDARD OF THE

PEOPLE'S REPUBLIC OF CHINA

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National food safety standard - Determination of dietary fiber in foods

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1 Scope

This Standard specifies the method for determination of dietary fiber in food.

This Standard is applicable to the determination of total dietary fiber, soluble dietary fiber, and insoluble dietary fiber in plant foods and their products, as well as foods with added dietary fiber components.

2 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

2.1 dietary fiber; DF

Carbohydrate polymers that cannot be digested and absorbed by the human small intestine and have a degree of polymerization >=3.

According to its source, dietary fiber is divided into. Carbohydrate Polymers naturally present in the edible parts of plants, such as cellulose, hemicellulose, pectin, lignin, etc.

in plant cell walls; & Carbohydrate Polymers that are isolated, extracted or synthesized from food raw materials using physical, enzymatic or chemical means and have been proven by scientific evidence to have beneficial physiological effects.

2.2 soluble dietary fiber; SDF

The portion of dietary fiber that is soluble in water, including indigestible oligosaccharides and some polysaccharides.

During the detection process, based on whether it can be precipitated by 78% ethanol, it is divided into precipitable soluble dietary fiber (SDFP) and non-precipitable soluble dietary fiber (SDFS).

2.3 insoluble dietary fiber; IDF

The portion of dietary fiber that is insoluble in water.

2.4 total dietary fiber; TDF

The sum of soluble dietary fiber and insoluble dietary fiber.

3 Principle

The specimen is homogenized and enzymatically hydrolyzed to remove starch and protein to obtain an indigestible enzymatic hydrolyzate.

The enzymatic hydrolyzate is precipitated with 78% ethanol. Collect the precipitated part, wash, dry and weigh it, and then measure the mass of DF (including IDF and SDFP)

in the residue. Collect the filtrate portion. After desalting and concentration, liquid chromatography (internal standard method) is used to determine SDFS. The sum of the two is TDF.

4 Reagents and materials

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

4.1 Reagents

4.1.1 95% ethanol (CH3CH2OH).

4.1.17 Weakly basic acrylic anion exchange resin (OH-). cross-linked acrylic gel whose

functional group is tertiary amine group; average particle size is 0.50 mm~0.75 mm;

ion exchange capacity (based on OH-) >=1.6 mmol/mL.

4.1.18 Strongly acidic hydrogen ion exchange resin (H+). styrene-divinylbenzene

copolymer whose functional group is sulfonic acid (SO3-); average particle size is 0.82 mm~1.00 mm; ion exchange capacity (calculated as H+) >=1.6 mmol/mL.

4.2.1 Ethanol solution (78%). Take 821 mL of 95% ethanol. Dilute with water and

bring

to 1 L. Mix well.

4.2.2 Ethanol solution (85%). Take 895 mL of 95% ethanol. Dilute with water and bring

to 1 L. Mix well.

4.2.8 Maleic acid buffer (50 mmol/L). Weigh 11.6 g of maleic acid and dissolve it in

1600 mL of water. Adjust to pH=6.0 with 4 mol/L sodium hydroxide solution. Add another 0.6 g of calcium chloride dihydrate. Add water to dilute to 2 L. Store at 4°C protected from light. The storage period does not exceed 1 month.

4.2.9 Trishydroxymethylaminomethane (Tris) solution (0.75 mol/L). Weigh 90.8 g of

Tris solid and dissolve it in about 800 mL of water. Add water to dilute to 1 L.

4.2.10 Acetic acid solution (2 mol/L). Measure 115 mL of glacial acetic acid. Add water

to dilute to 1 L.

4.2.11 Mixed enzyme solution. Take 0.5 g of pancreatic alpha-amylase and 0.05 g of

amyloglucosidase. Use 50 mL of 50 mmol/L maleic acid buffer to prepare a solution containing 400 U of pancreatic alpha-amylase and 30 U of amyloglucosidase per mL.

Vortex for 5 min. Prepare when needed.

4.2.12 Protease solution. Take 2.5 g of protease. Use 50 mL of 50 mmol/L maleic acid

buffer to prepare a protease solution containing 50 mg per mL. Vortex for 5 min. Prepare when needed. Store at 4°C before use.

4.4.1 Diethylene glycol internal standard solution (100 mg/mL). Accurately weigh 10

g (accurate to 0.1 mg) of diethylene glycol. Dilute with water. Transfer to a 100 mL volumetric flask. Add water and bring volume to the mark. Prepare when needed.

4.4.2 D-glucose standard solution (10 mg/mL). Accurately weigh 1.0 g (accurate to 0.1

mg) of D-glucose. Dissolve in water and transfer to a 100 mL volumetric flask. Add water to bring volume to the mark. Prepare when needed.

4.4.4 Qualitative standard solution. Weigh about 0.10 g of fructose and 0.10 g of D-

maltose monohydrate. Dissolve in water. Transfer to a 50 mL volumetric flask. Add 1 mL of 100 mg/mL diethylene glycol internal standard solution. Add water to bring volume to the mark. Prepare when needed.

5.2.1 Vacuum filtration device. Vacuum pump or aspirator with regulating device. 1 L

suction filter bottle with a suction filter port on the side wall and a rubber stopper matching the suction filter bottle, used for suction filtration of enzymatic hydrolyzate.

5.2.2 Constant temperature oscillating water bath. with automatic timer. The

temperature control range is room temperature +5 degrees C~100 degrees C. The temperature fluctuation is +/-1 degrees C.

5.2.4 Crucible. with rough sintered glass plate. Pore diameter is 40 um~60 um. The

cleaned crucible is ashed in a muffle furnace at 550°C+/-25°C for 6 h. The furnace temperature drops below 130 degrees C and is taken out. Soak in potassium dichromate washing solution at room temperature for 2 h. Rinse well with tap water and water respectively. Finally, rinse with 15 mL of acetone and air dry. Before use, add about 1.0 g of diatomaceous earth and bake at 130 degrees C+/-3 degrees C until constant weight. Take out the crucible. Cool in a desiccator for approximately 1 h. Weigh and record the mass of the crucible (containing diatomite, mG), accurate to 0.1 mg.

5.3 High performance liquid chromatography (HPLC). equipped with a differential

refractive index detector and an 80°C column oven.

5.8 pH meter. with temperature compensation function, accuracy of +/-0.1.Calibrate

with pH 4.0, 7.0 and 10.0 standard buffers before use.