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Test methods of canned foods

罐头食品的检验方法

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Test methods of canned foods

1 Scope

This document describes methods for testing canned foods for organoleptic quality, soluble solids, net and solids content, pH, dry matter, headspace, and vacuum degree.

This document is applicable to the inspection of canned food.

2 Normative references

The following documents contain the provisions which, through normative reference in this document, constitute the essential provisions of this document. For the dated referenced documents, only the versions with the indicated dates are applicable to this document; for the undated referenced documents, only the latest version (including all the amendments) is applicable to this document.

GB 5009.237 National standard food safety - Determination of pH value in food

GB/T 10784 Classification of canned food

GB/T12143-2008 General analytical methods for beverage

3 Terms and definitions

The terms and definitions defined in GB/T 10784 apply to this document.

4 Senses

4.1 Requirements for sensory analysis laboratory

Sensory analysis laboratories shall be set up according to actual needs, see GB/T 13868.

4.2 Requirements for sensory analysis personnel

4.2.1 The sensory analysis personnel shall be in good health, and their vision, smell, taste, touch, etc. meet the sensory analysis requirements.

4.2.2 The sensory analysis personnel shall have relevant skills, be familiar with the color, taste, smell, structure, and shape of the analyzed samples and the required methods, etc., and master the relevant sensory analysis terms.

4.2.3 On the day of sensory analysis, the analysis personnel shall not use smelly cosmetics, smoke, or drink alcohol.

4.2.4 During the sensory analysis, the sensory analysis personnel shall wear clean and odor-free work clothes and caps.

4.2.5 The sensory analysis shall not be carried out when the analysis personnel is hungry or tired.

4.2.6 The sensory analysis personnel shall keep their mouth clean 1 hour before the start of the analysis, and not eat anything except drinking water.

4.3 Instruments and equipment

4.3.1 White porcelain plate.

4.3.2 Sanitary can opener.

4.3.3 Spoons.

4.3.4 Stainless steel round sieve.

4.3.5 Beakers.

4.3.6 Measuring cylinder.

4.4 Structure, shape, and impurities

4.4.1 The canned meat, canned poultry, and canned aquatic product are first heated until the soup is melted (some canned food such as luncheon meat, anchovies, etc. do not need to be heated), then pour the contents into a white porcelain plate, observe and inspect the structure, shape, and impurities according to the requirements of the corresponding product standards.

4.4.2 Open canned fruits with syrup, canned vegetables, and canned mushrooms at room temperature, filter out the soup first, then pour the contents into a white porcelain plate, observe and inspect the structure, shape, and impurities according to the requirements of the corresponding product standards.

4.4.3 After the canned fruit with heavy syrup is opened, pour the contents into a stainless-steel round sieve, let them stand for 3 minutes, then pour the contents into a white porcelain plate, observe and inspect the structure, shape, and impurities according to the requirements of corresponding product standards.

4.4.4 Open the canned jam at room temperature (15 °C~20 °C), take out the jam (about 20 g) with a spoon and place it on a dry white porcelain plate, and check within 1 minute whether the jam body has flowed and the juice has effused. Observe and inspect the

structure, shape, and impurities according to the requirements of corresponding product standards.

4.4.5 After the canned juice is opened, pour the contents into a glass container and let them stand for 30 minutes, then observe the degree of precipitation, stratification, and oil ring phenomenon, and observe and inspect the structure, shape, and impurities according to the requirements of the corresponding product standards.

4.4.6 Shake the canned porridge well, open the can, and pour the contents into a white porcelain plate; spread them evenly, then observe and inspect the structure, shape, and impurities according to the requirements of product standards.

4.4.7 For other canned foods, refer to the above-mentioned similar methods.

4.5 Color

4.5.1 For canned meat, canned poultry, and canned aquatic products, observe whether the color meets the standard in a white porcelain plate, pour the soup into a measuring cylinder, and observe the color and clarity after standing for 3 minutes.

4.5.2 For canned fruits with syrup, canned vegetables, and canned mushrooms, observe whether the color meets the standard in a white porcelain plate, pour the juice into a beaker, and observe whether the juice is clear and transparent, whether there are inclusions and crushed fruit pulp causing turbidity.

4.5.3 For canned fruits with heavy syrup, pour all the contents into a white porcelain plate, then observe whether it is cloudy, whether there is jelly, a large amount of crushed fruit pulp, and inclusions. Pour the pulp on the stainless steel round sieve into the plate and observe the color.

4.5.4 For canned jams and canned tomato paste, pour all the jam into a white porcelain plate and observe the color.

4.5.5 Pour the canned juice into a glass container and let it stand for 30 minutes, then observe the color.

4.5.6 Shake the canned porridge well, open the can, pour it into a white porcelain plate, spread it evenly, and observe the color.

4.5.7 For other canned foods, refer to the above-mentioned similar methods.

4.6 Taste and smell

4.6.1 For canned food, check whether it has the taste and smell that the product shall have, and whether it has a rancid taste or a peculiar smell.

4.6.2 For canned fruits and canned vegetables, check whether they have a fragrance

5.3.1.4 Canned porridge

After the can is opened, stir evenly to form the sample to be tested.

5.3.1.5 Products with separate solid and liquid phases

According to the solid-liquid phase ratio of the sample itself, the sample is crushed with a masher and then filtered; the filtrate is used for determination.

5.3.2 Determination

5.3.2.1 The refractometer shall be calibrated according to the instructions before the measurement.

5.3.2.2 Separate the two prisms of the refractometer and clean them with absorbent cotton dipped in ether or alcohol.

5.3.2.3 Dip 2~3 drops of the prepared sample solution with a glass rod with a rounded end, and carefully drop it on the center of the prism plane of the refractometer (be careful not to let the glass rod touch the prism).

5.3.2.4 Quickly close the upper and lower prisms and let them stand for 1 min. The liquid is required to be uniform without bubbles and to fill the field of vision.

5.3.2.5 Aim at the light source, observe through the eyepiece, and adjust the indicator gauge so that the field of view is divided into two parts, light and dark. Then, turn the trim knob to make the boundary between the two parts clear, and the dividing line is just at the cross point of the objective lens, and read the reading.

5.3.2.6 If the scale of the ruler of the refractometer is a percentage, the reading is the mass fraction of soluble solids, which is converted to the standard mass fraction of soluble solids at 20 °C according to the correction table of soluble solids content versus temperature (see Table B.1 of Appendix B of GB/T 12143-2008).

5.3.2.7 If the reading of the ruler scale of the refractometer is the refractive index, the refractive index can be read, and the mass fraction of soluble solids in the sample can be obtained according to the conversion table of the refractive index and soluble solids content (see Table A.1 of Appendix A of GB/T 12143-2008); then, the mass fraction of soluble solids is converted into the standard mass fraction of soluble solids at 20 °C according to the correction table of soluble solids content versus temperature (see Table B.1 of Appendix B of GB/T 12143-2008).

5.3.2.8 The Brix meter shall be calibrated before measurement. Open the cover of the Brix meter and wipe off the detection prism with lens cleaning paper. Take a few drops of the solution to be tested, place it on the detection prism, and close the cover gently to avoid bubbles; spread the solution all over the surface of the prism, and aim the light

6.1.1 For cans with a net weight of less than 1.5 kg, a circular sieve with a diameter of 200 mm shall be used; it shall be woven with stainless steel wire with a diameter of 1 mm, and its holes shall be 2.8 mm×2.8 mm (equivalent to a 7-mesh circular sieve).

6.1.2 For cans with a net weight equal to or greater than 1.5 kg, a circular sieve with a diameter of 300 mm shall be used; it shall be woven with stainless steel wire with a diameter of 1 mm, and the hole size shall be 2.8 mm×2.8 mm (equivalent to a 7-mesh circular sieve).

6.1.3 For sticky canned porridge, canned bird's nest, and other canned foods, a round sieve with a diameter of 200 mm shall be used; it shall be woven with stainless steel wire with a diameter of 0.5 mm, and the holes shall be 0.85 mm×0.85 mm (equivalent to a 20-mesh round sieve).

6.2 Measurement steps

6.2.1 Net content

Wipe the outer wall of the can, and weigh the total mass of the canned food with a balance.

The canned meat, canned poultry, and canned aquatic products need to be heated to melt the jelly before opening the can. Canned fruits and canned vegetables can be opened directly without heating. After pouring out the contents, wash the container, wipe dry, weigh it, and calculate the net content according to formula (2):

$$m = m_4 - m_3 \quad \dots\dots\dots (2)$$

where:

m -- the net content of the canned food, in grams (g);

m_4 -- the total mass of the canned food, in grams (g);

m_3 -- the mass of the container, in grams (g).

6.2.2 Solids content

6.2.2.1 canned fruits, canned vegetables, canned mushrooms, canned nuts and seeds, non-sticky canned cereals and pulses

After opening the cans, pour the contents into a pre-weighed round sieve (choose the corresponding 6.1.1 or 6.1.2 round sieve according to the net content), tilt the sieve appropriately, and after draining the contents for 2 minutes, weigh the round sieve and the drained matter together. For canned vegetables with small ingredients, the small ingredients shall be deducted when weighing the drained matter. The solids content is

calculated according to formula (3), and its value is expressed in %.

$$X_2 = \frac{m_6 - m_5}{m_7} \times 100 \quad \dots\dots\dots (3)$$

where:

X_2 -- solids content, %;

m_6 -- the mass of drained pulp or vegetable plus a round sieve, in grams (g);

m_5 -- the mass of the round sieve, in grams (g);

m_7 -- the net content marked on the canned food, in grams (g).

6.2.2.2 Canned meat, canned poultry, and canned aquatic products

Heat the can in a water bath at $(50 \pm 5)^\circ\text{C}$ for 10 min~20 min or in water at 100°C for 2 min~7 min (depending on the size of the can) to melt the frozen soup. After the can is opened, pour the contents onto the pre-weighed round sieve (select the corresponding 6.1.1 or 6.1.2 round sieve according to the net content); a funnel is fitted under the round sieve, and it is placed on a measuring cylinder with a suitable capacity. Without stirring the product, tilt the round sieve properly to drain the contents. After 3 min, weigh the sieve and drained matter together. Let the measuring cylinder stand still for 5 minutes to separate the oil and soup into two layers, measure the volume of the oil layer in milliliters, and multiply the density of 0.9 g/cm^3 to obtain the mass of the oil layer. The solids content is calculated according to formula (4), and its value is expressed in %:

$$X_3 = \frac{(m_9 - m_8) + 0.9 \times V_1}{m_{10}} \times 100 \quad \dots\dots\dots (4)$$

where:

X_3 -- solids content, %;

m_9 -- the mass of the drained matter plus a round sieve, in grams (g);

m_8 -- the mass of the round sieve, in grams (g);

V_1 -- the volume of the oil layer, in milliliters (mL);

m_{10} -- the net content marked on the canned food, in grams (g).

6.2.2.3 Sticky canned cereals and pulses

7 pH

It shall be measured according to the method specified in GB 5009.237.

8 Dry matter

8.1 Principle

Dry in vacuum to constant weight, calculate the content of dry matter, expressed in mass fraction.

8.2 Instruments

8.2.1 Flat glass weighing bottles.

8.2.2 Vacuum drying oven: the accuracy shall be ± 0.5 °C.

8.2.3 Glass desiccators.

8.2.4 Stainless steel spoon or glass rod.

8.2.5 General dry heat oven: the accuracy shall be ± 0.5 °C.

8.2.6 Analytical balance: its sense quantity shall be 0.1 mg.

8.3 Test procedure

The liquid and paste samples are fully mixed for later use, and the product, whose solid and liquid phases are separate, shall be mashed and then mixed for later use. Take 10 g~15 g of clean fine sand (40 mesh sea sand) into a flat glass weighing bottle, and place it together with a stainless steel spoon or a glass rod in an oven at 100 °C~105 °C to dry until constant weight. Take them out, place them in a desiccator to cool for 30 min, and then weigh them (accurate to 0.001 g). Weigh about 5 g of the sample (accurate to 0.001 g) in the bottle by the subtraction method, mix the sample and sand evenly with a spoon or glass rod, and spread it into a thin layer; evaporate the mixture on a water bath until it is nearly dry, and transfer it to a vacuum drying oven with a temperature of 70 °C and a pressure below 13332.2 Pa (100mmHg) for 4 hours. Take it out, put it in a desiccator to cool for 30 min, weigh it, and then dry it; every 2 h, take it out, cool it, and weigh it (the two operations are the same), until the mass difference between two times is not more than 0.003 g.

8.4 Calculation of results

The mass fraction of dry matter is calculated according to formula (7), and its value is expressed in %.

Place the opened real can sample to be tested horizontally, put a ruler across the mouth of the can, take another ruler perpendicular to it, and measure the distance from the surface of the contents to the lower edge of the transverse ruler (L_1). The net headspace (L) is calculated according to formula (8):

$$L = L_1 - C_s - C_t \quad \dots\dots\dots (8)$$

where:

L -- the net headspace, in millimeters (mm);

L_1 -- the distance from the surface of the contents to the lower edge of the transverse ruler, in millimeters (mm);

C_s -- the countersink depth of seaming, in millimeters (mm);

C_t -- the iron sheet thickness of the cover, in millimeters (mm).

9.3.2 Glass packaging real can sample

Put the real can sample to be tested on the workbench and let it stand for later testing. Open the cap, place a ruler across the mouth of the can, take another ruler perpendicular to it, and measure the distance from the surface of the contents to the lower edge of the transverse ruler, which is the headspace, and the unit is millimeter (mm).

9.4 Presentation of results

The result is accurate to an integer, and the unit is millimeter (mm).

10 Vacuum degree

10.1 Principle

The pressure in the can is passed to the vacuum degree test gauge by puncture, and the diaphragm is pushed to move due to the difference between the atmospheric pressure and the pressure in the can, then, the vacuum degree can be read.

10.2 Instruments

Vacuum degree test gauge: the scale shall be 0.001 MPa.

10.3 Operation steps

10.3.1 Place the real can sample to be tested on the workbench under the vacuum test gauge, and let it stand for later testing.

10.3.2 Turn the handle on the top of the vacuum test gauge and align it with the near

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