NATIONAL STANDARD OF THE

PEOPLE'S REPUBLIC OF CHINA

GB 1886.384-2025

Replacing GB 28308-2012

National food safety standard - Food additive - Vegetable carbon black

食品安全国家标准 食品添加剂 植物炭黑

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2 Chemical name, molecular formula and relative molecular mass

The chemical name is carbon and the molecular formula is C.

The relative molecular mass is given as 12.011, according to the 2021 international relative atomic masses.

3.1 Sensory requirements

Table 1 fixes three sensory items. The colour is black, the state is a powder and the product is odourless and tasteless.

The method is the same for all three: take a suitable quantity of the sample, place it in a clean dry white porcelain dish, observe the colour and the state under natural light and smell it.

3.2 Physical and chemical indexes

Table 2 has one index column and one test method column. The carbon content on a dry

basis, as mass fraction, is to be not less than 95 per cent, determined by A.3 of Annex A. The loss on drying, as mass fraction, is to be not greater than 12.0 per cent, by A.4. The ash, as mass fraction, is to be not greater than 4.0 per cent, by A.5. The particle size expressed as D10 is to be not less than 0.275 μm, determined by GB/T 19077.

Alkali-soluble colouring matter and higher aromatic hydrocarbons are both expressed as pass the test, determined by A.6 and A.7 respectively.

The heavy metal and metalloid limits, in milligrams per kilogram, are: total arsenic, calculated as As, not greater than 3.0, determined by GB 5009.76 or GB 5009.11; lead, not greater than 2.0, by GB 5009.75 or GB 5009.12; cadmium, not greater than 1.0, by GB 5009.15; and mercury, not greater than 1.0, by GB 5009.17.

A note to Table 2 states that commercialised vegetable carbon black is to be made from vegetable carbon black complying with this document, to which food raw materials such as edible vegetable oil, maltodextrin and water, and emulsifiers, thickeners, antioxidants, acidity regulators and similar substances meeting the quality specifications for food additives, may be added; the content is to agree with the declared value and the form may be a powder or a liquid.

A.1 Annex A (test methods) - general provisions

Unless otherwise stated, the reagents used are of analytical grade and the water is grade three water as specified in GB/T 6682. Standard volumetric solutions, standard solutions for the determination of impurities, preparations and products are prepared according to GB/T 601, GB/T 602 and GB/T 603 unless otherwise stated. Where the solvent of a solution is not stated, an aqueous solution is meant.

A.2 Identification tests

Solubility test. The apparatus is a beaker, a funnel, slow speed qualitative filter paper and a microporous membrane of 0.2 μm pore size. Two portions of about 0.1 g of the sample are weighed out; 100 mL of water is added to one and 100 mL of cyclohexane to the other. The portions are shaken to mix and left to stand for 10 min. Each solution is filtered first through the paper and then through the membrane, and the filtrate is to be colourless.

Combustion test. The apparatus is a spirit lamp and a combustion spoon. About half a spoonful of the sample is placed in the combustion spoon, which is heated slowly in the outer flame of the spirit lamp for about 5 min; the sample turns red slowly starting from the bottom of the spoon, without an open flame being produced.

A.3 Determination of carbon content on a dry basis

The apparatus is a porcelain crucible and a high temperature electric furnace.

About 1 g of sample dried for 4 h at 120 °C +/- 2 °C is weighed to the nearest 0.0001 g and placed in a crucible that has been ignited to constant mass at 625 °C +/- 20 °C. The crucible is put into the furnace at a temperature not above 300 °C, the lid is opened, the temperature is raised gradually and the sample is ashed and brought to constant mass at 625 °C +/- 20 °C; constant mass means that two successive weighings differ by not more than 0.5 mg.

The mass fraction is computed by formula (A.1), whose symbols are: the mass of the sample and the crucible after ignition, in grams; the mass of the crucible, in grams; and the mass of the sample on a dry basis, in grams. The result is the arithmetic mean of parallel determinations, kept to one decimal place; the absolute difference of two independent results obtained under repeatability conditions, divided by their arithmetic mean, is to be not greater than 5 per cent.

A.4 Determination of loss on drying and of ash

Loss on drying. The apparatus is a weighing bottle, a constant temperature oven and a desiccator. About 2 g of sample is weighed to the nearest 0.0001 g into a weighing bottle that has been dried to constant mass in the oven at 120 °C +/- 2 °C, dried for 4 h at 120 °C +/- 2 °C, taken out, cooled to room temperature in the desiccator and weighed. The mass fraction is computed by formula (A.2), whose symbols are the mass of the sample before drying and the mass of the sample after drying, both in grams. The result is the arithmetic mean of parallel determinations, kept to two decimal places, with the same repeatability limit of 5 per cent.

Ash. The apparatus is a porcelain crucible and a high temperature electric furnace. About 1 g of sample is weighed to the nearest 0.0001 g into a crucible ignited to constant mass at 625 °C +/- 20 °C, and the crucible is put into the furnace at a temperature not above 300 °C, the lid opened, the temperature raised gradually and the sample ashed and brought to constant mass at 625 °C +/- 20 °C, constant mass again meaning a difference of not more than 0.5 mg between two weighings. The mass fraction is computed by formula (A.3), whose symbols are the mass of the ash and the mass of the sample, both in grams, with the result kept to two decimal places and the same repeatability limit.

A.6 Determination of alkali-soluble colouring matter

The reagent is a sodium hydroxide solution of 40 g/L.

About 2 g of sample is weighed to the nearest 0.0001 g into a 100 mL conical flask, 20 mL of the sodium hydroxide solution is added, the mixture is heated slowly to boiling, cooled and filtered through filter paper; a colourless filtrate means the test is passed.

A.7 Determination of higher aromatic hydrocarbons

The reagents are cyclohexane, quinine sulfate and a sulfuric acid solution of 3 parts in 1000. Quinine sulfate standard solution I, at 1 mg/mL, is prepared by weighing 1.048 g of quinine sulfate into a 1000 mL volumetric flask, dissolving it in the sulfuric acid solution, diluting to the mark and mixing. Standard solution II, at 0.01 mg/mL, is prepared by pipetting 1 mL of solution I into a 100 mL volumetric flask and diluting to the mark with the sulfuric acid solution. The standard reference solution, at 0.1 μg/mL, is prepared by pipetting 1 mL of solution II into a 100 mL volumetric flask and diluting to the mark in the same way.

The apparatus is an electronic balance, colorimetric tubes, a constant temperature water bath, an ultraviolet lamp at 365 nm and a Soxhlet extractor; Figure A.1 shows the extractor, its key numbering the condenser, the extractor, the filter paper packet and the 60 mL flask.

About 4 g of sample is weighed to the nearest 0.0001 g, wrapped tightly in clean filter paper and placed in the Soxhlet extractor; 40 mL of cyclohexane is put in the flask, the apparatus is assembled and the flask is held in a water bath at 90 °C to 97 °C for 4 h of continuous extraction. The extract is to be colourless; the extracts are combined, cooled, and 10 mL is transferred to a colorimetric tube. A second tube receives 10 mL of the quinine sulfate standard reference solution. The two tubes are observed under the ultraviolet lamp at 365 nm, and the test is passed when the fluorescence of the sample solution does not exceed that of the reference solution.

R Relationship to previous standards

The foreword states that this document replaces GB 28308-2012, National food safety standard - Food additive - Vegetable carbon black.

The main changes recorded against that edition are: the description of the scope was modified; the relative molecular mass was modified; a particle size index was added; the name of the index printed as cadmium (Ge) was changed to cadmium (Cd); the requirement for lead (Pb) was modified; test methods for lead (Pb) and for total arsenic, calculated as As, were added; a description of commercialised products was added; the analytical procedure of the identification test was modified; and the test method for higher aromatic hydrocarbons was modified.