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NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA

GB 1886.357-2022

National food safety standard - Food additive - Pigment blue

食品安全国家标准 食品添加剂 靛蓝铝色淀

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National food safety standard - Food additive - Pigment blue

1 Scope

This standard is applicable to the food additive - pigment blue, which is made from food additive pigment blue and aluminum salt as raw materials, through color lake.

2 Molecular formula, relative molecular mass

2.1 Molecular formula

$C_{16}H_8N_2Na_2O_8S_2$ (Pigment blue)

2.2 Relative molecular mass

466.35 (in pigment blue) (according to 2018 international relative atomic mass)

3 Technical requirements

3.1 Sensory requirements

Sensory requirements shall meet the requirements of Table 1.

3.2 Physical-chemical indicators

Physical-chemical indicators shall meet the requirements of Table 2.

Appendix A

Inspection method

A.1 General provisions

The reagents and water, which are used in this standard, refer to analytically pure reagents and grade-3 water, as specified in GB/T 6682, unless otherwise specified. The standard titration solution, standard solution for impurity determination, preparations and products, which are used in the test, shall be prepared in accordance with the provisions of GB/T 601, GB/T 602, GB/T 603, unless otherwise specified. The solution, which is used in the test, refers to the aqueous solution, unless otherwise specified.

A.2 Identification test

A.2.1 Reagents and solutions

A.2.1.1 Sulfuric acid solution: 1 + 20.

A.2.1.2 Hydrochloric acid solution: 1 + 4.

A.2.1.3 Sodium hydroxide solution: 100 g/L.

A.2.1.4 Ammonium acetate solution: 3.4 g/L.

A.2.2 Instruments and equipment

A.2.2.1 Spectrophotometer.

A.2.2.2 Cuvette: 10 mm.

A.2.3 Analytical procedures

A.2.3.1 Color reaction

Weigh about 0.1 g of specimen. Add 5 mL of sulfuric acid solution. Shake continuously in a water bath. Heat for about 5 min, the solution turns blue purple. After cooling, take 2 ~ 3 drops of the upper clear liquid. Add 5 mL of water, it shall still be blue purple.

A.2.3.2 Aluminum salt reaction

Weigh about 0.1 g of specimen. Add 5 mL of sodium hydroxide solution. Heat in a water bath for 5 min. Shake from time to time, the solution is yellow brown. After cooling, use hydrochloric acid solution to neutralize it, it appears a blue-purple gelatinous precipitate.

The mass fraction w_1 of the pigment blue content is calculated, according to formula (A.1).

$$w_1 = \frac{(V/1\ 000) \times c \times (M/2)}{m} \times 100\% \quad \dots\dots\dots (A.1)$$

Where:

V - The volume of titanium trichloride standard titration solution, which is consumed by titrating the specimen, in milliliters (mL);

1000 - The volume conversion factor;

c - The concentration of titanium trichloride standard titration solution, in mole per liter (mol/L);

M - The molar mass of pigment blue, in grams per mole (g/mol)
[$M(C_{16}H_8N_2Na_2O_8S_2) = 466.35$];

2 - The mole conversion factor;

m - The mass of the specimen, in grams (g).

The test results are based on the arithmetic mean of the parallel determination results (retaining one decimal). The absolute difference, between the results of two independent determinations, which are obtained under the repeated conditions, shall not be greater than 1.0% of the arithmetic mean.

A.3.2 Spectrophotometric colorimetry

A.3.2.1 Summary of method

After dissolving the specimen, measure its absorbance value, at the maximum absorption wavelength (about 610 nm), to calculate its content.

A.3.2.2 Reagents and materials

A.3.2.2.1 Sodium hydrogen tartrate.

A.3.2.2.2 Acetic acid solution: 3.4 g/L.

A.3.2.3 Instruments and equipment

A.3.2.3.1 Magnetic stirring heater.

A.3.2.3.2 Spectrophotometer.

A.3.2.3.3 Cuvette: 1 cm.

A.3.2.4 Analytical procedures

A.3.2.4.1 Preparation of specimen solution

Weigh about 0.5 g of specimen, accurate to 0.0001 g. Add 20 mL of water and 2 g of sodium hydrogen tartrate. Heat it, until the sample is completely dissolved. Then transfer it to a 1000 mL volumetric flask. Use water to dilute it to the mark. Shake well. Pipette 10 mL into a 100 mL volumetric flask. Use ammonium acetate solution, to dilute it to the mark. Shake well.

A.3.2.4.2 Determination

Place the specimen solution in a 1 cm cuvette. Use a spectrophotometer, to measure the absorbance value, at the maximum absorption wavelength (about 610 nm). The absorbance value shall be controlled, within the range of 0.3 ~ 0.7. Otherwise, it shall adjust the concentration of the specimen solution, before measuring the absorbance again. Take the ammonium acetate solution as blank.

A.3.2.5 Result calculation

The mass fraction w_2 of pigment blue content is calculated, according to formula (A.2).

$$w_2 = \frac{A}{47.8 \times b \times c} \times 100\% \quad \dots\dots\dots (A.2)$$

Where:

A - The absorbance value of the specimen solution;

47.8 - The absorption actor of pigment blue, in liters per gram centimeter (L/g • cm);

b - The inner diameter of the cuvette, which is 1 cm;

c - The concentration of the specimen solution, in grams per liter (g/L).

The test results are based on the arithmetic mean of the parallel determination results (retaining one decimal). The absolute difference, between the results of two independent determinations, which are obtained under repeated conditions, shall not be greater than 5.0% of the arithmetic mean.

A.4 Determination of hydrochloric acid insoluble

A.4.1 Reagents and materials

A.4.1.1 Hydrochloric acid.

A.4.1.2 Hydrochloric acid solution: 5 + 995.

Appendix B

Preparation method of titanium trichloride standard titration solution

B.1 Reagents and solutions

B.1.1 Hydrochloric acid.

B.1.2 Ferrous ammonium sulfate.

B.1.3 Ammonium thiocyanate solution: 200 g/L.

B.1.4 Sulfuric acid solution: 1 + 1.

B.1.5 Titanium trichloride solution.

B.1.6 Potassium dichromate standard titration solution: $[c(1/6 K_2Cr_2O_7) = 0.1 \text{ mol/L}]$.

B.2 Instruments and equipment

See Figure A.1.

B.3 Preparation of titanium trichloride standard titration solution

B.3.1 Preparation

Take 100 mL of titanium trichloride solution and 75 mL of hydrochloric acid. Put it in a 1000 mL brown volumetric flask. Use freshly boiled water, that has been cooled to room temperature, to dilute it to the mark. Shake well. Immediately pour it into a lower-mouth bottle in the dark. Store it under the protection of carbon dioxide gas.

B.3.2 Calibration

Weigh about 3 g of ferrous ammonium sulfate, accurate to 0.0001 g. Put it in a 500 mL conical flask. Under the protection of carbon dioxide gas flow, add 50 mL of water, which was freshly boiled and cooled, to dissolve it. Then add 25 mL of sulfuric acid solution. Continue to pass carbon dioxide gas flow, under the liquid surface for protection. Quickly and accurately add 35 mL of potassium dichromate standard titration solution. Then use the titanium trichloride standard solution to be calibrated, to titrate it, until approaching to the end of the calculated volume. Immediately add 25 mL of ammonium thiocyanate solution. Use the titanium trichloride standard solution to be calibrated, to titrate it, until the red turns to green, which is the end point. The entire titration process shall be operated, under the protection of carbon dioxide gas flow. Meanwhile, carry out a blank test.

B.3.3 Result calculation

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