



**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB 1886.244-2016

**National Food Safety Standard -- Food Additives -- Purple
Sweet Potato Color**

**食品安全国家标准 食品添加剂 紫甘薯色素
(English Translation)**

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1 Scope

This standard applies to the sweet potato roots of sweet potato (*Ipomoea batatas* Lam) in the purple roots as raw materials, with citric acid and other acids of water or ethanol aqueous solution, by leaching, refined food additives purple sweet potato pigment.

2.1 Chemical composition

Purple sweet potato pigment is the main coloring elements anthocyanins, of which the main anthocyanin ligand for cyanidin and paeoniflorin.

2.2 Molecular formula

Cyanine chrysanthemum. $C_{15}H_{11}O_6$ Paeonifolia. $C_{16}H_{13}O_6$

2.3 Structural formula

Cyanidin. $R = OH$

Paeonifolia. $R = OCH_3$

2.4 Relative molecular mass

Cyanidin. 287.23 (according to 2013 International relative atomic mass) Paeonifolia. 301.26 (according to 2013 International relative atomic mass)

3.1 Sensory requirements

Sensory requirements shall comply with the requirements of Table 1.

Table 1 sensory requirements

The project requires a test method Color red to purple black State liquid, powder or granular, no visible impurities Take appropriate sample, placed in a clean, dry white porcelain dish, in nature Under light, observe the color and state

3.2 Physical and chemical indicators

Physical and chemical indicators should be consistent with the provisions of Table 2.

Table 2 Physical and chemical indicators

The project requires a test method Color, E1 m (530nm $\pm$ 10nm) $\geq$ 5.0 Appendix A A.3 pH (10 g/L aqueous solution) 2.0 to 5.0 Appendix A A.4 Total anthocyanins (based on cornflower-3-glucoside), w /% $\geq$ 0.7 Appendix A, A.5 Ash, w /% $\leq$ 4.0 GB 5009.4 Total arsenic (in As)/(mg/kg) $\leq$ 2.0 GB 5009.11 Lead (Pb)/(mg/kg) $\leq$ 3.0 GB 5009.12 Note. Commercial purple sweet potato pigment products should meet the standards of purple sweet potato pigment as raw material, can add dextrin, tea polyphenols and other accessories made of its color Declaration of conformity.

Appendix A

Testing method

A.1 General provisions the reagents and water used in this standard, when not specified in other requirements, refer to the analysis of pure reagents and GB/T 6682 specified in the three Water level. The standard titration solution used in the test, the standard solution for the determination of impurities, the preparation and the products, when no other requirements are specified, Prepared according to GB/T 601, GB/T 602 and GB/T 603. The solution used in the test was formulated with no known solvent , Refers to the aqueous solution.

A.2 Identification test A.2.1 Color response Weigh about 0.1g sample, dissolved in 100mL pH3.0 citric acid - disodium hydrogen phosphate buffer, the solution should be red ~ purple;

This solution gradually dropping sodium hydroxide solution (40g/L), to the sample solution is alkaline, it should gradually become violet, blue, green.

A.2.2 Maximum absorption peak Take A.3 color price determination of purple sweet potato pigment sample solution, with a spectrophotometer detection, in the wavelength of 530nm $\pm$ 10nm range should be A maximum absorption peak.

A.3 Determination of color price A.3.1 Reagents and materials A.3.1.1 Disodium hydrogen

phosphate.

A.3.1.2 Citric acid.

A.3.2 Instruments and equipment Spectrophotometer.

A.3.3 Analysis steps A.3.3.1 Preparation of reagents A.3.3.1.1 disodium hydrogen phosphate solution. 0.2mol/L, accurately weighed 71.64g disodium hydrogen phosphate ($\text{Na}_2\text{HPO}_4 \cdot 12\text{H}_2\text{O}$), dissolved in water and set to 1000mL.

A.3.3.1.2 citric acid solution. 0.1mol/L, accurately weighed 21.01g citric acid ($\text{C}_6\text{H}_8\text{O}_7 \cdot \text{H}_2\text{O}$), dissolved in water and set to 1000mL.

A.3.3.1.3 pH3.0 Citric acid-disodium hydrogen phosphate buffer solution. Accurate amount of 4.11 mL of sodium hydrogen phosphate solution with 15.89 mL of lemon Acid solution, shake, with acidity meter to detect, if the pH is not 3.0, then with sodium hydrogen phosphate solution or citric acid solution to adjust the pH to 3.0.

A.3.3.2 Determination Weigh 0.1g ~ 0.2g sample (accurate to 0.0001g), with pH3.0 citric acid - disodium hydrogen phosphate buffer solution dissolved, transferred to 100mL volumetric flask, add pH3.0 citric acid - disodium hydrogen phosphate buffer solution volume to the scale, shake. Take this sample solution at 1cm Cistern, pH3.0 citric acid - disodium hydrogen phosphate buffer solution as a blank control, with a spectrophotometer in the range of 530nm $\pm$ 10nm (Absorbance value should be controlled at 0.3 ~ 0.7, otherwise the sample solution concentration should be adjusted, and then re-measured set).

A.3.4 Calculation of results Color value $E_{1\text{ m}}$ (530nm $\pm$ 10nm), according to formula (A.1) calculation.

$E_{1\text{ m}} =$

Where.

A - the absorbance of the sample solution;

c - the concentration of the test solution, in grams per milliliter (g/mL);

100 --- concentration conversion factor (corresponding to the color price required to convert the sample concentration of 1g/100mL).

The results of the test are based on the arithmetic mean of the parallel measurement results. The absolute difference between the two independent determinations obtained under repeatability conditions the value is not greater than 2.5% of its arithmetic mean.

A.4 pH (10 g/L aqueous solution) the sample was dosed into 10 g/L aqueous solution, shaken and measured with an acidity meter.

A.5 Determination of total anthocyanins (measured as cornflower-3-glucoside) A.5.1

Reagents and materials A.5.1.1 Potassium chloride.

A.5.1.2 Hydrochloric acid.

A.5.1.3 Sodium acetate.

A.5.2 Instruments and equipment Spectrophotometer.

A.5.3 Analysis steps A.5.3.1 Preparation of reagents A.5.3.1.1 pH 1.0 potassium chloride buffer solution. 0.025mol/L, accurately weighed 1.86g KCl into the beaker, add about 980mL of water.

The pH was measured, adjusted to pH 1.0 (± 0.05) with HCl (about 6.3 mL), transferred and fixed to 1000 mL with water.

A.5.3.1.2 pH 4.5 sodium acetate buffer solution. 0.4mol/L, accurately weighed 54.43g $\text{CH}_3\text{CO}_2\text{Na} \cdot 3\text{H}_2\text{O}$ into the beaker, add About 960mL of water. The pH was measured, adjusted to pH 4.5 (± 0.05) with HCl (about 20 mL), transferred and fixed to 1000 mL with water.

A.5.3.2 Preparation of test solution Accurately weighed a certain amount of the sample (accurate to 0.0001g), dissolved in water, dilute the volume to 50mL, this is the sample to be tested liquid. Accurately absorb two equal amounts of stock solution, respectively, pH1.0 buffer solution and pH4.5 buffer solution diluted to 50mL, this is the sample solution. The maximum sample volume of the stock solution should not exceed 10 mL to ensure that the buffering capacity of the buffer solution is not exceeded.

The stock solution was properly diluted with a buffer solution of pH 1.0 until the absorbance at wavelengths of 520 nm was on the line of the spectrophotometer Sexual range (0.3 ~ 0.7). Using this dilution factor, two sample solutions were prepared, one diluted with a buffer solution of pH 1.0 and the other pH 4.5 buffer solution.

A.5.3.3 Determination with 1cm cuvette, with water as a blank control, at 520nm and 700nm wavelength, measured by pH1.0 and pH4.5 of the buffer solution diluted with the absorbance of the sample after the preparation of the requirements of 20min ~ 50min within the time required to determine the absorbance.

Note: The absorbance value is measured at a wavelength of 700 nm in order to correct the interference of the turbidity to the measurement results. If the diluted sample is too cloudy, with centrifugation or filtration method for clarification, the filter can not be used to adsorb anthocyanins.

A.5.4 Calculation of results the mass fraction w of the total anthocyanin (calculated as cornflower-3-glucoside) is calculated according to formula (A.2) $w = A \times M \times f \text{ epsilon} \times l \times 1000 \times m \times 100\%$ (A.2) where.

A --- ($A_{520\text{nm}} - A_{700\text{nm}}$) pH1.0- ($A_{520\text{nm}} - A_{700\text{nm}}$) pH4.5;

M - the weight of the cornflower-3-glucoside in grams per mole (g/mol) ($M = 449.2 \text{ g/mol}$);