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

GB 31624-2014

**National Food Safety Standard -- Food Additive -- Natural
carotene**

食品安全国家标准 食品添加剂 天然胡萝卜素

(English Translation)

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1 Scope

This standard applies to carrot (*Daucuscarota*), palm fruit oil (*Elaeisguinensis*), sweet potatoes (*Ipomoeabatatas*) or Other edible plants as raw material, solvent extraction, refining natural carotene food additives. The main coloring substances beta- carrot Su and alpha- carotene, beta- carotene majority.

Molecular formula, structural formula and relative molecular mass of the main component 2

Formula 2.1 $C_{40}H_{56}$ (beta- carotene)

2.3 Molecular Weight

536.88 (beta- carotene, according to international relative atomic mass in 2007)

3.1 Sensory requirements

Shall comply with the requirements in Table 1.

Table 1 Sensory requirements

Project requires test methods Brown or red-brown color to orange to dark orange Solid or liquid state the sample is placed in the appropriate uniform white porcelain plate, its color was observed under natural light.

And state

3.2 Physical and Chemical Indicators

Shall be in accordance with Table 2.

Table 2. Physical and chemical indicators

Item Index Test Method Carotene content (in terms beta- carotene, w) /% conform claimed in Appendix A A.4 Residual solvent (acetone, hexane, methanol, ethanol and

isopropanol)/(mg/kg) ≤ 50 (alone or in combination) A.4 Lead (Pb)/(mg/kg) ≤ 5 GB 5009.12

NOTE: commercial product should be natural carotene natural carotene compliance with this standard as a raw material, may be added antioxidants, emulsifiers and the like materials, which Formulated as a suspension in an aqueous suspension or oil-type powder.

Appendix A

Testing method

A.1 General Provisions Unless otherwise specified in this standard, the reagents were of analytical grade, standard titration solution used, the impurity determined by standard solution, and made preparations Product, should GB/T 601, GB/T 602, GB/T 603 provisions prepared test water shall meet the GB/T 6682 in a predetermined three water.

The test does not indicate when the solution which is formulated with a solvent, refer to the aqueous solution.

A.2 Identification Test A.2.1 solubility test Insoluble in water.

A.2.2 Spectrophotometers Measured using a spectrophotometer, a cyclohexane solution of the sample (5mg/L) in the most 440nm ~ 457nm 470nm ~ 486nm and at Large absorption values.

A.2.3 color reaction A sample of a toluene solution (containing about beta- carotene 400μg/mL) on the filter paper points, antimony into a toluene solution with 200g/L trichloride Spray line, after 2min ~ 3min, blue spots.

A.3 Determination of carotene content A.3.1 Reagents and materials A.3.1.1 chloroform.

A.3.1.2 cyclohexane.

A.3.2 Instruments and Equipment Spectrophotometer.

A.3.3 Analysis step

Preparation of sample solution A.3.3.1 Sample Weigh 0.08g ± 0.01g, placed in a 100mL volumetric flask, add 20mL sample dissolution chloroform, diluted with cyclohexane to the mark. Take 5.0 mL of this sample solution, diluted further with cyclohexane 100mL flask to the mark. Take this dilution 5.0 mL solution, diluted in a third 100mL flask with cyclohexane, shaken to give a final sample solution.

A.3.3.2 Determination the sample solution was placed in a 1cm cuvette with cyclohexane as a blank using a spectrophotometer at wavelength of maximum absorption (440nm ~) Measuring the absorbance 457nm. Absorbance should be controlled between 0.2 and 0.8, or the amount of sample should be adjusted by adjusting the concentration of the sample solution, said weight and then the new absorbance was measured.

Note: The above operation should be completed as soon as possible to avoid exposure to air, should ensure that all operations are to avoid direct sunlight.

A.3.4 calculation results Carotene content (in terms beta- carotene) by mass fraction w_1 of formula (A.1) is calculated.

$A \times 40000$

$m_1 \times 100$

$2500 \times 100\%$

Where.

A --- the diluted sample absorbance of the solution;

--- 40000 dilution;

M1 --- mass of sample, grams (G);

100 --- conversion factor;

2500 --- beta- carotene absorption coefficient in cyclohexane.

The test result to the arithmetic mean of replicates results.

A.4 Determination of residual solvent (acetone, hexane, methanol, ethanol and isopropanol) of A.4.1 Reagents and materials A.4.1.1 Component Reference Sample tested. acetone, hexane, methanol, ethanol and isopropanol.

A.4.1.2 blank. almost no sample solvent.

A.4.1.3 3- methyl-2-pentanone.

A.4.1.4 methanol.

A.4.1.5 water. a water GB/T 6682-2008 specified.

A.4.2 Instruments and Equipment Gas chromatograph with flame ionization detector (FID) and a headspace sampler.

A.4.3 Reference chromatographic conditions A.4.3.1 Column. fused Shi Ying, 0.8m long, 0.53mm inner diameter, the coating is 100% dimethyl polysiloxane, a coating thickness of 1 μ m.

Supporting. fused Shi Ying, length 30m, internal diameter 0.53mm, a coating of 10% dimethyl polysiloxane coating thickness of 5 μ m. Or other equivalent Separation column and the chromatographic conditions.

A.4.3.2 carrier gas. helium.

A.4.3.3 flow rate. 208kPa, 5mL/min.

A.4.3.4 Column temperature. 35 °C maintained 5min, at 5 °C/min temperature was raised to 90 °C, maintained 6min.

A.4.3.5 Inlet temperature. 140 °C.

A.4.3.6 Detector temperature. 300 °C.

A.4.4 headspace sampler reference condition A.4.4.1 Sample heating temperature. 60 °C.

A.4.4.2 sample heating time. 10min.

A.4.4.3 Injector temperature. 70 °C.

A.4.4.4 mass transfer temperature. 80 °C.

A.4.4.5 sample gas injection. splitless mode, 1.0mL.

A.4.5 Analysis step

Preparation of internal standard solution A.4.5.1 50.0mL of methanol pipetted into a 50mL sample vial, capped vials weighed to the nearest 0.0001g. Pipette 15μL of internal standard Was 3-methyl-2-pentanone, which is injected through the septum into the sample vial, mixed, and weighed vials, accurate to 0.0001g.

Preparation of blank solution A.4.5.2 Weigh 0.20g blank, placed in an injection vial. Was added 5.0mL of methanol and 1.0mL internal standard solution. For 10min at 60 °C, Shake vigorously 10s, and mix.

Preparation of sample solution A.4.5.3 0.20g sample was weighed, placed into vials. Was added 5.0mL of methanol and 1.0mL internal standard solution. For 10min at 60 °C, Shake vigorously 10s, and mix.

Preparation of calibration solution A.4.5.4 Solution A. 50.0mL of methanol pipetted into a 50mL sample vial, capped vials weighed to the nearest 0.0001g. Pipette 50μL Reference component to be measured, which is injected through the septum into the sample vial, mixed, and weighed vials, accurate to 0.0001g.

Weigh 0.20g blank, placed in an injection vial. Was added 4.9mL of methanol and 1.0mL internal standard solution. 0.1mL solution injected through the septum Liquid A. Uniformly mixed for 10min at 60 °C, shake vigorously 10s.

A.4.6 Determination

A.4.3 and A.4.4 in the reference operation conditions, respectively, of the sample solution, calibration solution and a blank solution chromatographed.

A.4.7 calculation results A.4.7.1 calibration factor f_i F_i calibration factor according to equation (A.2) is calculated.

$m_0 \times (A_f - A_g) \times 10$