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

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National Food Safety Standard -- Food Additives -- Curcumin

食品安全国家标准 食品添加剂 姜黄素

(English Translation)

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1 Scope

This standard applies to Zingiberaceae turmeric (*Curcuma longa* L.) Roots as raw material, organic solvent extraction, and then by physical methods Refining derived food additives curcumin.

2.1 Chemical Name

Curcumin. 1,7-bis (4-hydroxy-3-methoxyphenyl) hept-1,6-diene-3,5-dione
Bisdemethoxycurcumin. 1- (4-hydroxyphenyl) -7- (4-hydroxy-3-methoxyphenyl)
hept-1,6-diene-3,5-dione Bis Bisdemethoxycurcumin. 1,7-bis (4-hydroxyphenyl)
hept-1,6-diene-dione Formula 2.2 Curcumin. $C_{21}H_{20}O_6$ Bisdemethoxycurcumin.
 $C_{20}H_{18}O_5$ Double Bisdemethoxycurcumin. $C_{19}H_{16}O_4$

2.3 Formula

Curcumin. $R_1 = R_2 = OCH_3$ Bisdemethoxycurcumin. $R_1 = OCH_3$, $R_2 = H$ Double
Bisdemethoxycurcumin. $R_1 = R_2 = H$

2.4 Relative molecular mass

Curcumin. 368.39 (according to 2011 international relative atomic mass)
Bisdemethoxycurcumin. 338.39 (according to 2011 international relative atomic mass)
Double Bisdemethoxycurcumin. 308.39 (according to 2011 international relative atomic
mass)

3.1 Sensory requirements

Sensory requirements shall comply with the requirements of Table 1.

Table 1 Sensory requirements

Project requires test methods Color orange State crystal or crystalline powder with turmeric smell peculiar smell Take the right amount of sample is placed in a white porcelain dish, under natural light, observed Color, state, smell the smell

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

Item Index Test Method Total curcumin content /% ≥ 90.0 Appendix A A.3 Residual solvent (hexane, ethyl acetate and isopropanol) a/(mg/kg) ≤ 50.0 Appendix A A.4 Total arsenic (As)/(mg/kg) ≤ 3.0 GB 5009.11 Lead (Pb)/(mg/kg) ≤ 2.0 GB 5009.12 a extraction solvent is ethanol, acetone, isopropyl alcohol, n-hexane and/or ethyl acetate.

Appendix A

Testing method

A.1 General Provisions this standard reagents and water in the absence of other requirements specified, refers to three analytical reagent water and GB/T 6682 stipulated. test Test used in the determination of impurities standard solution, the reagent solution and the sample solution, in the absence of other specified requirements, according to GB/T 601, GB/T 602 and GB/T 603 provisions prepared. Solution was used in the tests did not indicate what is formulated with solvent, it refers to an aqueous solution.

A.2 Identification Test A.2.1 Reagents and materials A.2.1.1 ether.

A.2.1.2 glacial acetic acid.

A.2.1.3 sodium hydroxide solution. 0.05mol/L.

A.2.1.4 Hydrochloride. 1mol/L.

A.2.1.5 ethanol. 95%.

A.2.1.6 sulfuric acid.

A.2.1.7 silica gel thin layer plate. silica gel weighed 10g, add water, 20mL, placed ground in a mortar into a thin slurry suitable thick, uniform coating on the glass, the coating thickness of 0.5mm. 100 °C activation 30min.

A.2.1.8 developing solvent. chloroform. methanol = 99.

A.2.2 Identification method A.2.2.1 solubility Insoluble in water and ether, soluble in ethanol and glacial acetic acid.

A.2.2.2 color reaction A.2.2.2.1 Weigh 0.1g sample was dissolved in 5mL sodium hydroxide solution, then red roses, a solution of hydrochloric acid to the acid, the solution that is it rose from the red to bright yellow.

A.2.2.2.2 Weigh 10mg sample was dissolved in 5mL ethanol solution, the color is pure microstrip yellow green fluorescence, plus a small amount of sulfuric acid becomes of red roses.

A.2.2.3 TLC

A.2.2.3.1 Preparation of sample solution. Weigh the sample 0.1g, dissolved in 10mL ethanol. When using the supernatant.

A.2.2.3.2 spotted. The activated silica gel plates, using a micro syringe 2μL sample solution spotted. Spacing of 1.5cm.

A.2.2.3.3 expand the observation. Good point will advance into the sheet is expanded when (expansion room temperature with developing solvent saturated chromatography tank uplink law is 17 °C ~ 20 °C). When the solvent front to be reached 15cm, removed, air-dried. Observation should have three yellow spots, Rf values were 0.11 ~ 0.12, 0.23 ~ 0.25, 0.41 ~ 0.43.

A.3 Determination of the total content of curcumin A.3.1 Method summary According to calculate the total content of curcumin ethanol absorbance intensity at a particular wavelength.

A.3.2 Reagents and materials 95% ethanol.

A.3.3 Instruments and Equipment Spectrophotometer.

A.3.4 Analysis step

Take about 0.1g sample (accurate to 0.0002g), placed in 100mL flask, add 95% ethanol, dissolved by shaking shake. With 95% Ethanol volume mix. Pipette 1.0mL solution to 250mL volumetric flask, constant volume with 95% ethanol. With a 1cm cuvette, measuring 425nm Absorbance under.

A.3.5 Calculation Results Curcumin content of total mass fraction w1, according to equation (A.1) Calculated.

$A \times 250 \times 100$

$m \times 1607$

Where.

A --- absorbance of the sample;

250 --- volume conversion factor;

100 --- capacity conversion factor;

M --- the quality of the sample, in grams (g);

1607 --- 425nm at the specific absorption coefficient of ethanol solution of curcumin standard products.

A.4 Determination of residual solvents (n-hexane, ethyl acetate and isopropanol) of A.4.1 Principle when the balance of the sample in a sealed vial, at a certain temperature, the residual solvent vaporization equilibrium, the upper layer of gas injected into the gas Chromatograph determination, quantitative comparison with a standard curve.

A.4.2 Reagents and materials Note. Unless otherwise noted, all reagents were HPLC grade.

A.4.2.1 N, N- dimethylformamide (HPLC grade).

A.4.2.2 standard stock solution. Weigh isopropyl alcohol (HPLC grade) and hexane (HPLC grade), ethyl acetate (HPLC grade) each 0.05g (nearest 0.0001g), was dissolved in N, N- dimethylformamide and treated with N, N- dimethylformamide was diluted to 50mL volumetric flask, constant volume. this Equivalent to 1.0mg solution 1mL isopropanol, n-hexane and ethyl acetate. Placed in 4 °C refrigerator.

A.4.3 Instruments and Equipment A.4.3.1 Gas chromatograph. with flame ionization detector (FID).

A.4.3.2 analytical balance, a sense of the amount of 0.1mg.

A.4.3.3 flask. 50mL.

A.4.3.4 Vial. 100mL small infusion bottle mouth.

A.4.3.5 sealing jaws.

A.4.3.6 airtight needle. 100μL.

A.4.3.7 pipettes. 500μL, 5mL.

A.4.3.8 headspace autosampler (automatic headspace method).

A.4.3.9 Vial. 20mL headspace vial (automatic headspace method).

A.4.4 Analysis step

A.4.4.1 manual headspace method A.4.4.1.1 standard curve drawing Take vial (A.4.3.4), along the sides of the bottle to the micropipette injecting 500μL stock standard solution, quickly stuffed back on the rubber stopper, aluminum cap sealing After opening at 80 °C ± 2 °C oven heating 2h, then cool to room temperature, 100μL micro-injector, according to 20μL, 40μL, 60μL, 80μL and 100μL take headspace were injected into the chromatograph,