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Food Additive Erythritol

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Approved By:
Scott Sindelar

Prepared By:
Melinda Meador and Wu Bugang

Report Highlights:
On May 2, China's Ministry of Health notified to the WTO the National Food Safety Standard on Food Additive Erythritol as G/SPS/N/CHN/360. The standard specifies the technical requirements and testing methods for the food additive erythritol. The adoption date of the standard was May 15, 2011. This report contains an INFORMAL translation of the document.

General Information:
BEGIN TRANSLATION

National food safety standard

Food Additive Erythritol

GB26404-2011

Issued on March 15, 2011

Implemented on May 15, 2011

Issued by the Ministry of Health

National Food Safety Standard

Food Additive

Erythritol

1. Scope

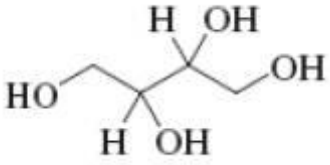
This standard is applicable for food additive erythritol crystal products, a kind of food additive using glucose as the main raw material and produced by using candida lipolytica, moniliella pollinis or trichosporonoides megachiliensis to produce erythritol through a fermenting and then refining process.

2. Molecular Formula, Constitutional Formula and Relative Molecular Mass

1. Molecular Formula

$C_4H_{10}O_4$

1. Constitutional Formula



2.3 Relative Molecular Mass

122.12 (as per 2007 International Relative Atomic Mass)

3. Technical Requirements

3.1 Sensory Requirements shall comply to the requirements in Table 1.

Table 1 Sensory Requirements

Item	Requirements	Testing Method
Color	White	Put an appropriate amount of samples into a clean and dry white porcelain plate, and observe the color and status of samples in natural light, and then taste the samples.
Odor	Sweet Taste	
Status	Crystalline Powder or Granules	

3.2 Physicochemical Indicators shall comply to the requirements in Table 2.

Table 2 Physicochemical Indicators

Item	Indicators	Testing Method
Erythritol (Calculated as $C_4H_{10}O_4$, dry basis), *w*/%	99.5~100.5	A.3, Appendix A
Loss on Drying, *w*/% ≤	0.2	GB 5009.3 Direct Drying Method [a]
Burning Residue, *w*/% ≤	0.1	A.4, Appendix A
Reducing Sugar (Calculated as Glucose), *w*/% ≤	0.3	A.5, Appendix A
Ribitol and Glycerin (Calculated as dry basis),*w*/% ≤	0.1	A.6, Appendix A
Lead (Pb)/(mg/kg) ≤	1	GB 5009.12
[a] Drying temperature and time refer to 105°C and 4h respectively		

Appendix A

Testing Method

A.1 General

Unless otherwise specified, any reagents and water involved in this Standard shall refer to analytical reagent and grade-III water as specified in GB/T 6682—2008. Unless otherwise specified, any standard volumetric solution, standard solution for impurity content test, preparation, and final products used for the test shall be prepared in accordance with the regulations under GB/T 601, GB/T 602 and GB/T 603. Any solution used for the test that the testers do not know which solvent will be used to prepare, shall refer to aqueous solution.

A.2 Identification Test

A.2.1 Soluble in water, slightly soluble in ethanol, insoluble in ether.

A.2.2 Crystalline melting point is between 119 °C~123°C. Determine according to the method specified in GB/T 617.

A.2.3 In the test of determining erythritol content, main peak retention time in the sample solution chromatogram shall be consistent with that in the standard solution chromatogram.

A.3 Determination of Erythritol (Calculated as $C_4H_{10}O_4$, dry basis) (HPLC Method)

A.3.1 Reagents and Materials

A.3.1.1 Water: Grade-III water regulated in GB/T 6682-2008.

A.3.1.2 Erythritol Standard Substance: Purity≥99%.

A.3.2 Instruments and Equipment

High performance liquid chromategraph, equipped with differential refractive index detector.

A.3.3 Reference Chromatographic Conditions

A.3.3.1 Mobile Phase: Double Distilled Water

A.3.3.2 Chromatographic Column: Hydrogen large aperture cation exchanges resin packed column, resin contains large grid sulfonated polystyrene-divinyl benzene copolymer, cross linking degree is 8%, particle size is 9μm, or other equivalent chromatographic columns.

A.3.3.3 Flow Rate: 0.6mL/min

A.3.3.4 Column Temperature: 60°C

A.3.3.5 Sample Volume: 10μL

A.3.4 Analysis Procedure

A.3.4.1 Standard Solution Preparation

Weigh accurately 0.25g erythritol standard substance in 105°C, after drying for 4 hours, accurate to 0.0001g, transfer to a 50mL volumetric flask, dissolve with mobile phase, dilute and constant volume to graduation, and blend for spare use. Filter with 0.45μm microfiltration membrane before Chromatographic analysis.

A.3.4.2 Sample Solution Preparation

Weigh accurately 2.0g erythritol standard sample in 105°C, after drying for 4 hours, accurate to 0.0001g, transfer to a 50mL volumetric flask, dissolve with mobile phase, dilute and constant volume to graduation, and blend for spare use. Filter with 0.45μm microfiltration membrane before chromatographic analysis.

A.3.4.3 Determination

Under the Reference Chromatographic Condition of A.3.3, have chromatographic analysis to standard solution and sample solution respectively, and record 60min chromatogram. The peak time of erythritol is qualitative according to the peak time of standard substance. Repeat the experiment two times to obtain average peak area value.

A.3.5 Result Calculation

Erythritol content is calculated by mass fraction w_1 of erythritol ($C_4H_{10}O_4$) in % and calculated with Formula (A.1):

$$w_1 = \frac{m_1}{m_2} \times \frac{A_1}{A_2} \times 100\% \quad \cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots \quad (A.1)$$

Where,

m_1——Numerical value of weighed erythritol standard substance mass, gram (g);

m_2——Numerical value of weighed sample mass, gram (g);

A_1——Numerical value of erythritol average peak area value in the sample solution chromatogram;

A_2——Numerical value of erythritol average peak area value in the standard solution chromatogram.

A.4 Determination of Residue

A.4.1 Analysis Procedure:

Weigh accurately 2g sample, accurate to 0.0001g, place in a crucible which is burned to constant weight with a temperature of 800°C±25°C and slowly heat the sample to completely carbonization. Cool the carbonizing sample, moist the residue with 0.5mL sulfur acid, heat continuously until sulfur acid vapor is evaporated and burn the residue to constant weight in high temperature furnace in a temperature with a temperature of 800°C±25°C.

A.4.2 Result Calculation

Burning residue is calculated as mass fraction w_2 in %, and calculated with Formula (A.2):

$$w_2 = \frac{m_4 - m_3}{m} \times 100\% \quad \cdots\cdots\cdots\cdots\cdots\cdots \quad (A.2)$$

Where,

m_4——Numerical value of residue and empty crucible, gram (g);

m_3——Numerical value of empty crucible, gram (g);

m——Numerical value of weighed sample mass, gram (g).

Experimental Result: Arithmetic mean value of parallel determination result shall prevail and the absolute difference value of parallel determination result shall not larger than 0.05%.

A.5 Determination of Reducing Sugar (Calculated as Glucose)

A.5.1 Reagents and Materials

A.5.1.1 Glucose Solution: 0.75mg/ml

A.5.1.2 Fehling's Solution A: Weigh 34.66g copper sulfate ($CuSO_4 \cdot 5H_2O$), dissolve in the water. After completely dissolution, dilute to 500mL with water and store in a closed container.

A.5.1.3Fehling's Solution B: Weigh 173g potassium sodium tartrate ($KNaC_4H_4O_6 \cdot 4H_2O$) and 50g sodium hydroxide (NaOH), and dissolve in water. After complete dissolution, dilute to 500mL with water and store in a rubber glass bottle with rubber plug.

A.5.2 Analysis Procedure

Weigh accurately about 0.5g sample, accurate to 0.0001g, transfer to a 20mL flask, add 2mL water, dilute and mix. This is sample solution. Pipet 2mL glucose solution (A.5.1.1) to another 20mL flask. Add 1mL Fehling's solution A and 1mL Fehling's solution B to two flasks respectively, heat until boiling and then cool. Solution forms reddish brown precipitate.

A.5.3 Result Judgment

Comparing with sample solution reaction solution, if the glucose solution reaction solution is muddy, then it is qualified.

A.6 Determination of Ribitol and Glycerin

A.6.1 Reagent and Material

A.6.1.1 Water: Third grade water regulated in the GB/T 6682-2008.

A.6.1.2 Ribitol Standard Substance: Analytically Pure

A.6.1.3 Glycerin Standard Substance: Analytically Pure

A.6.2 Instrument and Equipment

High performance liquid chromategraph, equipped with differential refractive index detector

A.6.3 Reference Chromatographic Condition

The same reference chromatographic condition as erythritol determination in A.3.3.

A.6.4 Analysis Steps:

A.6.4.1 Standard Solution Preparation

Weigh accurately 0.25g ribitol and glycerin standard substance respectively in 105°C, accurate to 0.0001g, transfer to a 50mL volumetric flask, dissolve with mobile phase, dilute and constant volume to graduation, and blend for spare use. Filter with 0.45μm microfiltration membrane before chromatographic analysis.

A.6.4.2 Sample Solution Preparation

Weigh accurately 2.0g erythritol standard sample in 105°C, after drying for 4 hours, accurate to 0.0001g, transfer to a 50mL volumetric flask, dissolve with mobile phase, dilute and constant volume to graduation, and blend for spare use. Filter with 0.45μm microfiltration membrane before chromatographic analysis.

A.6.4.3 Determination

Under the Reference Chromatographic Condition of A.6.3, have chromatographic analysis to standard solution and sample solution respectively, and record 60min chromatogram. The peak times of ribitol and glycerin are qualitative according to the peak time of corresponding standard substance. Repeat the experiment two times to obtain average peak area value.

A.6.5 Result Calculation

Ribitol and glycerin contents are calculated as mass fraction w_3 and w_4 in %, and calculated with Formula (A.3) and (A.4):

$$w_3 = \frac{m_5}{m_0} \times \frac{A_3}{A_4} \times 100\% \quad \cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots \quad (A.3)$$

$$w_4 = \frac{m_6}{m_0} \times \frac{A_5}{A_6} \times 100\% \quad \cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots \quad (A.4)$$

Where,

m_5——Numerical value of weighed ribitol standard substance mass, gram (g);

m_0——Numerical value of weighed sample mass, gram (g);

A_3——Numerical value of ribitol average peak area value in the sample solution chromatogram;

A_4——Numerical value of ribitol average peak area value in the standard solution chromatogram;

m_6——Numerical value of weighed glycerin standard substance mass, gram (g);

A_5——Numerical value of glycerin average peak area value in the sample solution chromatogram;

A_6——Numerical value of glycerin average peak area value in the standard solution chromatogram

Take arithmetic mean value of two times parallel determination results as determination result and the absolute difference value of parallel determination result shall not larger than 0.01%.

END TRANSLATION