NATIONAL STANDARD OF THE

PEOPLE'S REPUBLIC OF CHINA

GB 1886.343-2021

National food safety standard - Food additives - L-Threonine

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1 Scope

This Standard is applicable to the food additive L-threonine, which is obtained through fermentation, extraction and refining with starch and sugar as the main raw materials.

2 Chemical Name, Molecular Formula, Structural

Formula and Relative Molecular Mass

2.1 Chemical Name

L-2-amino-3-hydroxybutyric acid

2.2 Molecular Formula

C4H9NO3

2.4 Relative Molecular Mass

119.12 (in accordance with the international relative atomic mass of 2018)

3.1 Sensory Requirements

The sensory requirements shall comply with the requirements of Table 1.

Table 1 -- Sensory Requirements

Appendix A Inspection Method

A.1 General Rules When other requirements are not specified, the reagents and water used in this Standard refer to analytically pure reagents and Grade-3 water specified in GB/T 6682.

When other requirements are not specified, the standard solutions used in tests, and standard solutions, preparations and products used for impurity determination shall be prepared in accordance with the stipulations of GB/T 601, GB/T 602 and GB/T 603.

When it is not specified which solvent is used for preparation, the solutions used in tests refer to aqueous solutions.

A.2 Identification Test A.2.1 Reagents and materials A.2.1.1 Ninhydrin solution: weigh-take 0.1 g of ninhydrin; use water to dissolve it and dilute to a constant volume of 100 mL.

A.2.1.2 Litmus paper.

A.2.1.3 Potassium periodate.

A.2.2 Analytical procedures A.2.2.1 Ninhydrin test Weigh-take about 0.1 g of specimen, accurate to 0.01 g; dissolve it in 100 mL of water.

Take 5 mL of this solution; add 1 mL of ninhydrin solution. Heat it up to boiling; after a certain time, it shall turn purple.

A.2.2.2 Litmus paper color test Take 0.5 g of specimen; add 5 mL of water. Then, add 0.5 g of potassium periodate;

heat it up in water bath. The generated gas shall turn the moistened red litmus paper into blue.

A.2.3 Infrared spectroscopy test Adopt the potassium bromide smear method, in accordance with GB/T 6040, determine the infrared absorption spectrum. The obtained infrared spectrogram shall be consistent with the spectrogram of L-threonine standard substance (see Appendix B).

specimen solution, expressed in (mL);

V2---the volume of the standard titration solution of perchloric acid consumed by the blank solution, expressed in (mL);

c---the concentration of the standard titration solution of perchloric acid, expressed in (mol/L);

M---the molar mass of L-threonine, expressed in (g/mol) (M = 119.12);

m---the mass of the specimen, expressed in (g);

1,000---the volume conversion factor.

When titrating the specimen, if the difference between the temperature of the standard

titration solution of perchloric acid and the temperature at the time of calibration exceeds 10 °C, then, it shall be re-calibrated; if it does not exceed 10 °C, then, in accordance with Formula (A.2), correct the concentration c of the standard titration solution of perchloric acid, expressed in (mol/L).

Where, c0---the concentration of the standard titration solution of perchloric acid at the time of calibration, expressed in (mol/L);

0.0011---the expansion coefficient of glacial acetic acid;

t---the actual temperature of the standard titration solution of perchloric acid when titrating the specimen, expressed in (°C);

t0---the temperature of the standard titration solution of perchloric acid at the time of calibration, expressed in (°C).

The arithmetic mean value of parallel determination results shall prevail in the test result. The absolute difference between two independent determination results obtained under repeatability conditions shall not be greater than 0.3% of the arithmetic mean value.

A.4 Determination of Loss on Drying A.4.1 Instruments and equipment A.4.1.1 Electrically heated drying oven.

A.4.1.2 Weighing bottle.

solution); at 25 °C, calibrate the pH of the pH meter to 6.86; position it; use water to rinse the electrode.

A.5.3.2 Preparation of specimen solution Weigh-take 5 g of specimen, accurate to 0.01 g; place it in a beaker. Add water that does not contain carbon dioxide to dissolve it and dilute to a constant volume of 100 mL; shake it well. Use the specimen solution to rinse the electrode, then, insert the electrode into the specimen solution. Adjust the temperature compensation knob of the pH meter to 25 °C; determine the pH of the specimen solution. Repeat the operation, until the pH reading is stable for 1 min, then, record it.

A.5.3.3 Result recording The determination result shall be accurate to one decimal place. The arithmetic mean value of parallel determination results shall prevail in the test result. The absolute difference between two independent determination results obtained under repeatability conditions shall not be greater than 0.05.

A.6 Determination of Specific Rotation A.6.1 Instrument and equipment Polarimeter: equipped with sodium light (sodium spectrum D line 589.3 nm), with an accuracy of +/- 0.01°.

A.6.2 Analytical procedures Weigh-take 6 g of specimen that has been pre-dried at 105 °C to a constant mass, accurate to 0.0001 g. Add hot water to dissolve it; after it cools down, reach a constant volume in a 100 mL volumetric flask; shake it well. Adjust the temperature of the solution to 20 °C. Use the above-mentioned specimen solution to rinse the optical

rotation tube for 3 times. Add the specimen solution (without bubbles) into the optical rotation tube; observe and determine the optical rotation.

A.6.3 Result calculation Specific rotation am (20 °C, D), expressed in (°) ? dm2 ? kg-1, shall be calculated in accordance with Formula (A.4).

Where, a---the optical rotation measured at 20 °C, expressed in (°);

l---the length of the optical rotation tube, expressed in (dm);

A.8.1.1 Concentrated sulfuric acid.

A.8.1.2 Sulfuric acid solution: 1 + 8.

A.8.2 Instruments and equipment A.8.2.1 Platinum (or porcelain) crucible.

A.8.2.2 High-temperature furnace.

A.8.2.3 Desiccator.

A.8.3 Analytical procedures Weigh-take about 2 g of specimen, accurate to 0.0001 g. Place it in a crucible that has been burnt at 800 °C +/- 25 °C to a constant mass. Slowly dropwise add 1 mL of sulfuric acid solution to completely moisten the specimen. Firstly, heat it up on an electric furnace with a small fire, until the specimen has just begun to be carbonized, then, remove it and cool it down. Then, dropwise add 0.5 mL of concentrated sulfuric acid;

use the above-mentioned method to heat it up, until the sulfuric acid vapor is exhausted;

transfer it into a high-temperature furnace at 800 °C +/- 25 °C and burn it for 45 min.

When the temperature of the furnace drops to 200 °C, remove the cover, put it in the desiccator to cool down for 30 min, then, weigh it.

A.8.4 Result calculation The mass fraction w3 of burning residue in the specimen shall be calculated in accordance with Formula (A.5).

Where, m5---after burning, the mass of the crucible and the specimen, expressed in (g);

m3---the mass of the crucible, expressed in (g);

m4---the mass of the crucible and the specimen, expressed in (g).

The calculation result shall retain one decimal place.

The arithmetic mean value of parallel determination results shall prevail in the test result. The absolute difference between two independent determination results obtained under repeatability conditions shall not be greater than 10% of the arithmetic mean value.