

ICS 67.220.20
CCS X 42



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

GB 25544-2010

**DL-malic acid of the national food safety standards of food
additives**

(English Translation)

Issued on: December 21, 2010

Implemented on: February 21, 2011

Issued by: Ministry of Health of the People's Republic of China

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Foreword

Appendix A, Appendix B and Appendix C of this standard are normative appendices.

National standards for food safety Food additives DL-malic acid

1 Scope

This standard is suitable for the use of maleic anhydride, cis/fumaric acid as raw materials by hydration reaction, concentrated crystallization, dehydration, drying and prepared Food additives DL-malic acid.

2 Normative reference documents

The documents cited in this standard are indispensable for the application of this standard. Any reference to the date of the document, only the date of the edition this applies to this standard. For undated references, the latest edition (including all amendments) applies to this standard.

3.1 Chemical name

DL-hydroxy succinic acid

3.2 Molecular formula

C₄H₆O₅

3.3 Structural formula

HO CH COOH

CH₂ COOH

3.4 Relative molecular mass

134.09 (according to 2007 International Relative Atomic Quality)

4 Technical requirements

4.1

sensory requirements. should be consistent with the provisions of Table 1.

Table 1 sensory requirements

Item Index Test Method Color white or white Odor has a special sour taste Organizational state Crystallization powder or granules Take appropriate laboratory samples and place them in a clean, dry white porcelain dish in the natural light, visual observation, smell the smell

4.2

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

Table 2 Physical and chemical indicators

Item Index Test Method DL-malic acid (based on C₄H₆O₅), w /% 99.0 to 100.5 Appendix A, A.4 Specific rotation α_D^{25} [(°) · dm² · kg⁻¹] -0.10 ~ 0.10 Appendix A A.5 Arsenic (As)/(mg/kg) ≤ 2 Appendix A A.6 Lead (Pb)/(mg/kg) ≤ 2 Appendix A A.7 Residue on ignition, w /% ≤ 0.1 Appendix A A.8 Fumaric acid, w /% ≤ 1.0 Appendix A A.9 Maleic acid, w /% ≤ 0.05 Appendix A A.9 Water insoluble matter, w /% ≤ 0.1 A. A in Appendix A.

Appendix A

(Normative appendix) Testing method A.1 Warning Some of the test procedures specified in the test method may result in a hazardous situation. Operators should take appropriate safety and protective measures.

A.2 General provisions Unless otherwise stated, only the reagents identified as analytical reagents and the tertiary water specified in GB/T 6682-2008 are used in the analysis.

Standard titration solution used in the test method, standard solution for the determination of impurities, preparations and articles, in the absence of other requirements, GB/T 601, GB/T 602 and GB/T 603.

A.3 Identification test A.3.1 Malate Ammonia Salt coloring test A.3.1.1 Reagents and materials A.3.1.1.1 Ammonia solution. 2 3.

A.3.1.1.2 p-aminobenzenesulfonic acid. 10 g/L.

A.3.1.1.3 Sodium nitrite solution..200 g/L.

A.3.1.1.4 Sodium hydroxide solution. 40 g/L.

A.3.1.2 Analysis steps Weigh 0.5g of laboratory samples, accurate to 0.01g, placed in 50mL test tube, add 10mL of water dissolved. Neutralized with aqueous ammonia solution to neutral, add 1mL p-aminobenzenesulfonic acid solution and heat in a boiling water bath for 5min. Add 5mL sodium nitrite solution, and then placed in a water bath After heating for 3 min, add 5 mL of sodium hydroxide solution, the test solution should be red immediately.

A.3.2 Infrared Spectrum Control Weigh about 1mg of laboratory samples and 100mg potassium bromide, research into uniform powder, into the former, after pressing into the film with infrared the spectra of the DL-malic acid are shown in Figure B.1, and the spectra are consistent with the DL-malic acid standard.

A.4 Determination of DL-malic acid content A.4.1 Methodological Summary the aqueous solution of the sample was titrated with the standard solution of sodium hydroxide with phenolphthalein as the indicator, and the amount of the solution was titrated according to the standard of sodium hydroxide.

The total acid content of C₄H₆O₅ is DL-malic acid content.

A.4.2 Reagents and materials A.4.2.1 sodium hydroxide standard sodium titration solution. c (NaOH) = 1.0mol/L.

A.4.2.2 phenolphthalein indicator solution. 10g/L.

A.4.3 Analysis steps A.4.3.1 Weigh 2.0g of laboratory samples, accurate to 0.0002g, add 40mL of water without carbon dioxide dissolved, add 2 drops of phenolphthalein instructions Liquid, titration with sodium hydroxide standard solution to reddish, keep 30s do not fade for the end.

A.4.3.2 At the same time as the determination, the same amount of reagent solution was used as a blank test in the same procedure as for the measurement.

A.4.4 Calculation of results DL-malic acid (based on C₄H₆O₅), the value is expressed in%, calculated according to the formula (A.1) $w_1 = [(V-V_0)/1000] c_M m \times 100\%$ (A.1) where.

V --- sample consumption of sodium hydroxide standard titration solution (A.4.2.1) volume of the value in milliliters (mL);

V₀ --- blank test consumption of sodium hydroxide standard titration solution (A.4.2.1) volume of the value in milliliters (mL);

c - the exact value of sodium hydroxide standard titration solution concentration in moles per liter (mol/L);

m - the mass of the sample, in grams (g);

M - malic acid ($C_4H_6O_5$) in grams per mole (g/mol) ($M = 67.04$).

The arithmetic mean of the results of two parallel measurements is the result of the report.
The absolute difference between the two parallel determinations is not more than 0.2%.

A.5 Determination of specific rotation A.5.1 Weigh 4.25 g of laboratory sample, accurate to 0.001g, add 20mL of water to dissolve, move to 50mL volumetric flask, diluted with water to the scale, shake. The measurement temperature was $25^\circ C \pm 0.5^\circ C$.

The value of the specific rotation $\alpha_m(25^\circ C, D)$ is expressed by $(^\circ) \cdot dm^2 \cdot kg^{-1}$, calculated according to the formula (A.2) $\alpha_m(25^\circ C, D) = \alpha / l \cdot \rho$ where.

α - the measured angle of rotation, in degrees ($^\circ$);

l - the length of the rotating tube in dm (dm);

ρ - Mass concentration of the effective components in solution, in grams per milliliter (g/mL).

A.5.2 Other according to GB/T 613.

A.6 Determination of arsenic A.6.1 Weigh 1.0g of laboratory samples, accurate to 0.01g, into the arsenic device into the conical flask, add 5mL of water dissolved, add 1 drop Bromophenol blue indicator solution (0.4g/L), dropping ammonia solution (14) and the solution was purple, replenishment to about 35mL, then add 20mL sulfur Acid solution (15), shake, as the sample solution. Use Absorbent Solution B. Perform a limited test to measure $2 mL \pm 0.02 mL$ arsenic (As) standard Solution (equivalent to $2.0 \mu g As$) to prepare a limited standard solution.

A.6.2 other according to GB/T 5009.76 diethylamino dithiocarbamate colorimetric method.

A.7 Determination of lead A.7.1 Colorimetric method (Arbitration law) According to GB/T 5009.75. The sample treatment was carried out by dry digestion. Before use, 1mg/mL lead (Pb) standard solution dilute Release $5 \mu g/mL$ lead (Pb) standard solution. Measure $25 mL \pm 0.02 mL$ sample solution (equivalent to 2.5g laboratory samples) And 1 mL of $\pm 0.02 mL$ lead (Pb) standard solution (equivalent to $5 \mu g$ of Pb) were placed in a 125 mL separatory funnel and the lead standard solution Add 1% nitric acid solution to 25mL.

A.7.2 Atomic Absorption Spectrometry Specimen treatment according to GB/T 5009.75 dry digestion method. Others are carried out according to GB 5009.12.

A.8 Determination of burning residue Weigh about 2g of laboratory samples, accurate to 0.0001g. The burning temperature is $800^\circ C \pm 25^\circ C$. Other according to GB/T 9741.

The arithmetic mean of the results of two parallel measurements is the result of the report.
The absolute difference between the two parallel determinations is not more than 0.01%.