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National Standard

of the People's Republic of China

GB/T 8967-2007

Replacing GB/T 8967-2000

Monosodium L-glutamate

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Standardization Administration Committee.

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Foreword

This Standard is not equivalent to “Monosodium L-glutamate” standard in the 7th edition of Japanese “Specifications and Standards for Food Additives”. This Standard incorporates relevant contents in QB 1500-1992 “MSG”, and it is a revision to GB/T 8967-2000 “Monosodium L-glutamate (99% MSG)”.

This Standard replaces GB/T 8967-2000, from the date of execution; QB 1500-1992 shall be invalidated accordingly.

Compared with GB/T 8967-2000, the main changes of this Standard are as follows:

— CHANGE the name to Monosodium L-glutamate (MSG);

— DEFINE the monosodium L-glutamate (MSG), salted MSG, and special delicious MSG;

— CLASSIFY the monosodium L-glutamate (MSG);

— The hygienic requirements shall execute the relevant hygienic standards; therefore, this Standard has no requirement;

— Methods for analysis of chloride: ADD the potassium chromate indicator method (applicable to chromate added with edible salt);

— Visible turbidimetric methods for sulfate: there is difference at detail-level for MSG, special delicious MSG, and salted MSG;

— ADD the determination of three flavor enhancers in special delicious MSG.

Annex A of this Standard is normative, and Annex B is informative.

This Standard shall be under the jurisdiction of the Subcommittee of Industrial Fermentation of National Technical Committee on Food Industry of Standardization Administration of China.

Drafting organizations of this Standard: China National Research Institute of Food & Fermentation Industries, BBCA Biochemical Co., Ltd., Hangzhou West Lake MSG Group Co., Ltd., Zhejiang Mifeng Group Co., Ltd., Shenyang Hongmei Enterprise Group Co., Ltd., and Hebei Meihua Holding Group Co., Ltd.

Main drafters of this Standard: Zhang Wei, Chang Zhuxia, Cheng Changping, Gong Xuming, Shi Zhongke, and Liu Senzhi.

The previous versions replaced by this Standard are as follows:

— GB 8967-1988, GB/T 8967-2000.

Monosodium L-glutamate

1 Scope

This Standard specifies monosodium L-glutamate's (MSG) terms and definitions, classification, requirements, analysis methods, test rules, marking, packaging, transportation, and storage.

This Standard applies to monosodium L-glutamate (MSG).

2 Normative references

The provisions in following documents become the provisions of this Standard through reference in this Standard. For dated references, the subsequent amendments (excluding corrections) or revisions do not apply to this Standard, however, parties who reach an agreement based on this Standard are encouraged to study if the latest versions of these documents are applicable. For undated references, the latest edition of the referenced document applies.

GB/T 191 Packaging - Pictorial marking for handling of goods (GB/T 191-2008, eqv ISO 780: 1997)

GB/T 601 Chemical reagent - Preparations of standard volumetric solutions

GB/T 602-2002 Chemical reagent - Preparations of standard solutions for impurity (ISO 6353-1: 1982, NEQ)

GB 2720 Hygienic standard for weijing (gourmet powder)

GB/T 5009.43 Method for analysis of hygienic standard of monosodium glutamate

GB/T 6682-1992 Water for laboratory use; Specifications

GB 7718 General standard for the labeling of prepackaged foods

JJF 1070 Rules of Metrological Testing for Net Quantity of Products in Prepackages with Fixed Content

QB/T 3798 Food additive - Disodium 5'-inosinate+disodium 5'-guanylate

QB/T 3799 Food additive - Disodium guanylate

Measurement supervision and management methods for fixed quantity packaged commodity (Order by General Administration of Quality Supervision, Inspection

7 Analysis methods

The water involved in this Standard, if not otherwise specified, refers to the water that complies with GB/T 6682-1992.

The reagent involved in this Standard, if not otherwise specified for the specifications, refers to analytical reagents (AR). Special requirements shall be expressly provided otherwise.

The solution involved in this Standard refers to aqueous solution if there is no indication of which solvent is used to prepare the solution.

7.1 Appearance

WEIGH about 10g of samples. OBSERVE them with the naked eye. SMELL and taste them. And then make a judgment and keep a good record.

7.2 Identification test

CONDUCT according to Annex B.

7.3 Content of monosodium L-glutamate

7.3.1 Perchloric acid non-aqueous titration

7.3.1.1 Principle

With the existence of acetic acid, TITRATE the monosodium L-glutamate in the sample with standard perchloric acid solution; determine its end point by potentiometric titration or use α-naphtholbenzein as an indicator to titrate the solution to green as its end point.

7.3.1.2 Instruments

7.3.1.2.1 Automatic potentiometric titrator (accuracy: ±5mV).

7.3.1.2.2 Acidometer.

7.3.1.2.3 Magnetic stirring apparatus.

7.3.1.3 Reagents and solutions

7.3.1.3.1 Standard titration solution of perchloric acid [c($HClO_4$)=0.1mol/L]: prepared and standardized according to GB/T 601.

7.3.1.3.2 Acetic acid.

7.3.1.3.3 Formic acid.

specific rotation of the sample is calculated according to formula (4):

$$X_3 = [\alpha]_D^t - 0.047(20 - t) \qquad \cdots\cdots(4)$$

Where:

X_3 - the specific rotation of the sample, in °;

$[\alpha]_D^t$ - the specific rotation of the sample solution at t°C, in °;

t - the temperature of the measured sample solution, in °C;

0.047 - temperature correction factor.

The computing result shall be rounded off to the first decimal.

7.5.6 Tolerance

The difference in absolute value between the two test results of the same sample shall not exceed 0.02%.

7.6 Chloride

7.6.1 Turbidimetry (applicable to traces of chloride)

7.6.1.1 Principle

Traces of chloride ions in the sample solution react with silver nitrate to produce precipitated silver chloride, whose turbidity is compared with the silver chloride produced from standard chloride ions. Visible turbidimetric method is conducted.

7.6.1.2 Reagents and solutions

7.6.1.2.1 Nitric acid

7.6.1.2.2 Chloride standard solution (1mL of solution contains 0.1mg of chloride)

Prepared according to GB/T 602.

7.6.1.2.3 10% (volume fraction) salpeter solution

MEASURE 1-volume nitric acid (7.6.1.2.1) and put it into 9-volume water.

7.6.1.2.4 Silver nitrate standard solution [c($AgNO_3$)=0.1mol/L]

Prepared and standardized according to GB/T 601.

7.6.1.3 Analysis procedures

Phosphate standard buffer solution (pH 6.86): WEIGH 3.40g of monopotassium phosphate (KH_2PO_4) and 3.55g of disodium hydrogen phosphate (Na_2HPO_4) that has been pre-dried for 2h at 120°C. DISSOLVE them in water solution without carbon dioxide; dilute to 1000mL; shake them well.

7.7.4 Analysis procedures

USE phosphate standard buffer solution. CALIBRATE pH meter to set the pH as 6.87 at 25°C. FIX the position. WASH the electrode with water.

WEIGH 5g of samples, accurate to 0.1g. DISSOLVE them in water solution without carbon dioxide and dilute to 50mL. SHAKE the mixture well, which will serve as sample solution. WASH the electrode with the sample solution before inserting it into the sample solution. ADJUST the pH meter's temperature compensation knob to 25°C; measure the pH of the sample solution. REPEAT the operation until pH reading remains steady for 1min. Finally record the results.

The measured result shall be accurate to the first decimal.

7.7.5 Tolerance

The difference in absolute value between the two tests of the same sample shall not exceed 0.05pH.

7.8 Loss on drying

7.8.1 Principle

DETERMINE the mass of the lost volatile substance by drying method, expressed in percentage.

7.8.2 The first method - Conventional method

7.8.2.1 Instruments

7.8.2.1.1 Electrically heated drying oven: temperature control of 98°C±1°C.

7.8.2.1.2 Weighing bottle: 50mm×30mm.

7.8.2.1.3 Desiccator: allochroic silica gel.

7.8.2.1.4 Analytical balance: sensibility of 0.1mg.

7.8.2.2 Analysis procedures

WEIGH 5g of samples with a weighing bottle that has been dried to a constant weight, accurate to 0.0001g. PUT the bottle in the electrically heated drying oven at 98°C±1°C for 5h. TAKE the bottle out. COVER the bottle and put it into a desiccator. COOL it down to room temperature (30min). WEIGH it.

Similar to 7.8.2.3.

7.9 Ferrum

7.9.1 Principle

Under acid conditions, ferric irons in the sample solution react with ammonium rhodanate. Its shade is directly proportional to the concentration of ferric irons. Thus it is possible for colorimetry.

7.9.2 Instruments

Colorimeter tube: 50mL.

7.9.3 Reagents and solutions

7.9.3.1 Nitric Acid

7.9.3.2 1+1 salpeter solution: MEASURE 1-volume nitric acid (7.9.3.1) and mix it in 1-volume water.

7.9.3.3 Ammonium rhodanate

7.9.3.4 Ammonium rhodanate solution (150g/L): WEIGH 5.0g of ammonium rhodanate (7.9.3.3). DISSOLVE it in water and dilute the mixture to 100mL.

7.9.3.5 Ferric standard solution I (iron content 0.1g/L): prepared according to GB/T 602.

7.9.3.6 Ferric standard solution II (iron content 0.1g/L): TAKE 10mL of ferric standard solution I (7.9.3.5) and dilute it with water to 100mL.

7.9.4 Analysis procedures

WEIGH 1g of samples into a colorimetric tube, accurate to 0.1g. ADD 10mL of water to dissolve them; then add 2mL of salpeter solution (7.9.3.2). SHAKE the mixture well. SUCK accurately 0.5mL of ferric standard solution II (7.9.3.6) INTO another colorimetric tube. ADD 9.5mL of water and 2mL of saltpeter solution (7.9.3.2); shake the mixture well. PUT the two tubes in boiling water for 20min. TAKE them out and cool them down to room temperature. ADD 10.00mL of ammonium rhodanate solution (7.9.3.4) to the two tubes respectively; add water to 25mL. SHAKE them well before visual colorimetry.

If the color of the sample solution tube is not higher than that of the standard tube solution, the iron content is ≤5mg/kg.

7.10 Sulfate

7.10.1 Principle

Traces of sulfate radicals react with barium chloride in the sample solution to produce white precipitated barium sulfate, which can be compared with standard turbidity for determination.

7.10.2 Instruments

7.10.2.1 Colorimeter tube: 50mL.

7.10.2.2 Beaker: 50mL.

7.10.3 Reagents and solutions

7.10.3.1 10% hydrochloric acid solution (volume fraction): WEIGH 1-volume hydrochloric acid and add 9-volume water.

7.10.3.2 50g/L barium chloride solution: WEIGH 5.0g of barium chloride, dissolve it in water solution and dilute to 100mL.

7.10.3.3 1.0g/L sulfate standard solution I: WEIGH 1.480g of anhydrous sodium sulfate, and prepare the solution according to 4.28 in GB/T 602-2002.

7.10.3.4 0.1g/L sulfate standard solution II: prepared according to 4.28 in GB/T 602-2002.

7.10.4 Analysis procedures

7.10.4.1 Monosodium L-glutamate, special delicious monosodium L-glutamate

WEIGH 0.5g of samples into a 50mL colorimetric tube, accurate to 0.01g. ADD 18mL of water to dissolve them; then add 2mL of hydrochloric acid solution (7.10.3.1). SHAKE the mixture well. Suck accurately 2.50mL of sulfate standard solution II (7.10.3.4) into another 50mL colorimetric tube. ADD 15.5mL of water and 2mL of hydrochloric acid solution (7.10.3.1); shake the mixture well. ADD 5.00mL of barium chloride solution (7.10.3.2) to 2 tubes respectively; shake them well. PUT them in a dark place for 10min. TAKE them out for visual colorimetry.

If the turbidity of the sample tube solution is not higher than that of the standard tube solution, the sulfate content is ≤0.05%.

7.10.4.2 Salted monosodium L-glutamate

WEIGH 0.5g of samples into a 50mL colorimetric tube, accurate to 0.01g. ADD 18mL of water to dissolve them; then add 2mL of hydrochloric acid solution (7.10.3.1). SHAKE the mixture well. SUCK accurately 2.50mL of sulfate standard solution I (7.10.3.3) INTO another 50mL colorimetric tube. ADD 15.5mL of water and 2mL of hydrochloric acid solution (7.10.3.1); shake the mixture well. ADD 5.00mL of barium chloride solution (7.10.3.2) to 2 tubes respectively; shake them well. PUT them in a dark place for 10min. TAKE them out for visual colorimetry.

8.4.1 The product shall be inspected batch-by-batch according to this Standard before delivery.

8.4.2 Items of factory inspection

8.4.2.1 Monosodium L-glutamate (MSG): package, net content, content of monosodium L-glutamate, light transmittance, specific rotation, loss on drying, ferrum, sulfate.

8.4.2.2 Salted monosodium L-glutamate: package, net content, content of monosodium L-glutamate, edible salt, light transmittance, loss on drying, ferrum, sulfate.

8.4.2.3 Special delicious monosodium L-glutamate: package, net content, content of monosodium L-glutamate, light transmittance, content of sodium ribonucleotide, loss on drying, ferrum, sulfate.

8.5 Type inspection

The type inspection involves all items in the sensory, physiochemical, and hygienic requirements as stated in this Standard. The product is normally subject to a type inspection every quarter. In case of any of the following situations, type inspection is also necessary:

a) Major changes in raw and auxiliary materials;

b) Change of key processes or equipment;

c) Restoration to production after 3-month production halt of new trial-manufactured products or normally manufactured products;

d) Occurrence of major differences in the inspection results between the factory inspection and the previous type inspection;

e) Spot test by national quality supervision and inspection agency according to relevant regulations.

8.6 Determination rules

8.6.1 If one item is unsatisfactory in the inspection results, double volume of samples shall be drawn from the same batch for re-inspection, and the re-inspection result shall prevail. If there is still one item unsatisfactory in re-inspection, the whole batch will be determined as unsatisfactory.

8.6.2 If there is dispute between the seller and the buyer over the quality, both parties shall negotiate to choose an arbitration agency to do re-inspection according to this Standard.

9 Marking, packaging, transportation, and storage

9.1 Marking

9.1.1 The outer packing marks of products shall comply with GB/T 191.

9.1.2 The outer packaging material shall have obvious marks, which shall indicate product name, manufacturer, address of manufacturer, net content, date of production (batch number), and etc.

9.1.3 The package of prepackaged products shall be marked according to GB7718. The package of salted monosodium L-glutamate shall be marked with the specific content of monosodium L-glutamate.

9.2 Packaging

9.2.1 The inner packaging material of products shall meet hygienic requirements of packaging material for food.

9.2.2 Packaging requirements: the inner package shall be airtight. The outer package shall not be polluted.

9.3 Transportation and storage

9.3.1 The product shall be handled gently and prevented from pollution, rain, and insolation in transportation.

9.3.2 The means of transportation shall be clean, nontoxic, and pollution-free. It is strictly prohibited to transport the products with toxic, hazardous, and corrosive substance.

9.3.3 The product shall be stored in a cool, dry, ventilated, and pollution-free place. Outdoor storage is not allowed.

A.3.1 L-glutamic acid content

A.3.1.1 Polarimetry

A.3.1.1 Principle

Similar to 7.3.2.1.

A.3.1.1.2 Instruments

Similar to 7.3.2.2.

A.3.1.1.3 Reagents

Similar to 7.3.2.3.

A.3.1.1.4 Analysis procedures

a) Preparation of sample solution: WEIGH 10g of samples, accurate to 0.0001g. ADD 20mL of water. Add 16.5mL of hydrochloric acid while stirring. MOVE it into a 100mL volumetric flask when the samples are completely dissolved. COOL down the solution to about 20°C. DILUTE it to a constant volume and mix it well. FILTER it with filter paper.

If the solution color is dark, add 0.1g (0.3g at most) of activated carbon. STIR, decolor, and filter it. DISCARD the first 5mL of filtrate and collect the rest filtrate for later use.

b) Determination: similar to 7.3.2.4.

A.3.1.1.5 Calculation

The content of L-glutamic acid in the sample is calculated according to formula (A.1), expressed in %.

$$X_{A1} = \frac{\frac{\alpha}{L \times c}}{32.00 + 0.06(20 - t)} \times 100 \quad \cdots\cdots (A.1)$$

Where:

X_{A1} - the content of L-glutamic acid in the sample, in %;

α - the measured optical rotation of the solution, in °;

L - the length of polarization tube (that is liquid layer thickness), in dm;

c - the content of L-glutamic acid in 1mL samples, in g/mL;

32.00 - the specific rotation, in °;

0.06 - temperature correction factor.

The computing result shall be rounded off to the first decimal.

A.3.2.3 Tolerance

The difference of the absolute values of two times of determination for the same sample shall not exceed 0.02%.

A.3.3 Light transmittance

A.3.3.1 Instruments

Spectrophotometer: accuracy of ±0.5%.

A.3.3.2 Reagents

a) Hydrochloric acid;

b) Hydrochloric acid solution [c(HCl)=2 mol/L]: measure 16.5mL of hydrochloric acid [A.3.3.2a]; inject it into 100mL of water; shake them well.

A.3.3.3 Analysis Procedures

WEIGH 5g of samples, accurate to 0.1g. DISSOLVE them in hydrochloric acid solution [A.3.3.2b]; dilute to 100mL. SHAKE the mixture well to be as test solution. WASH the cuvette with the test solution. USE 1cm cuvette TO ADJUST zero with the same batch of hydrochloric acid solution [A.3.3.2b]. DETERMINE the light transmittance at 590nm wavelength.

A.3.3.4 Tolerance

Similar to 7.4.3.

A.3.4 Sulfate

A.3.4.1 Principle

Similar to 7.10.1.

A.3.4.2 Reagents and solutions

Similar to 7.10.3.

A.3.4.3 Analysis procedures

TAKE 1.00ml of test solution [A.3.1.1.4a]. ADD 17mL of water and 2mL of hydrochloric acid [10% (volume fraction)], as the sample tube. TAKE 3.50mL of standard sulfate solution. ADD 14.5mL of water and 2mL of hydrochloric acid [10% (volume fraction)],

TAKE little samples (about 0.5g). ADD 1mL of hydrochloric acid (B.2.a) to dissolve them. DIP the pointed end of the platinum needle into the test solution for about 5mm. Then put the platinum needle in the colorless or blue flame of the Bunsen burner to burn.

If there is yellow flame and it lasts about 4s, it can be identified as sodium salt.

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