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

GB 7300.203-2020

Replacing GB/T 21515-2008

**Feed additive - Part 2: Vitamins, provitamins and chemically
well-defined substances having similar effect - Betaine**

饲料添加剂 第2部分：维生素及类维生素 甜菜碱

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Table of Contents

1	Scope	
2	Normative references	
3	Chemical name, molecular formula, relative molecular mass, and structural formula ...	
4	Requirements...	
5	Test method...	
5.2	Identification test	
5.2.1	Reagents	
5.2.1.2	Bismuth potassium iodide solution: Take	
5.2.2	Identification method	
5.2.2.1	Weigh	
5.3	Determination of betaine content	
5.3.1	Ion chromatography (the arbitration method)	
5.3.1.4	Analysis steps 5.3.1.4.1 Extraction Weigh about	
5.3.2	Perchloric acid titration method	
5.3.2.4	Test procedure Weigh about	
5.4	Loss on drying	
5.4.1	Instruments and equipment	
5.4.2	Determination steps Weigh about 1 g of the sample (accurate to 0.0001	
5.7	Determination of heavy metal content (in Pb)	
5.7.2	Reagents or materials	
5.7.2.14	Lead standard stock solution: Weigh	
5.7.3	Test procedure	
5.7.3.1	Preparation of test solution Weigh	
5.9	Determination of sodium chloride (NaCl) content	
5.9.1	Synthetic betaine	
5.9.1.4	Test procedure Weigh about 10 g (accurate to 0.0001	
5.9.2	Natural Betaine	
5.9.2.2	Reagents 5.9.2.2.1 Chloride stock solution (1 mL of solution contains	
5.9.2.3	Test procedure Weigh 5 g of the sample (accurate to	
5.10	Determination of sulfate content (in SO ₂ -4)	
5.10.3	Reagents	
5.10.4	Test procedure Weigh about 10 g of the sample, accurate to	

6 Inspection rules

7 Labeling, packaging, transportation, and storage...

1 Scope

GB 7300.203-2020 is the Chinese national standard on feed additive - part 2: vitamins, provitamins and chemically well-defined substances having similar effect - betaine, in the field of agriculture. It carries no /T suffix, which in the Chinese system means compliance is mandatory: a product or a practice within its scope has to meet it to be lawfully made, sold or carried out in China. It was issued on 29 May 2020 by the State Administration for Market Regulation; Standardization Administration of China, and has been in force since 1 December 2020. Classification: ICS 65.120, CCS B46. This page is published from the official record of the standard held by the Chinese standards administration: the identification, the dates, the classification and the issuing body are taken from there. The clause text, the tables and the numeric limits are in the document itself, which is delivered complete in English translation.

This part of GB 7300 specifies the requirements, test methods, inspection rules, labeling, packaging, transportation, storage, and shelf life of the feed additive betaine. This part applies to natural betaine products that are separated from beet molasses and processed, and feed additive betaine products that are chemically synthesized from sodium chloroacetate and trimethylamine.

2 Normative references

The following documents are essential to the application of this document. For the dated referenced documents, only the versions with the indicated dates are applicable to this document; for the undated referenced documents, only the latest version (including all the amendments) is applicable to this document.

GB/T 601 Chemical reagent - Preparations of reference titration solutions

GB/T 602 Chemical reagent - Preparations of standard solutions for impurity

GB/T 603 Chemical reagent - Preparations of reagent solutions for use in test methods

GB/T 6682 Water for analytical laboratory use - Specification and test methods GB 10648 Feed label

GB/T 13079-2006 Determination of total arsenic in feeds

GB/T 14699.1 Feeding stuffs - Sampling

3 Chemical name, molecular formula, relative molecular mass,

and structural formula Chemical name: Trimethylglycine Molecular formula: $C_5H_{11}NO_2$

5.1 Appearance characteristics Take an appropriate amount of the sample, place it on a white porcelain plate, and visually inspect its color and shape under natural light.

5.2.1 Reagents

5.2.1.1 Hydrochloric acid solution: hydrochloric acid + water = 1 + 4 (volume ratio).

5.2.1.2 Bismuth potassium iodide solution: Take

0.85 g of bismuth subnitrate, dissolve it in 10 mL of acetic acid, and add 40 mL of water. Take 40 g of potassium iodide, dissolve it in water, and dilute the solution to 100 mL. Mix the above two solutions in equal volumes and store the mixture in a brown glass container.

5.2.1.3 Bismuth potassium iodide hydrochloric acid solution: Take 1 mL of bismuth potassium iodide solution (5.2.1.2), add 2 mL of hydrochloric acid solution (5.2.1.1), and add water to 10 mL (prepare the solution newly when it will be used).

5.2.2.1 Weigh

0.5 g of the sample, add 1 mL of water to dissolve, and add 2 mL of bismuth potassium iodide hydrochloric acid solution (5.2.1.3). Shake the mixture to produce an orange-red precipitate.

5.2.2.2 Take the solution in 5.3.1.4.1 and measure it with the instrument according to 5.3.1.4.3.3. The retention time is consistent with that of the standard solution.

5.3.1 Ion chromatography (the arbitration method)

5.3.1.1 Method principle The sample is dissolved in water, the solution is diluted to an appropriate concentration, and a cation exchange column and a non-suppressed conductivity detector are used for separation and determination. The quantitative analysis is carried out by the external standard method.

5.3.1.2 Reagents and materials 5.3.1.2.1 Standard betaine ($\geq 99\%$). 5.3.1.2.2

Methanesulfonic acid stock solution: Accurately pipette 2 mL of methanesulfonic acid into a 100 mL volumetric flask, dilute to volume with water, and shake well. The concentration is 300 mmol/L. 5.3.1.2.3 Mobile phase: Accurately pipette 10 mL of methanesulfonic acid stock solution (5.3.1.2.2) into a 1000 mL volumetric flask, dilute to volume with water, and shake well. The concentration is

3.0 mmol/L. Ultrasonic degassing for 5 min~10 min. Prepare the solution newly when it will be used. 5.3.1.2.4 Betaine standard stock solution: Weigh

0.10 g (accurate to 0.0001

g) of standard betaine (5.3.1.2.1) that has been dried at $105\text{ }^{\circ}\text{C}\pm 2\text{ }^{\circ}\text{C}$ for 4 h; put it in a 100 mL volumetric flask, make up to volume with water and shake well. The solution concentration is $1000\text{ }\mu\text{g/mL}$. 5.3.1.2.5 Filter membrane: $0.45\text{ }\mu\text{m}$, hydrophilic.

5.3.1.3 Instruments and equipment 5.3.1.3.1 Ion chromatograph: It has a cation exchange analytical column or another analytical column with comparable performance and a conductivity detector. 5.3.1.3.2 Analytical balance: The sense quantity is

0.1 mg. 5.3.1.3.3 Electrically heated drying oven: The temperature can be controlled at $105\text{ }^{\circ}\text{C}\pm 2\text{ }^{\circ}\text{C}$.

5.3.1.4 Analysis steps 5.3.1.4.1 Extraction Weigh about

0.25 g (accurate to 0.0001

g) of the sample that has been dried in an oven at $105\text{ }^{\circ}\text{C}$ to a constant weight, place it in a 100 mL volumetric flask, add about 70 mL of water, and make up the volume to the mark after the sample dissolved. Take 2 mL of the solution to a 50 mL volumetric flask, make up the volume to the mark, shake well, and pass it through a $0.45\text{ }\mu\text{m}$ filter membrane; let the filtrate stand for later test. 5.3.1.4.2 Preparation of a series of standard solutions Accurately pipette

50.00 mL of betaine standard stock solution (5.3.1.2.4) into 100 mL volumetric flasks respectively, dilute to volume with water, and shake well. The concentrations of the series of standard solutions are $10.0\text{ }\mu\text{g/mL}$, $50.0\text{ }\mu\text{g/mL}$, $100.0\text{ }\mu\text{g/mL}$, $200.0\text{ }\mu\text{g/mL}$, and $500.0\text{ }\mu\text{g/mL}$. Prepare these solutions newly when they will be used soon. 5.3.1.4.3 Determination 5.3.1.4.3.1 Reference conditions for ion chromatograph Chromatographic column: a cation exchange analytical column with 4 mm of inner diameter and 250 mm of length, and $4.5\text{ }\mu\text{m}$ of packing particle size; or other chromatographic columns with equivalent performance.

5.3.2 Perchloric acid titration method

5.3.2.1 Method principle The sample that has been dried to constant weight is dissolved in glacial acetic acid, and the perchloric acid is used as the standard titration solution; the crystal violet is used as the indicator for titration, and when the color changes from purple to blue-green, it is the end point of the titration.

5.3.2.2 Reagents or materials 5.3.2.2.1 Glacial acetic acid. 5.3.2.2.2 Acetic anhydride.

5.3.2.2.3 Crystal violet indicator solution: 5 g/L. 5.3.2.2.4 Perchloric acid standard titration solution: $c(\text{HClO}_4) =$

0.1 mol/L.

5.3.2.3 Instruments and equipment 5.3.2.3.1 Acid burette: 25 mL. 5.3.2.3.2 Analytical balance: The sense quantity is

0.1 mg.