GB

NATIONAL STANDARD OF THE

PEOPLE'S REPUBLIC OF CHINA

GB 5009.241-2017

National Food Safety Standard - Determination of Magnesium in Food

Issued on: April 06, 2017 **Implemented on: October 06, 2017**

Issued by: National Health and Family Planning Commission of PRC; China Food and Drug Administration.

Table of Contents

Foreword

This Standard replaced the determination of magnesium in the following standards such as GB/T 5009.90-2003 *Determination of iron, Magnesium and Manganese in Foods*, GB/T 9695.21-2008 *Meat and Meat Products - Determination of Magnesium*, GB 5413.21-2010 *National Food Safety Standard – Determination of Calcium, Iron, Zinc, Sodium, Potassium, Magnesium, Copper and Manganese in Foods for Infants and Young Children, Milk and Milk Products*, GB/T 23375-2009 *Determination of Copper, Iron, Zinc, Calcium, Magnesium and Phosphorus Content in Vegetables and Derived Products*, GB/T 14609-2008 *Inspection of Grain and Oils - Determination of Copper, Iron, Manganese, Zinc, Calcium, Magnesium In Cereals and Derived Products by Atomic Absorption and Flame Spectrophotometry*, GB/T 18932.12-2002 *Method for the Determination of Potassium, Sodium, Calcium, Magnesium, Zine, Iron, Copper, Manganese, Chromium, Lead, Cadmium Contents in Honey - Atomic Absorption Spectrometry*, NY 82.19-1988 *Determination of Calcium and Magnesium in Fruit Juice*.

Compared with GB/T 5009.90-2003, this Standard has the major changes as follows:

--- Modify the standard name into “National Food Safety Standard – Determination of Magnesium in Food”;

--- Adjust the sample pre-treatment into wet digestion, microwave digestion, dry ashing and pressure tank digestion;

--- Retain the flame atomic absorption spectrometry, and delete titration for sample determination;

--- Add inductively coupled plasma emission spectrometry as the second method;

--- Add inductively coupled plasma mass spectrometry as the third method.

National Food Safety Standard - Determination of Magnesium in Food

1 Scope

This Standard specifies use flame atomic absorption spectrometry, inductively coupled plasma emission spectrometry, and inductively coupled plasma mass spectrometry to determine the magnesium in food.

This Standard is applicable to the determination of magnesium in various foods.

The First Method of Flame Atomic Absorption Spectrometry

2 Principle

After digestion, the sample was flame atomized, then measure the absorbance at 285.2nm. In a certain concentration range, the magnesium absorbance value is proportional to the magnesium content; compare with the standard series and then quantify.

3 Reagents and Materials

Unless otherwise is specified, the reagents used in this method shall be guarantee reagent; while water used in this method shall be Class-II water stipulated in GB/T 6682.

3.1 Reagents

3.1.1 Nitric acid (HNO_3).

3.1.2 Perchloric acid ($HClO_4$).

3.13 Hydrochloric acid (HCl).

3.2 Reagents preparation

3.2.1 Nitric acid solution (5+95): take 50mL of nitric acid; pour into 950mL of water; mix evenly.

nitric acid; then digest the specimen as per the microwave digestion operation steps; the digestion conditions can refer to Appendix A. After cooling off, take out the digestion tank, put on the electric hot plate at 140°C~180°C to catch acid to 0.5mL ~ 1mL. After the digestion tank is allowed to cool off, transfer the digestion solution into 25mL volumetric flask; use a small amount of water to wash the digestion tank for 2~3 times; combine the washing liquid into the volumetric flask; then use water to make constant volume to the scale; mix evenly for spare-use. Meanwhile, do the blank teste of reagents.

5.2.3 Pressure tank digestion

Take 0.2g~1g (accurate to 0.001g) of solid specimen or accurately pipette 0.500mL~5.00mL of liquid specimen into the digestion inner tank; add 5mL of nitric acid. Cover the inner cap, tighten the stainless-steel jacket; place into the constant-temperature drying oven; maintain for 4h~5h at 140°C~160°C. Slowly loosen the outer tank after cooling; take out the digestion inner tank; place onto the adjustable electric hot plate, then expel the acid to about 1mL at 140°C~160°C. After cooling, transfer the digestion solution to the 25mL volumetric flask; use a small amount of water to wash the inner tank and inner cap for 2~3 times; combine the washing liquid into the volumetric flask; and use water to make constant volume to the scale, mix evenly for spare-use. Meanwhile do the blank test.

5.2.4 Dry ashing

Take 0.5g~5g (accurate to 0.001g) of solid specimen or accurately pipette 0.500mL~10.0mL of liquid specimen into the crucible; slowly heat the crucible onto the electric hot plate; carbonize with slight fire to no longer smoke. After carbonizing, place the specimen into the muffle furnace; ashing for 4h at 550°C. If the specimen after ashing has the black participles; cool off the crucible to the room temperature; add small amount of nitric acid (5+95) to moisten the residue; after evaporating on the electric hot plate with small fire, place it onto the muffle furnace to continue ashing at 550°C till specimen becomes lime-shape. After cooling off in the muffle furnace, take it out; cool off to the room temperature; use 2.5mL of nitric acid (1+1) to dissolve; use small amount of water to wash crucible for 2~3 times; combine the washing liquid into the volumetric flask; make constant volume to 25mL; mix evenly for spare-use. Meanwhile, do the blank test.

5.3 Determination

5.3.1 Instrument reference conditions

According to the performance of their instruments adjusted to the best condition, reference conditions: air-acetylene flame, wavelength 285.2mm, slit 0.2nm, lamp current 5mA~15mA.

5.3.2 Drawing of standard curve