NATIONAL STANDARD OF THE

PEOPLE'S REPUBLIC OF CHINA

GB 5009.168-2016

National food safety standard

Determination of fatty acids in foods

食品安全国家标准

食品中脂肪酸的测定

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Issued by: National Health and Family Planning Commission of the People's Republic of China;

China Food and Drug Administration.

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Foreword

This Standard replaces GB/T 5009.168-2003 “Determination of eicosapentaenoic acid and docosahexaenoic acid in foods”, GB/T 22223-2008 “Determination of total fat, saturated fat, and unsaturated fat in foods - Hydrolytic Extraction - Gas Chromatography”, GB 5413.27-2010 “National food safety standard - Determination of fatty acids in foods for infants and young children milk and milk products”, GB/T 9695.2-2008 “Meat and meat products - Determination of fatty acids”, GB/T 17376- 2008 “Animal and vegetable fats and oils - Preparation of methyl esters of fatty acids”, GB/T 17377-2008 “Animal and vegetable fats and oils - Analysis by gas chromatography of methyl esters of fatty acids”, SN/T 2922-2011 “Determination of eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) in foods for export - Gas chromatography”, NY/T 91-1988 “Determination of erucic acid in the oil of rapeseed - Gas chromatographic method”.

Compared with GB/T 5009.168-2003, the main changes of this Standard are as follows:

- the standard name is changed to “National food safety standard - Determination of fatty acids in foods”;
- ADD the internal standard method and the normalization method;
- MODIFY the chromatographic column in the original standard, changing the glass column to capillary chromatographic column.

National food safety standard
Determination of fatty acids in foods

1 Scope

This Standard specifies the determination method for the content of fatty acids in foods.

This Standard applies to the determination of total fats, saturated fats (fatty acids) and unsaturated fats (fatty acids) in foods.

In this Standard, the hydrolysis-extraction method applies to the determination of the content of fatty acids in foods; the transesterification method applies to the determination of the content of fatty acids in fat samples with free fatty acid content of not more than 2 %; the acetyl chloride-methanol method applies to the determination of the content of fatty acids in milk powder and anhydrous cream samples with water content less than 5 %.

Method I Internal standard method

2 Principle

2.1 Hydrolysis-extraction method: after the fats in the sample that has added with internal standard are extracted with hydrolysis-ether solution, saponify and methyl-esterify the sample under alkaline conditions to produce fatty acid methyl esters. After analyzed by capillary column gas chromatography, use internal standard method to quantitatively determine the content of fatty acid methyl esters. According to the content and conversion coefficients of various fatty acid methyl esters, calculate the content of total fats, saturated fats (fatty acids), monounsaturated fats (fatty acids) and polyunsaturated fats (fatty acids).

Animal and vegetable fat samples are directly saponified and fatty-acid-methyl esterified after adding with internal standard, without fat extraction.

2.2 Transesterification method (applies to fats with free fatty acid content of not more than 2 %): DISSOLVE fats in isooctane; after adding internal standard, ADD potassium hydroxide methanol solution to make the sample methyl-esterified through transesterification. After the reaction is complete, USE sodium sulfate to neutralize the residual potassium hydroxide to avoid saponification of methyl esters.

3 Reagents and materials

Unless otherwise stated, the reagents used in this method are analytical regents and the water is the Grade 1 water specified in GB/T 6682.

3.1 Reagents

3.1.1 Hydrochloric acid (HCl).

3.1.2 Ammonia ($NH_3 \cdot H_2O$).

3.1.3 Pyrogallic acid ($C_6H_6O_3$).

3.1.4 Ether ($C_4H_{10}O$).

3.1.5 Petroleum ether: with a boiling range of 30 ℃ ~ 60 ℃.

3.1.6 Ethanol (C_2H_6O) (95 %).

3.1.7 Methanol (CH_3OH): chromatographically pure.

3.1.8 Sodium hydroxide (NaOH).

3.1.9 N-heptane [$CH_3(CH_2)_5CH_3$]: chromatographically pure.

3.1.10 Boron trifluoride methanol solution, with a concentration of 15 %.

3.1.11 Anhydrous sodium sulfate (Na_2SO_4).

3.1.12 Sodium chloride (NaCl).

3.1.13 Isooctane [$(CH_3)_2CHCH_2C(CH_3)_3$]: chromatographically pure.

3.1.14 Sodium bisulfate ($NaHSO_4$).

3.1.15 Potassium hydroxide (KOH).

3.2 Preparation of reagents

3.2.1 Hydrochloric acid solution (8.3 mol/L): WEIGH 250 mL of hydrochloric acid; DILUTE with 110 mL of water; MIX well. It can be placed for 2 months at room temperature.

3.2.2 Ether-petroleum ether mixture (1 + 1): TAKE the same volume of ether and petroleum ether; MIX well for further use.

3.2.3 Sodium hydroxide methanol solution (2 %): TAKE 2 g of sodium hydroxide and