



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

GB 5009.257-2016

**National food safety standard - Determination of Trans-fatty
Acids in Foodstuffs**

食品安全国家标准 食品中反式脂肪酸的测定

(English Translation)

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Table of Contents

Foreword...	3
1 Scope...	4
2 Principle...	4
3 Reagents and Materials...	4
4 Instruments and Equipment...	5
5 Analytical Procedures...	6
6 Expression of Analytical Result...	9
7 Precision...	11
8 Others...	11
Appendix A Information of Standard Substance...	12
Appendix B Chromatogram of Standard Substance...	14
Appendix C Calculation of FID Response Factor and FID Calibration Factor	16
Appendix D FID Response Factor and FID Calibration Factor...	17

Foreword

This Standard serves as a replacement of GB/T 22110-2008 Determination of Trans-fatty Acids in Foods - Gas Chromatographic Method; GB/T 22507-2008 Animal and Vegetable Fats and Oils - Determination of the Content of Trans-fatty Acid Isomers of Vegetable Fats and Oils - Gas Chromatographic Method; SN/T 1945-2007 Determination of Trans-fatty Acids in Foods - Capillary Gas Chromatography. In comparison with the standards being replaced by this Standard, there are certain main changes as follows.

---The title of this Standard is modified into "National Food Safety Standard - Determination of Trans-fatty Acids in Foodstuffs";

---The scope of application is extended to animal fats and oils, and foods containing animal fats and oils;

---The analyte is extended to 15 kinds of fatty acid, for example, C16:1t ~ C22:1t.

National Food Safety Standard - Determination of

Trans-fatty Acids in Foodstuffs

1 Scope

This Standard specifies the gas chromatographic method for the determination of trans-fatty acids and isomer in foods.

This Standard is applicable to the determination of trans-fatty acids in animal and vegetable fats and oils, hydrogenated vegetable oil, refined vegetable oil and frying oil, as well as foods that contain animal and vegetable fats and oils, hydrogenated vegetable oil, refined vegetable oil and frying oil.

This Standard is not applicable to the determination of food samples, in which, free fatty acid (FFA) content in fats and oils is more than 2%.

2 Principle

Animal and vegetable fats and oils samples, or fats in food samples extracted through acid hydrolysis method, under alkaline condition, go through transesterification with methanol; generate fatty acid methyl ester. Furthermore, on strong polarity stationary phase capillary chromatographic column, separate it. Use gas chromatograph, which is equipped with hydrogen flame ionization detector, for determination. Use area normalization method to quantify it.

3 Reagents and Materials

Unless it is otherwise stipulated, all reagents used in this method shall be analytically pure. Water shall be Grade-2 water stipulated in GB/T 6682.

3.2 Preparation of Reagents

Potassium hydroxide - methanol solution (2 mol/L). weigh-take 13.2 g of potassium hydroxide; dissolve it in 80 mL of methanol. Cool it down to room temperature. Use methanol to reach a constant volume of 100 mL.

3.3 Standard Substance

Fatty acid methyl ester standard substance. please refer to Table A.1 for the type of

fatty acid methyl ester standard substance. Purity shall be > 99%.

3.4.1 Fatty acid methyl ester standard stock solution. respectively and accurately

weigh-take 100 mg (accurate to 0.1 mg) of trans-fatty acid methyl ester standard substances; place them in 25 mL beaker. Respectively use isooctane to dissolve them, then, transfer them into 10 mL volumetric flask. Accurately reach the volume of 10 mL. The concentration of the standard stock solutions is 10 mg/mL.

4.3 Vortex oscillator.

4.7 Round-bottomed flask. 200 mL. Before usage, place it in 100 °C oven to reach a constant weight.

5.1.1 Solid sample

Take 500 g of representative test sample. Use a grinder to grind and mix it up. Evenly divide it into two parts. Respectively load them into clean containers. Seal them up;

5.1.2 Semi-solid lipid sample

Take 500 g of representative sample. Place it in a beaker. At 60 °C ~ 70 °C water bath, melt it. Thoroughly mix it up. After cooling it down, evenly divide it into two parts. Respectively load them into clean containers. Seal them up;

5.2.1 Animal and vegetable fats and oils

Weigh-take 60 mg of fats and oils; place it in a 10 mL test tube with a stopper. Add 2 mL of isooctane to thoroughly dissolve it. Add 0.2 mL of potassium hydroxide-methanol solution. Conduct vortex mixing for 1 min. Place it till the mixed liquid in the test tube becomes pellucid.

5.2.2.1 Determination of fats in foods

Solid and semi-solid lipid sample. weigh-take 2.0 g (accurate to 0.01 g; the weighing amount of different foods may be properly adjusted, so as to guarantee that fat mass in foods is not less than 0.125 g) of homogeneous sample. Place it in a 50 mL test tube. Add 8 mL of water to thoroughly mix it up. Then, add 10 mL of hydrochloric acid to evenly mix it up. Liquid sample. weigh-take 10.00 g of homogeneous sample, then,

place it in a 50 mL test tube. Add 10 mL of hydrochloric acid to evenly mix it up. Place the above-mentioned test tube into 60 °C ~ 70 °C water bath. In every 5 min ~ 10 min, oscillate it once. Last for around 40 min ~ 50 min, till the sample is completely hydrolyzed. Take out the test tube. Add 10 mL of ethanol to thoroughly mix it up, then, cool it down to room temperature.

5.3.1 Capillary gas chromatographic column. SP-2560 polydicyanopropyl siloxane;

column length. 100 m x 0.25 mm. Membrane thickness. 0.2 µm, or others with equivalent performance.

5.4 Quantitative Determination

Respectively inject the standard working solution and the sample test solution into the gas phase chromatograph. In accordance with the chromatographic peak response area of the standard solution, adopt normalization method for quantitative determination.

5.6 Blank Test

In blank test, except from the adding of test sample, other test procedures, reagents and dosage that are completely identical to the sample analysis shall be adopted.

6 Expression of Analytical Result

The content of trans-fatty acids is reported in trans-fats (% , mass fraction). The content of trans-fats is calculated in the form of trans-fatty acid methyl ester's percentage content.

6.1 Calculation of Mass Fraction of Fats in Foods

The mass fraction of fats in foods shall be calculated in accordance with Formula (1).

6.4 Calculation of Trans-fatty Acids Content in Foods

Mass fraction of trans-fatty acids content in foods shall be calculated in accordance with Formula (4).