



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

GB 5009.202-2016

**National food safety standard - Determination of Polar
Components (PC) in Edible Oils**

**食品安全国家标准 食用油中极性组分（PC）的测定
(English Translation)**

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1 Scope

This Standard specifies the determination method for polar components (PC) in edible animal and vegetable oils.

This Standard is applicable to the determination of polar components (PC) content in various edible animal and vegetable oils.

Method I Preparative Flash Column Chromatography

2 Principle

Through the separation of preparative flash column chromatography, oils and fats samples are divided into two parts: non-polar components and polar components. The non-polar components are firstly eluted; then, after the evaporation of the solvent to dryness, weigh it. After deducting the remaining part of non-polar components from oils and fats samples, polar components can be obtained.

3 Reagents and Materials

NOTE: unless it is otherwise stipulated, all reagents used in this Method are analytically pure; water is Grade-1 water stipulated in GB/T 6682.

3.1.1 Ether (C₄H₁₀O), before usage, place it in low-temperature environment for

several hours, so that its temperature can be controlled between 10 °C ~ 18 °C.

3.1.2 Petroleum ether, boiling range: 30 °C ~ 60 °C. Before usage, place it in low-temperature environment for several hours, so that its temperature can be controlled between 10 °C ~ 18 °C.

3.1.3 Acetone (C₃H₆O), before usage, place it in low-temperature environment for

several hours, so that its temperature can be controlled between 10 °C ~ 18 °C.

3.1.4 Trichloromethane (CHCl₃).

3.1.5 Glacial acetic acid (C₂H₄O₂).

4.3 Rotary evaporator.

4.4 Balance: division value shall at least reach 0.001 g.

4.5 Vacuum constant-temperature drying oven.

4.6 Constant-temperature drying oven.

4.7 Glass desiccator (filled with color-changing silica gel desiccant).

4.8 Thin-layer chromatographic glass chromatography cylinder: can be matching with thin-layer chromatographic plate (3.3.2).

4.9 10 mL glass beaker.

4.10 10 mL disposable plastic syringe.

4.11 1,000 mL small mouth glass collection bottle.

5.1.1 Removal of impurity

Test samples shall be liquid, limpid and precipitation-free; they shall also be thoroughly mixed. If samples are not limpid, or if samples have precipitation, then, place oils and fats in 50 °C constant-temperature drying oven. Heat up the oils and fats to 50 °C;

thoroughly shake it, so that the possible crystallization of oils and fats can be dissolved.

At this moment, if the oils and fats samples become limpid and precipitation-free, then, they can be considered as samples. Otherwise, place the oils and fats in 50 °C

constant-temperature drying oven; use filter paper to filter the insoluble impurities; take the filtered limpid liquid oils and fats as the samples. In order to avoid oxidation of oils and fats, the filtration process shall be completed as soon as possible.

In terms of samples whose freezing point is higher than 50 °C, or, samples which contain oils and fats whose freezing point is higher than 50 °C, place the oils and fats in constant-temperature drying oven, which is around 10 °C higher than the freezing point. Heat up and thoroughly shake the oils and fats, so that the possible crystallization of oils and fats can be dissolved. If filtration is still needed, place the oils and fats in constant-temperature drying oven, which is around 10 °C higher than the freezing point. Use filter paper to filter the insoluble impurities; take the filtered limpid liquid oils and fats as the samples. In order to avoid oxidation of oils and fats, the filtration process shall be completed as soon as possible.

5.1.2 Drying and dehydration

Method II Column Chromatography

8 Principle

Through the separation of column chromatography, oils and fats samples are divided into two parts: non-polar components and polar components. The non-polar components are firstly eluted; then, after the evaporation of the solvent to dryness, weigh it. After deducting the remaining part of non-polar components from oils and fats samples, polar components can be obtained.

9 Reagents and Materials

Unless it is otherwise stipulated, all reagents used in this Method are analytically pure; water is Grade-1 water stipulated in GB/T 6682.

9.1.1 Column chromatography adsorbent: silica gel 60, SiO₂, amorphous silica gel

(grain size: 0.063 mm ~ 0.200 mm); average pore size: 6 nm; pore volume: 0.74 mL/g ~ 0.84 mL/g; specific surface area: 480 m²/g ~ 540 m²/g; pH: 6.5 ~ 7.5; moisture content: 4.4% ~ 5.4%.

9.1.2 Sea sand, chemically pure.

9.2 Preparation of Reagents

9.2.1

Non-polar components eluent

Same as 3.2.1.

9.2.2

Thin-layer chromatographic developer

Same as 3.2.3.

9.2.3

Thin-layer chromatographic color developing agent

Same as 3.2.4.

9.3 Materials

Thin-layer chromatographic plate: same as 3.3.2.

10.1 Glass chromatographic column: inner diameter: 21 mm; length: 450 mm; the

lower part has a PTFE piston valve. There is a layer of sand core sieve plate in the chromatographic column in the upper part of the piston valve. Moreover, this layer of sand core sieve plate can effectively prevent the adsorbent (9.1.1) from leaking out of the chromatographic column. In addition, after 20 mL of petroleum ether is vertically added, open the piston valve to the maximum; all the petroleum ether shall drain within of the eluent, so as to collect the eluent.

11.3.3 Use a transfer pipette to accurately transfer-take 20 mL of sample solution

(11.3.1) into the already-filled glass chromatographic column. During this process, avoid the sample solution's interference with the sea sand layer on top of the chromatographic column. Open the piston valve on the lower end of the glass chromatographic column; discharge the eluent inside the chromatographic column, till the liquid level of the eluent in the chromatographic column drops to the top of the sea sand layer. During this process, collect the outflowing eluent in the 250 mL flask (containing non-polar components) below it.

11.3.4 In 2 ~ 3 times, add a total of 200 mL of non-polar eluent into the glass chromatographic column, so as to continue to elute the non-polar components. Collect all the eluent in the same 250 mL flask. During this period, adjust the piston valve on the lower end of the glass chromatographic column, so that the 200 mL of eluent can completely pass through the glass chromatographic column within 80 min ~ 90 min.

After the elution is completed, use a transfer pipette or a burette to absorb the non-polar eluent to rinse the substance that is attached to the entrance of the solvent on the lower end of the glass chromatographic column. Combine the eluent in the same