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Soybean Oil

CAS RN[®]: 8001-22-7.

DEFINITION

Soybean Oil is the refined fixed oil obtained from the seeds of the soya plant *Glycine max* Merr. (Fam. Fabaceae). It may contain suitable antioxidants.

IDENTIFICATION

• A. IDENTITY BY FATTY ACID COMPOSITION

Analysis: Proceed as directed in the test for [Fats and Fixed Oils, Fatty Acid Composition](#).

Acceptance criteria: Meets the composition profile of fatty acids in [Table 1](#).

• B. IDENTITY BY TRIGLYCERIDE PROFILE

Analysis: Proceed as directed in [Identification of Fixed Oils by Thin-Layer Chromatography \(202\)](#).

Acceptance criteria: Meets the requirements in the chapter

IMPURITIES

• ALKALINE IMPURITIES

Sample: 10 mL

Analysis: Mix 10 mL of acetone and 0.3 mL of water, and add 0.05 mL of bromophenol blue TS. If necessary, neutralize the solution to a green color with 0.01 N hydrochloric acid or 0.01 N sodium hydroxide. Add the *Sample*, shake, and allow to stand. Titrate with 0.01 N hydrochloric acid VS to change the color of the upper layer to yellow.

Acceptance criteria: NMT 0.1 mL of 0.01 N hydrochloric acid is required.

SPECIFIC TESTS

• [FATS AND FIXED OILS, Acid Value\(401\)](#): NMT 0.3

• [FATS AND FIXED OILS, Peroxide Value\(401\)](#).

Solution A: Glacial acetic acid and chloroform (60:40)

Solution B: Prepare a saturated solution of potassium iodide in freshly boiled and cooled water, and store it protected from light. Discard it if it gives a color on addition of *Solution A* and starch TS.

Sample: 10 g

Titrimetric system

(See [Titrimetry \(541\)](#).)

Mode: Direct titration

Titrant: 0.01 N sodium thiosulfate VS

Endpoint detection: Visual

Analysis: Transfer the *Sample* to a conical flask. Add 30 mL of *Solution A*, and swirl to dissolve. Add 0.5 mL of *Solution B*, swirl the flask for 1 min, accurately timed, and add 30 mL of water. Titrate with *Titrant*, with vigorous agitation, to a light yellow color. Add 0.5 mL of starch TS, and continue the titration until the blue color has disappeared. Perform a blank test, and make any necessary correction.

Calculate the peroxide value:

$$\text{Result} = [(V \times N)/W] \times F$$

V = volume of sodium thiosulfate (mL)

N = normality of the sodium thiosulfate solution (mEq/mL)

W = weight of Soybean Oil taken (g)

F = conversion factor, 1000 g/kg

Acceptance criteria: NMT 10.0

- **FATS AND FIXED OILS, *Fatty Acid Composition*(401):** Soybean Oil exhibits the composition profile of fatty acids shown in [Table 1](#), as determined in the chapter.

Table 1

Carbon-Chain Length	Number of Double Bonds	Percentage (%)
<14	0	≤0.1
14	0	≤0.2
16	0	9.0–13.0
16	1	≤0.3
18	0	2.5–5.0
18	1	17.0–30.0
18	2	48.0–58.0
18	3	5.0–11.0
20	0	≤1.0
20	1	≤1.0
22	0	≤1.0
22	1	≤0.3
24	0	≤0.5

- **FATS AND FIXED OILS, *Unsaponifiable Matter*(401):** NMT 1.5%

• **STEROL COMPOSITION**

Sample A: Transfer 5 g of Soybean Oil to a 250-mL conical flask, add 50 mL of an alcoholic potassium hydroxide solution prepared by dissolving 12 g of potassium hydroxide in 10 mL of water and diluting with alcohol to 100 mL, and heat the flask on a steam bath under a suitable condenser to maintain reflux for 1 h, swirling frequently. Cool to a temperature below 25°, and transfer the contents of the flask to a separator with a polytetrafluoroethylene stopcock, rinsing the flask with two 50-mL portions of water that are added to the separator (do not use grease on the stopcock). Extract with three 100-mL portions of ether, combining the ether extracts in another separator containing 40 mL of water. Gently rotate or shake the separator for a few minutes. [NOTE—Violent agitation may result in the formation of a difficult-to-separate emulsion.] Allow the mixture to separate, and discard the lower aqueous phase. Wash the ether extract with two additional 40-mL portions of water, and discard the lower aqueous phase. Wash the ether extract successively with a 40-mL portion of potassium hydroxide solution (3 in 100) and a 40-mL portion of water. Repeat this potassium hydroxide solution–water wash sequence three times. Wash the ether extract with 40-mL portions of water until the last washing is not reddened by the addition of 2 drops of phenolphthalein TS. Transfer the ether extract to a tared flask, and rinse the separator with 10 mL of ether, adding the rinsings to the flask. Evaporate the ether on a steam bath, and add 6 mL of acetone to the residue. Remove the acetone in a current of air, and dry the residue at 105°.

Reference A: Transfer 5 g of sunflower oil to a 250-mL conical flask, and proceed as directed in *Sample A*, beginning with “add 50 mL of an alcoholic potassium hydroxide solution prepared by dissolving 12 g of potassium hydroxide in 10 mL of water and diluting with alcohol to 100 mL”.

Separation of the sterol fraction by LC

Mobile phase: Isopropyl alcohol and *n*-hexane (1:99)

Sample solution A: Transfer *Sample A* with three 4-mL quantities of ether to a 15-mL test tube. Evaporate to dryness under a stream of nitrogen. Dissolve *Sample A* in *Mobile phase* to obtain a solution with an approximate concentration of 40 mg/mL. Add a few drops of isopropyl alcohol to improve the solubility. [NOTE—3 drops are normally sufficient to ensure complete solubilization.] Pass through a membrane filter (nominal 0.45-μm pore size).