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Olive oils and olive pomace oils

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Foreword

The indices highlighted bold in Tables 6 and 7 of Subsection 5.1.2, as well as in Subsections 5.4, 5.5, 7.4 and Clause 8 of this Standard are mandatory whilst the rest are recommended.

This Standard was formulated after referring to the contents of the related standards of Codex Alimentarius Commission (CAC) and International Olive Oil Council (IOOC), and considering the situation in this country.

This Standard was proposed by the State Forestry Administration and the People's Republic of China.

This Standard is under the jurisdiction of the National Cooking Oil Standardisation Technical Committee.

The units responsible for drafting this Standard are: the Research Institute of Forestry under Chinese Academy of Forestry and the Academy of State Administration of Grain.

The units involving in drafting this Standard are: Ganshu Province Longnan City Xiangyu Olive Oil Development Co., Ltd., Shenzhen Kuwan Sunshine Food Co., Ltd., and Beijing Pinli Food Co., Ltd.

The main drafters of this Standard are: Yimin Xue, Yalin Xue, Rui Zhang, Yuhong Liu, Bofeng Lin, and Songli Xu.

Olive oils and olive pomace oils

1 Scope

This Standard specifies the terms and definitions, classifications, technical quality requirements, inspection methods, inspection rules, labelling, packaging, storage and transportation requirements of olive oils and olive pomace oils.

This Standard applies to different kinds of olive oil and olive pomace oil products.

2 Normative references

The provisions of the following documents become provisions of this Standard after being referenced. For dated reference documents, all later amendments (excluding corrigenda) and revised versions do not apply to this Standard. However, the parties to the agreement are encouraged to study whether the latest version of these documents applies. For undated reference documents, the latest versions apply.

GB 2716 Hygiene standard for edible vegetable oil

GB/T 5009.13 Determination of copper in food

GB/T 5009.90 Determination of iron, magnesium and manganese in food

GB/T 5009.37 Method for analysis of hygienic standard of edible vegetable oils

GB/T 5524 Vegetable fats and oils — Methods for sampling and sample splitting

GB/T 5525-1985 Vegetable fats and oils — Methods for identification of transparency, odour and flavour

GB/T 5528 Method for determination of moisture and volatile matter in vegetable fats and oils

GB/T 5530 Animal and vegetable fats and oils — Determination of acid value and acidity (GB/T 5530-2005, ISO 660: 1996, IDT)

GB/T 5535.1 Animal and vegetable fats and oils — Determination of unsaponifiable matter — Part 1: Method using diethyl ether extraction (Reference method) (GB/T 5535.1 • 1998 • eqv. ISO 3596-1: 1988)

GB/T 5535.2 Animal and vegetable fats and oils — Determination of unsaponifiable matter — Part 2: Rapid method using hexane extraction (GB/T 5535.2 • 1998, eqv. ISO 3596-2: 1988)

GB/T 5538 Oils and fats — Determination of peroxide value (GB/T 5538-2005, ISO 3960: 2001, IDT)

GB 7718 General standard for the labelling of pre-packaged foods

GB 14880 Hygiene Standard for the use of nutritional fortification substances in foods

GB/T 15688 Animal and vegetable fats and oils — Determination of insoluble impurities content

GB/T 17374 Distribution and sales packaging of edible vegetable oils

GB/T 17376 Animal and vegetable fats and oils — Preparation of fatty acid methyl esters (GB/T 17376-1998, eqv. ISO 5509: 1978)

GB/T 17377 Animal and vegetable fats and oils — Analysis by gas chromatography of fatty acid methyl esters (GB/T 17377-1998, eqv. ISO 5508: 1990)

ISO 661 Animal and vegetable fats and oils — Preparation of test sample

ISO 5555 Animal and vegetable fats and oils — Sampling

COI/T.20/Doc.no.10[1)] Determination of sterol ingredient and total sterol content — Capillary column gas chromatography

COI/T.20/Doc.no.15[1)] Analysis method of olive oil sensory assessment

COI/T.20/Doc.no.17[1)] Determination of non-saturated trans fatty acid — Capillary column gas chromatography

COI/T.20/Doc.no.18[1)] Determination of wax content — Capillary column gas chromatography

3 Terms and definitions

The following terms and definitions apply to this Standard.

3.1

Olive oil

The fruit of the olive tree (Olea europaea L) is the raw material for the extraction of oils and fats, with the exception of oils and fats acquired from solvent extraction or heavy esterification technology.

3.1.1

Virgin olive oil

Virgin olive oil adopts the physical method of mechanical extraction to extract oil products directly from the olive fruit.

Note: In the process of oil extraction, external factors such as temperature, etc., should not cause any changes to the oil and fat ingredients. Oil products may only be handled by means of cleaning, decantation, centrifugation or filtering technology.

3.1.1.1

Extra virgin olive oil

The acidic value of extra virgin olive oil is • 1.6 mgKOH/g, and other indices

1) This Standard is the standard of the International Olive Oil Council.

meet the requirements for virgin olive oil as set out in this Standard.

3.1.1.2

Medium-grade virgin olive oil

The acidic value of medium-grade olive oil is • 4.0 mgKOH/g, and other indices meet the requirements for virgin olive oil as set out in this Standard.

3.1.1.3

Lampante virgin olive oil

The acidic value of lampante virgin olive oil is > 4.0 mgKOH/g, and other indices meet the requirements set out for virgin olive oil in this Standard.

Note: This oil cannot be directly used as edible oil, but is mainly for refining or other purposes.

3.1.2

Refined olive oil

Refined olive oil is an oil product extracted from lampante virgin olive oil by refining technology (the structure of its glyceride should not be changed). The content of free fatty acid (counted by oleic acid) should not exceed 0.3g in every 100g of oil, implying that the acidic value is • 1.6 mgKOH/g, and other indices meet the requirements set out in this Standard.

3.1.3

Blended olive oil

An oil product blended with refined olive oil and virgin olive oil (except lampante virgin olive oil). The content of free fatty acid (counted by oleic acid) should not exceed 1g in every 100g of oil, implying that the acidic value is • 2.0 mgKOH/g, and other indices meet the requirements set out in this Standard.

3.2

Olive-pomace oil

The fats and oils acquired from olive pomace using solvent or other physical methods.

3.2.1

Crude olive-pomace oil

The olive-pomace oil without being handled, and is not directly edible.

3.2.2

Refined olive-pomace oil

An oil product extracted by refining technology (the structure of its glyceride should not be changed).

3.2.3

Blended olive-pomace oil

An oil product blended with refined olive-pomace oil and virgin olive oil

(except lampante virgin olive oil).

3.3

Unsaponifiable matter

A substance that has no action with the alkaline in fats and oils, and can be solved in ether but cannot be solved in water, including sterol, fat-soluble vitamin and pigment.

3.4

Ultraviolet absorbency

The absorbency of the sample under specific ultraviolet wavelength.

3.5

r **Delta E**

The variation value of the absorbency of sample under specific ultraviolet wavelength.

3.6

Residual solvent content in oil

The residue of solvent extracted from oil product, and indicated by the number of milligrams of residual solvent in 1 kg of fats and oils.

3.7

Wax

The synthesised ester of premium monohydric alcohol and premium fatty acid.

3.8

Sterol

A general term for the cyclopentane perhydrophenanthrenoid compound containing hydroxy, and this compound in free state or in ester state after combining with fatty acid exists inside an organism.

4 Classification

4.1 **Olive oil**

Olive oil includes:

a) Virgin olive oil, which is divided into:

1) extra virgin olive oil

2) medium-grade virgin olive oil

3) lampante virgin olive oil

b) Refined olive oil

c) Blended olive oil

4.2 **Olive-pomace oil**

Olive-pomace oil includes:

a) Crude olive-pomace oil

b) Refined olive-pomace oil

c) Blended olive-pomace oil

5 Quality requirements

5.1 Characteristic indices

5.1.1 **The composition of fatty acids is shown in Table 1.**

Table 1 Composition of fatty acids in olive oil and olive-pomace oil

Name	Content (%)
Myristic acid (C14: 0) •	0.05
Palmitic acid (C16: 0)	7.5 ~ 20.0
Palmitoleic acid (C16: 0)	0.3 ~ 3.5
Heptadecanoic acid (C17: 0) •	0.3
Heptadecene acid (C17: 1) •	0.3
Stearic acid (C18: 0)	0.5 ~ 5.0
Oleic acid (C18: 1)	55.0 ~ 83.0
Linoleic acid (C18: 2)	3.5 ~ 21.0
Linolenic acid (C18: 3) •	1.0
Arachidic acid (C20: 0) •	0.6
Eicosenoic acid (C20: 1) •	0.4
Behenic acid (C22: 0) •	0.2[a]
Tetracosanoic acid (C24: 0) •	0.2
a: Olive-pomace oil • 0.3	

5.1.2 **Trans fatty acid content is shown in Table 2.**

Table 2 Content of trans fatty acids

Type of trans fatty acid	Virgin olive oil	Refined olive oil	Olive-pomace oil
C18:1 T	• 0.05	• 0.20	• 0.40
C18:2 T + C18:3 T	• 0.05	• 0.30	• 0.35

5.1.3 **Unsaponifiable matter content is shown in Table 3.**

Table 3 Unsaponifiable matter content in olive oil and olive-pomace oil

Type of product	Unsaponifiable matter content (g/kg)
Olive oil •	15
Olive-pomace oil •	30

5.1.4 **Total sterol content is shown in Table 4.**

Table 4 Sterol content in olive oil and olive-pomace oil

Type of product	Sterol content (mg/kg)
Premium virgin olive oil •	1000
Medium-grade virgin olive oil •	
Lampante virgin olive oil •	
Refined olive oil •	
Blended olive oil •	
Crude olive-pomace oil •	2500
Refined olive-pomace oil •	1800
Blended olive-pomace oil •	1600
Percentage of several major sterols in the total volume of sterol (%)	
Cholesterol •	0.5
Campesterol •	4.0
Stigmasterol •	0.5
The total contents of •-sitosterol + •-5-avenasterol + •-5-stigmasterol dienol + Sitosterol + Clerosterol •	93.0

5.1.5 **Wax content is shown in Table 5.**

Table 4 Wax content in olive oil and olive-pomace oil

Type of product	Wax content (mg/kg)
Premium virgin olive oil •	250
Medium-grade virgin olive oil •	
Lampante virgin olive oil •	300
Refined olive oil •	350
Blended olive oil •	
Crude olive-pomace oil >	350
Refined olive-pomace oil >	
Blended olive-pomace oil >	

5.2 **Quality indices**

5.2.1 **The quality indices of olive oil are shown in Table 6.**

Table 6 Quality indices of olive oil

Items		Quality indices				
		Premium virgin olive oil	Medium-grade virgin olive oil	Lampante virgin olive oil	Refined olive oil	Blended olive oil
Odour and taste	Sensory judgment	With fixed odour and taste of olive oil, no peculiar odour		—	Odourless	Good
	Median of defect [a] (Me)	0	0 < Me • 2.5	Me > 2.5	—	—

	Median of fruit taste characteristic [b] (Me)	Me > 0	Me > 0	—	—	—
Colour		—			Light yellow to beige	Light yellow / light green
Transparency (20°C, 24h)		Transparent		—	Transparent	
Acid value (KOH) / (mg/g)		**• 1.6**	**• 4.0**	**> 4.0**	**• 0.6**	**• 2.0**
Peroxide value / (mmol/kg) •		**10**	**10**	—	**2.5**	**7.5**
Residual solvent content in oil / (mg/kg)		—			**Cannot be detected**	
Ultraviolet absorbency ($E_{1cm}^{1\%}$)	270 nm •	0.22	0.25	—	1.10	0.90
	• E •	0.01	0.01	—	0.16	0.15
	232 nm[c] •	2.5	2.6	—	—	—
Moisture & volatile matter/(%) •		0.2		0.3	0.1	0.1
Insoluble impurities/ (%) •		0.1		0.2	0.05	0.05
Metal content / (mg/kg)	Iron •	3.0				
	Copper •	0.1				

Note: 1. The blank marked with "—" indicates that no test has been carried out. When, after testing, the residual solvent content in oil is less than 10mg/kg, it is regarded as unable to be detected.

2. The indices in bold font are mandatory.

a Index for evaluation of taste defect in olive oil preset by International Olive Oil Council.

b Index for evaluation of taste characteristic in olive oil preset by International Olive Oil Council.

c This test only serves as the dosage restriction implemented by commercial partners on voluntary foundation.

5.2.2 **The quality indices of olive-pomace oil are shown in Table 7.**

Table 7 Quality indices of olive-pomace oil

Items		Quality indices		
		Crude olive-pomace oil	Refined olive-pomace oil	Blended olive-pomace oil
Odour and taste		—	No peculiar odour	Good
Colour		—	Light yellow to beige	Light yellow or light green
Transparency (20°C, 24h)		—	Transparent	
Acid value (KOH) / (mg/g)	•	—	**0.6**	**2.0**
Peroxide value / (mmol/kg)	•	—	**2.5**	**7.5**
Residual solvent content in oil / (mg/kg)		**• 100**	**Cannot be detected**	
Ultraviolet absorbency ($E_{1cm}^{1\%}$)	270 nm •	—	2.00	1.70
	• E •	—	0.20	0.18
Moisture and volatile matter / (%)	•	1.5	0.1	
Insoluble impurities/ (%)	•	—	0.05	
Metal content /	Iron •	—	3.0	

(mg/kg)	Copper •	—	0.1
Remarks: 1. The blank marked with "—" indicates that no test has been carried out. When, after testing, the residual solvent content in oil is less than 10mg/kg, it is regarded as unable to be detected. 2. The indices in bold font are mandatory.			

5.3 **Hygiene index**

The hygiene index is implemented according to GB 2716 and related national standards and requirements.

5.4 **Authenticity requirements**

No other edible oil or non-edible oil should be found in the olive oil and olive-pomace oil, and no essence or flavouring should be added to them.

5.5 **Food additives**

No additives shall be added to the oils. The addition of nutrition enhancers should meet the requirements set out in GB 14880.

6 Inspection methods

6.1 Inspection of odour, taste: implemented according to COI/T.20/Doc.no.15.

6.2 Inspection of transparency: implemented according to Clause 1 of GB/T 5525-1985.

6.3 Inspection of colour: implemented according to GB/T 5009.37.

6.4 Inspection of moisture and volatile matter: implemented according to GB/T 5528.

6.5 Inspection of insoluble impurities: implemented according to GB/T 15688.

6.6 Inspection of acid value or acidity: implemented according to GB/T 5530.

6.7 Inspection of unsaponifiable matter: implemented according to GB/T 5535.1 ~ 5535.2.

6.8 Inspection of peroxide value: implemented according to GB/T 5538.

6.9 Inspection of the composition of fatty acid: implemented according to GB/T 17376 and GB/T 17377.

6.10 Inspection of the composition of trans fatty acid: implemented according to COI/T.20/Doc.no.17.

6.11 Inspection of ultraviolet absorbency and r E: implemented according to Annex A.

6.12 Inspection of sterol content: implemented according to COI/T.20/Doc.no.10.

6.13 Inspection of wax content: implemented according to COI/T.20/Doc.no.18.

6.14 Inspection of residual solvent content in oil: implemented according to GB/T 5009.37.

6.15 Inspection of copper content: implemented according to GB/T 5009.13.

6.16 Inspection of iron content: implemented according to GB/T 5009.90.

6.17 Inspection of hygiene indices: implemented according to GB/T 5009.37.

7 Inspection rules

7.1 Sampling

Sampling methods are implemented according to the requirements set out in GB/T 5524.

7.2 Delivery inspection

7.2.1 Inspections should be carried out on each batch, and an inspection report should be produced.

7.2.2 Inspections should be carried out according to the requirements set out in Subsection 5.2 of this Standard.

7.3 Type inspection

7.3.1 Where there is greater change in the material, equipment and technology, a type inspection should be carried out.

7.3.2 The type inspection should be carried out according to the requirements set out in Clause 5 of this Standard.

7.4 Judgement rules

7.4.1 When a product is specified with a product name that does not meet the requirements set out in Clause 4 of this Standard, it is deemed to be a non-conforming product.

7.4.2 When the inspection of oleic acid content and sterol content of a product are inspected and do not meet the values specified in Tables 1 and 4 of this Standard, this is deemed as corruption.

7.4.3 When the wax content of an olive oil product is inspected to be greater than 350 mg/kg, it is judged as olive-pomace oil.

7.4.4 When the trans fatty acid content of a product does not meet the requirements set out in Table 2 of this Standard, it is deemed to be a non-conforming product. When one of the quality index items does not meet the requirements of this Standard, it is deemed to be a non-conforming product.

8 Labelling

8.1 Labelling should meet the requirements set out in GB 7718.

8.2 Product name: indicated according to the classification requirements specified in Clause 4 of this Standard. Under no circumstances shall “olive-pomace oil” products, as specified in Subsection 4.2, be referred to as “olive oil”.

8.3 Indication of production date: the date on which fats and oils are extracted from the fresh olive fruit by any type of processing technology is the production date.

With regard to the split packaging of imported products, when indicating the production date in the country of origin, the packaging date should also be indicated.

8.4 The production date in the country of origin is the starting date of the quality preservation period.

8.5 The country of origin of the product should be indicated.

8.6 The trans fatty acid content should be indicated.

9 Packaging, storage, transportation

9.1 Packaging

Should meet the requirements of GB/T 17374 and related national stipulations and requirements.

9.2 Storage

Products should be stored in a hygienic, cool, dry place, out of direct light. They should not be placed with harmful or poisonous substances and should particularly avoid being placed near any products with a peculiar odour.

If the validity of the product relies on certain special conditions, they should be specified on the label.

9.3 Transportation

When transporting the products, attention should be paid to safety, and the labels should be kept away from sunlight, rainfall, leakage, and pollution or from peeling away. With regard to transportation in bulk, a particular vehicle should be allocated for the transportation of the products; the vehicle should be kept clean and hygienic.

Annex A

(Normative Annex)

Determination of ultraviolet absorbency of animal and vegetable oils and fats[2)]

A.1 Scope

This method specifies the determination method of absorbency of animal and vegetable fats and oils under a specified ultraviolet wavelength.

A.2 Principles

The determination is made within a specific ultraviolet wavelength range using the absorbency rate of absorbency spectrum of sample solution. When indicated as 1g/100mL solution, the absorbency of 10mm colourimetric tank is adopted.

A.3 Reagent

All the reagents are analytically pure (unless other special circumstances are stipulated).

Solvent: 2, 2, 4-trimethylpentane (isooctane), using distilled water as the reference solution. When using 10mm colourimetric tank for determination, the absorbency at the place of 230nm is less than 0.12, and the absorbency at the place of 250nm is less than 0.05.

If there is no isooctane, cyclohexane or n-hexane may be selected as a replacement.

A.4 Instruments

All glass utensils should be thoroughly cleaned before use, and washed with solvent. Avoid the influence of impurities on the absorbency spectrum within the wavelength range of 220nm ~ 320nm.

A.4.1 Spectrophotometer

The spectrophotometer is equipped with a recording instrument and 10mm quartz colorimetric ware. Before use, calibrate the wavelength range of the spectrophotometer and the spectrum absorbency range.

Wavelength range: use mercury to calibrate it according to the manual. At the places of 279.37 nm and 287.5 nm there are sharp absorbency peaks. Use a filter for calibration.

Absorbency range: blend 200mg/L of potassium chromate solution in 0.05 mol/L of potassium hydroxide solution. Move 25 ml of the above solution into a 500 ml volumetric flask. Dilute it by 0.05 mol/L of potassium hydroxide solution until reaching the scale. Use 0.05 mol/L of potassium hydroxide solution as the reference

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2) This method in Chinese is the Chinese translated text of ISO 3656:2002 “Animal and vegetable fats and oils — Determination of ultraviolet absorbance expressed as specific UV extinction”.

solution. Perform determination in 10 mm colourimetric tank. The absorbency of this solution should be 0.200 ± 0.005.

Note: Be careful when using potassium chromate solution. Any absorption of potassium chromate solution will have carcinogenic danger.

A.4.2 25mL volumetric flask

A.5 Sampling

The sampling methods should conform to ISO 5555.

A.6 Preparation of experimental sample

The preparation of test sample should conform to ISO 661.

A.7 Procedures

A.7.1 Preparation of solution

In order to maintain the absorbency of the sample at the range of 0.2 ~ 0.8, accurately weigh 0.05g to 0.25g of sample to be tested (accuracy to 0.1 mg) and place it in a 25 ml volumetric flask. Firstly, at room temperature, use several millilitres of solvent to dissolve the test sample. Then use the same solvent to dilute it until reaching the scale. Shake evenly.

If the concentration of the test sample in the test solution is greater than 1g/mL, this should be indicated on the test report.

A.7.2 Determination

Use the test solution to wash the quartz colourimetric tank 3 times. Pour the test sample solution into the liquid tank. The diluted solvent serves as a reference. Use a spectrophotometer at the wavelength range of 220 nm ~ 320 nm to determine the absorbency. This determination can be made continuously, or made at every interval of 1 nm ~ 2 nm. At around the range between maximum absorbency and minimum absorbency, the interval may be lowered to 0.5 nm.

Note: it is unnecessary to determine absorbency within the entire wavelength range.

If the absorbency exceeds 0.8, the solution should be appropriately diluted for re-determination.

A.8 Expression of results

A.8.1 Ultraviolet absorbency $E_{1cm}^{1\%}(\bullet)$

Adopt 10mm optical path. Under the wavelength •, the determined concentration is the absorbency of 1g/100ml (1%) of solution. The formula is expressed as follows:

$$E_{1cm}^{1\%}(\bullet) = \frac{A(\bullet)}{W}$$

where A (•) — absorbency value under the wavelength •;

W — concentration of test solution sample, in the unit of g/100mL.

Remarks: • is usually 232nm and 268nm.

A.8.2 Variation value of absorbency r E

Calculation of variation value for 270 nm maximum absorbency specific extinction coefficient:

$$\bullet\ E = E \bullet m \bullet \frac{(E \bullet m \bullet 4) + (E \bullet m + 4)}{2}$$

• E — variation of specific extinction coefficient at the place of • m;

Em — particular specific extinction coefficient at the place of 270 nm

E • m • 4 and E • m + 4 — specific extinction coefficients when the wavelength is extended by 4 inches or reduced by 4 inches.

A.9 Precision

A.9.1 Repeatability

The same operator uses the same instruments to perform two independent tests, using the same sample, by undertaking the same method in the same laboratory. The absolute difference between the results yielded by these two independent tests should not exceed 5% of the case of repeatability limit. Repeatability limit (r): 0.026 at the place of 232 nm; 0.085 at the place of 268 nm.

A.9.2 Reproducibility

A.9.3 Different operators use different instruments to perform two independent tests using the same sample, by undertaking the same method in different laboratories. The absolute difference between the results of these two independent tests should not exceed 5% of the case of reproducibility limit. Repeatability limit (R): 0.396 at the place of 232 nm; 0.11 at the place of 268 nm.

A.9.3.1

References

[1] CODEX-STAN 33-1981 (Rev.1-1989): CODEX STANDARD FOR OLIVE OIL, VIRGIN AND REFINED, AND FOR REFINED OLIVE-POMACE OIL.

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[4] CHEMICAL-PHYSICAL CHARACTERISTICS OF OLIVE OILS, ONAOO - 2003.

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[8] INTERNATIONAL AGREEMENT ON OLIVE OIL AND TABLE OLIVES, 2005.

[9] COI/T20/DOC no.1 • 26/Rev.1 • 2.