



## Agenda Item 4.2

CX/MAS 21/41/5  
March 2021

### JOINT FAO/WHO FOOD STANDARDS PROGRAMME CODEX COMMITTEE ON METHODS OF ANALYSIS AND SAMPLING

41<sup>st</sup> Session  
Virtual  
17 – 21 and 25 May 2021

#### REVIEW OF METHODS OF ANALYSIS IN CXS234: FATS AND OILS WORKABLE PACKAGE

*(Prepared by the Electronic Working Group chaired by the Netherlands)*

## INTRODUCTION

1. At its 40<sup>th</sup> session, CCMAS agreed to continue efforts on the workable packages for the review and update of *the Standard for Methods of Analysis and Sampling* (CXS 234-1999). The Committee agreed to continue the review of all methods related to fats and oils through an EWG chaired by the Netherlands.
2. Due to the COVID-19 pandemic, CCMAS41 was postponed from May 2020 to May 2021, and in order to use the additional time at the disposal of the Committee, an interim report was provided by the EWG (CX/MAS 20/41/5) on which comments were requested through [CL 2020/29-MAS](#) in order for the EWG to consider the comments and continue their discussion. The comments were compiled in CX/MAS 20/41/5 Add.1.
3. The paper is an update of [CX/MAS 20/41/5](#).

## EWG PROCESS AND DISCUSSION

4. See [CX/MAS 20/41/5](#) for information on the process followed by the EWG . The list of participants is in [Appendix III](#).
5. The EWG considered the comments in response to CL 2020/29-MAS from Canada, Egypt, Mexico, Norway, Peru, Uruguay, USP, FOSFA International and GOED ([CX/MAS 20/41/5 Add.1](#)).

### *General considerations and decisions*

6. In response to the comments commodity, provision, methods, principle and typing have been changed in the revised list of methods listed in CXS 234 for consideration by CCMAS and its Endorsement Working Group ([Appendix I](#)).
7. General comments, i.e. on historical usage and relationships between various global standards, will require additional discussion and are indicated in [Appendix I](#) where applicable. It is suggested that CCMAS provide additional information on those methods for further consideration by the Endorsement Working Group.
8. The addition of new methods or provisions to CXS 234 was not considered by the EWG, except for method updates. New methods for endorsement should follow the standard procedure of CCMAS.

### *Selection of Type II methods from multiple Type III methods*

9. The provision 'Fatty acid composition' of Fish Oils, comprised a large number of Type III methods. No Type II method was provided in CXS 234. Therefore the EWG invited AOCS, Australia, Canada and USA to apply the method described in CX/MAS 20/41/10 (Discussion paper on rules to select Type II methods from multiple Type III methods)<sup>1</sup> with slight modifications to provide additional insights on the applicability of the rules for selection of Type II methods from multiple Type III methods. Their insights are available [here](#). The

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<sup>1</sup> The updated paper will be issued as CX/MAS 21/41/10

recommended Type II methods for this provision is provided in Appendix I. The EWG would like to thank the respondents for their efforts.

*Methods of analysis for provisions in the Standard for olive oils and olive pomace oils (CXS 33–1981)*

10. CCFO26 (2019) was informed of review of methods: fats and oils package in CCMAS and its EWG. CCFO is currently revising the CXS33-1981. The EWG chair, Mr Juan Ramón Izquierdo, has provided section 8 of the revised standard for information and a consolidated reconciliation report of comments of CCFO members which is available [here](#). The EWG Chair also elaborates on the choice of certain methods for provisions. Where applicable, changes were suggested to CXS 234 in [Appendix I](#).
11. As many changes for CXS 33-1981 consider new methods not endorsed in CXS 234, it is suggested that CCMAS awaits the request of CCFO to endorse the new methods proposed. After endorsement, changes can be applied in CXS 234.

*Other matters*

12. [Appendix II](#) contains all methods which have not been reviewed by the EWG.

## **RECOMMENDATIONS**

13. The Committee is invited to:
- Consider Appendix I and endorse the proposed changes to CXS 234.
  - Provide methods where historical usage and relations between various global standards are of importance for this workable package to the Endorsement Working Group.
  - Agree that CCMAS consider any new methods in CXS 33 once these have been finalized by CCFO and submitted to CCMAS for endorsement..
  - Consider Appendix II and determine whether the review and updating of these methods are warranted.

**PART A – METHODS OF ANALYSIS BY COMMODITY CATEGORIES AND NAMES**

Comments CX/MAS 20/41/5 Add.1 applicable to multiple lines:

- Egypt: Remove the word (drying) from the principle description
- Norway: Insoluble impurities, principle could be shortened to “Gravimetry, drying at 103 °C.

\*Excerpt comment from CX/MAS 20/41/5 Add. 1, please refer to this document for full comment.

\*\*Excerpt comment from Appendix III considering olive oils and olive-pomace oils.

Commodity	Provision	Method	Principle	Type
<del>Fat spreads and blended spreads</del>	Fat content	ISO 17189   IDF 194	Gravimetry	†
Fat spreads and blended spreads	Total fat	ISO 17189   IDF 194	Gravimetry. Direct determination of fat using solvent extraction.	I
<del>Fats and oils</del>	<del>Butylhydroxyanisole, butylhydroxytoluene, tert-butylhydroquinone, &amp; propyl gallate</del>	<del>AOAC 983.15; or AOCS Ce 6-86</del>	<del>Liquid chromatography</del>	<del>II</del>
Fats and oils	Butylhydroxyanisole, butylhydroxytoluene, tert-butylhydroquinone, and propyl gallate Synthetic antioxidants	AOAC 983.15	Liquid chromatography	II
Fats and oils	Butylhydroxyanisole, butylhydroxytoluene, tert-butylhydroquinone, and propyl gallate Synthetic antioxidants <i>*USP: AOAC Type III; AOCS Type II, check method updates</i> <i>*Canada: ISO/TC 34/SC 11 is coordinating a collaborative study on AOCS Ce 6-86. Check for results and retype if desired by trade.</i>	AOCS Ce 6-86	Liquid chromatography	III
<del>Fats and Oils (all)</del>	<del>Arsenic</del>	<del>AOAC 942.17</del>	<del>Colorimetry (molybdenum blue)</del>	<del>III</del>
Fats and Oils (all)	Arsenic	AOAC 963.21 and AOAC 942.17	Kjeldahl flask digestion and colorimetry (molybdenum blue)	III
<del>Fats and Oils (all)</del>	<del>Arsenic</del>	<del>AOAC 952.13</del>	<del>Colorimetry (diethyldithiocarbamate)</del>	<del>II</del>
Fats and Oils (all)	Arsenic	AOAC 963.21 and AOAC 952.13	Kjeldahl flask digestion and colorimetry (diethyldithiocarbamate)	II
Fats and Oils (all)	Arsenic	AOAC 986.15	Atomic absorption spectrophotometry	III

	*Norway: AOAC 942.17 and 952.13 surplus in 1993. Suggest AOAC 986.15 as Type II, Kjeldahl methods as Type III. *Mexico: AOAC 986.15 Type II, AOAC 963.21 and AOAC 952.13 Type III.			
<del>Fats and Oils (all)</del>	<del>Insoluble impurities</del>	<del>ISO 663</del>	<del>Gravimetry</del>	<del>†</del>
Fats and Oils (all)	Insoluble impurities	ISO 663	Calculation from total insoluble content in <i>n</i> -hexane or light petroleum. Gravimetry, drying at 103 °C	I
<del>Fats and Oils (all)</del>	<del>Lead</del>	<del>AOAC 994.02; or ISO 12193; or AOCS Ca 18c-91</del>	<del>Atomic absorption spectrophotometry (direct graphite furnace)</del>	<del>‡</del>
Fats and Oils (all)	Lead	AOAC 994.02 / ISO 12193 / AOCS Ca 18c-91	Atomic absorption spectrophotometry (direct graphite furnace)	II
<del>Fats and Oils (all)</del>	<del>Matter volatile at 105°C</del>	<del>ISO 662</del>	<del>Gravimetry (open-drying)</del>	<del>†</del>
Fats and Oils (all)	Moisture and volatile matter	ISO 662	Gravimetry, drying at 105 °C	I
<del>Fats and Oils (all)</del>	<del>Soap content</del>	<del>BS EN ISO 10539 or AOCS Cc 17-95</del>	<del>Gravimetry</del>	<del>†</del>
Fats and Oils (all)	Soap content	ISO 10539 / AOCS Cc 17-95	Titrimetry (Colorimetric)	I
<del>Fats and Oils not covered by individual standards</del>	<del>Acid value</del>	<del>ISO 660; or AOCS Cd 3d-63</del>	<del>Titrimetry</del>	<del>†</del>
Fats and Oils not covered by individual standards	Acidity: acid value	ISO 660 / AOCS Cd 3d-63	Titrimetry	I
<del>Fats and Oils not covered by individual standards</del>	<del>Copper and Iron</del>	<del>AOAC 990.05; or ISO 8294; or AOCS Ca 18b-91</del>	<del>Atomic absorption spectrophotometry (direct graphite furnace)</del>	<del>‡</del>
Fats and Oils not covered by individual standards	Copper and Iron	AOAC 990.05 / ISO 8294 / AOCS Ca 18b-91	Atomic absorption spectrophotometry (direct graphite furnace)	II
<del>Fats and Oils not covered by individual standards</del>	<del>Peroxide value</del>	<del>AOCS Cd 8b-90</del> <del>ISO 3960</del>	<del>Titrimetry using iso-octane</del>	<del>†</del>
Fats and Oils not covered by individual standards	Peroxide value	AOCS Cd 8b-90 / ISO 3960	Titrimetry (Colorimetric)	I
<del>Fish oils</del>	<del>Acid value</del>	<del>AOCS Ca 5a-40</del> <del>AOCS Cd 3d-63</del> <del>ISO 3960</del> <del>NMKL 38</del>	<del>Titration</del>	<del>†</del>

<b>Fish oils</b>	Acidity: acid value	AOCS Ca 5a-40 / AOCS Cd 3d-63 / ISO 660 / NMKL 38	Titrimetry	I
<b>Fish oils</b>	<del>Fatty acid composition</del>	<del>AOCS Ce 1a-13</del>	<del>Capillary GLC</del>	<del>III</del>
<b>Fish oils</b>	<del>Fatty acid composition</del>	<del>AOCS Ce 2-66</del>	<del>Preparation of methyl esters by fatty acids</del>	<del>III</del>
<b>Fish oils</b>	Fatty acid composition  <i>Type II from Type III selection suggests either (i) remain Type III, (ii) Type IV or (iii) removal from STAN 234. *FOSFA: Suggested combination for marine oils does not make sense. Should be combination of AOCS Ce 2-66 and AOCS Ce 1i-07.</i>	AOCS Ce 2-66 and AOCS Ce 1a-13	Gas Chromatography of methyl esters	III/IV/Removal
<b>Fish oils</b>	<del>Fatty acid composition</del>	<del>AOCS Ce 1b-89</del>	<del>GLC</del>	<del>III</del>
<b>Fish oils</b>	Fatty acid composition	AOCS Ce 1b 89	Gas Chromatography of methyl esters	III
<b>Fish oils</b>	<del>Fatty acid composition</del>	<del>AOCS Ce 2b-11</del>	<del>Alkali hydrolysis</del>	<del>III</del>
<b>Fish oils</b>	Fatty acid composition  <i>Type II from Type III selection comes unanymously to conclusion: Type III</i>	AOCS Ce 2b-11 and AOCS Ce 1i-07 or AOCS Ce 1j-07	Gas Chromatography of methyl esters	III
<b>Fish oils</b>	<del>Fatty acid composition</del>	<del>AOCS Ce 1-07</del>	<del>Capillary GLC</del>	<del>III</del>
<b>Fish oils</b>	<del>Fatty acid composition</del>	<del>ISO 12966-2</del>	<del>Gas chromatography</del>	<del>III</del>
<b>Fish oils</b>	<del>Fatty acid composition</del>	<del>ISO 5508</del>	<del>Gas chromatography</del>	<del>III</del>
<b>Fish oils</b>	Fatty acid composition  <i>Type II from Type III selection comes unanymously to conclusion: Type III</i>	ISO 12966-2 and ISO 12966-4	Gas Chromatography of methyl esters	III
<b>Fish oils</b>	Fatty acid composition  <i>Type II from Type III selection comes unanymously to conclusion: Type II</i>	AOCS Ce 2-66 and AOCS Ce 1i-07	Gas Chromatography of methyl esters	II
<b>Fish oils</b>	p-anisidine  <i>*Canada: Cd 18-90 chosen as Type I method by fish oil industry</i>	European Pharmacopoeia 2.5.36 / AOCS Cd 18-90 / ISO 6885	Spectrophotometry	I
<b>Fish oils</b>	Peroxide value	AOCS Cd 8b-90 ISO 3960 458	Titration	†

<b>Fish oils</b>	Peroxide value	European Pharmacopoeia 2.5.5- (Part B Iso-octane as solvent)	Titration	†
<b>Fish oils</b>	Peroxide value  <i>*Canada: EP 2.5.5 chosen as the method by CCMAS</i> <i>*GOED: Different chemical nomenclature is used for same solvent in different methods</i>	AOCS Cd 8b-90 / ISO 3960 / NMKL 158 / European Pharmacopoeia 2.5.5	Titrimetry (Colorimetric)	I
<b>Fish oils</b>	Phospholipids	USP-FCC 10 2S (Krill oil)- Phospholipids Nuclear Magnetic Resonance, Appendix IIC	NMR Spectroscopy	†
<b>Fish oils</b>	Phospholipids  <i>*Canada: USP does not publish validation data, refer to JAOCS article</i>	USP-FCC 11 1S	Nuclear Magnetic Resonance Spectroscopy	IV
<b>Fish oils</b>	<del>Triglycerides</del>	<del>AOCS Cd 11d-96</del>	<del>HPLC-ELSD</del>	<del>III</del>
<b>Fish oils</b>	Triglycerides	AOCS Cd 11d-96	Liquid chromatography with evaporative light scattering detection	II
<b>Fish oils</b>	<del>Triglycerides</del>	<del>European Pharmacopoeia 1352 (Omega-3 acid triglycerides): Oligomers and partial glycerides</del>	<del>HPLC-RI</del>	<del>III</del>
<b>Fish oils</b>	Triglycerides	European Pharmacopoeia 1352	Liquid chromatography with refractive index detection	III
<b>Fish oils</b>	<del>Triglycerides</del>	<del>USP 40-NF35 (Omega-3 Acid Triglycerides): Content of oligomers and partial glyceride</del>	<del>HPLC-RI</del>	<del>III</del>
<b>Fish oils</b>	Triglycerides	USP 40-NF35 USP 40 NF37	Liquid chromatography with refractive index detection	III
<b>Fish oils</b>	<del>Vitamin A</del>	<del>EN 12823-1 (Determination of vitamin A by high performance liquid chromatograph – Part 1: Measurement of all-E-retinol and 13-Z-retinol)</del>	<del>LC</del>	<del>III</del>
<b>Fish oils</b>	<del>Vitamin A</del>	<del>European Pharmacopoeia Monograph on Cod Liver Oil (Type A), monograph 01/2005:1192, with LC end-point 2.2.29</del>	<del>LC</del>	<del>III</del>
<b>Fish oils</b>	Vitamin A (all-E-retinol and 13-Z-retinol)	EN 12823-1	Liquid chromatography	II
<b>Fish oils</b>	Vitamin A (all-E-retinol)	European Pharmacopoeia 2398	Liquid chromatography	III

<del>Fish oils</del>	Vitamin D	EN 12821 (Determination of vitamin D by high performance liquid chromatography— Measurement of cholecalciferol (D3) or ergocalciferol (D2))	LC	III
<del>Fish oils</del>	Vitamin D	NMKL 167 (Cholecalciferol (vitamin D3) and Ergocalciferol (vitamin D2)). Determination by HPLC in foodstuffs	LC	III
Fish oils	Vitamin D (Vitamin D2 and D3)	EN 12821 / NMKL 167	Calculation from vitamin D2 or D3 concentration, preparative column chromatography and liquid chromatography	II
<del>Named Animal Fats</del>	<del>Acidity</del>	<del>ISO 660; or AOCS Cd 3d-63</del>	<del>Titrimetry</del>	<del>I</del>
Named Animal Fats	Acidity: acid value	ISO 660 / AOCS Cd 3d-63	Titrimetry	I
<del>Named Animal Fats</del>	<del>Copper and Iron</del>	<del>AOAC 990.05; or ISO 8294; or AOCS Ca 18b-91</del>	<del>Atomic absorption Spectrophotometry (direct graphite furnace)</del>	<del>II</del>
Named Animal Fats	Copper and Iron	AOAC 990.05 / ISO 8294 / AOCS Ca 18b-91	Atomic absorption Spectrophotometry (direct graphite furnace)	II
<del>Named Animal Fats</del>	<del>GLC ranges of fatty acid composition</del>	<del>ISO 5508 and ISO 12966-2; or AOCS Ce 2-66 and Ce 1e-91 or Ce 1f-96</del>	<del>Gas chromatography of methyl esters</del>	<del>II</del>
Named Animal Fats	Fatty acid composition	ISO 12966-2 and ISO 12966-4 / AOCS Ce 2-66 and Ce 1f-96	Gas Chromatography of methyl esters	II
	<i>*Canada: Replace AOCS Ce 1f-96 with Ce 1j-07. Retype to Type III, including the ISO methods. Suggest AOCS Ce 2-66 and Ce 1j-07 as Type II.</i>			
<del>Named Animal Fats</del>	<del>Iodine value (IV)</del>	<del>ISO 3961; or AOAC 993.20; or AOCS Cd 1d-92</del>	<del>Wijs-Titrimetry</del>	<del>I</del>
Named Animal Fats	Iodine value	ISO 3961 / AOAC 993.20 / AOCS Cd 1d-92 / NMKL 39	Titrimetry (Wijs)	I
<del>Named Animal Fats</del>	<del>Peroxide value</del>	<del>AOCS Cd 8b-90; or ISO 3960</del>	<del>Titrimetry using iso-octane</del>	<del>I</del>
Named Animal Fats	Peroxide value	AOCS Cd 8b-90 / ISO 3960	Titrimetry (Colorimetric)	I
<del>Named Animal Fats</del>	<del>Refractive index</del>	<del>ISO 6320; or AOCS Cc 7-25</del>	<del>Refractometry</del>	<del>II</del>
Named Animal Fats	Refractive index	ISO 6320 / AOCS Cc 7-25	Refractometry	II
<del>Named Animal Fats</del>	<del>Relative density</del>	<del>ISO 6883, with the appropriate conversion factor; or AOCS Ce 40c-95</del>	<del>Pycnometry</del>	<del>I</del>

<b>Named Animal Fats</b>	Relative density	ISO 6883, with the appropriate conversion factor / AOCS Cc 10c-95	Pycnometry	I
<del>Named Animal Fats</del>	<del>Saponification value</del>	<del>ISO 3657; or AOCS Cd 3-25</del>	<del>Titrimetry</del>	<del>†</del>
<b>Named Animal Fats</b>	Saponification value	ISO 3657 / AOCS Cd 3-25	Titrimetry (Colorimetric)	I
<del>Named Animal Fats</del>	<del>Titre</del>	<del>ISO 935; or AOCS Cc 12-59</del>	<del>Thermometry</del>	<del>†</del>
<b>Named Animal Fats</b>	Titre	ISO 935	Thermometry	I
<b>Named Animal Fats</b>	Titre <i>*USP: Historically important method, Type I</i> <i>*Canada: Make oldest method Type I (AOCS)</i>	AOCS Cc 12-59	Thermometry	IV
<del>Named Animal Fats</del>	<del>Unsaponifiable matter</del>	<del>ISO 3596; or ISO 18609; or AOCS Ca 6b-53</del>	<del>Titrimetry after extraction with diethyl ether</del>	<del>†</del>
<b>Named Animal Fats</b>	Unsaponifiable matter	ISO 3596 / ISO 18609 / AOCS Ca 6b-53	Gravimetry, drying at 103 °C and titrimetry (colorimetry)	I
<del>Named Vegetable Oils</del>	<del>Acidity</del>	<del>ISO 660; or AOCS Cd 3d-63</del>	<del>Titrimetry</del>	<del>†</del>
<b>Named Vegetable Oils</b>	Acidity: acid value	ISO 660 / AOCS Cd 3d-63 / AOCS Ca 5 <sup>a</sup> -40	Titrimetry	I
<del>Named Vegetable Oils</del>	<del>Apparent density</del>	<del>ISO 6883, with the appropriate conversion factor; or AOCS Cc 10c-95</del>	<del>Pycnometry</del>	<del>†</del>
<b>Named Vegetable Oils</b>	Apparent density	ISO 6883, with the appropriate conversion factor / AOCS Cc 10c-95	Pycnometry	I
<b>Named Vegetable Oils</b>	Baudouin test (modified Villavecchia or sesame seed oil test)	AOCS Cb 2-40	Colour reaction	I
<del>Named Vegetable Oils</del>	<del>Carotenoids, total</del>	<del>BS 684 Section 2.20</del>	<del>Spectrophotometry</del>	<del>††</del>
<b>Named Vegetable Oils</b>	Carotenoids, total	BS684-2.20	Spectrophotometry	II
<del>Named Vegetable Oils</del>	<del>Copper and Iron</del>	<del>ISO 8294; or AOAC 990.05; or AOCS Ca 18b-91</del>	<del>AAS</del>	<del>††</del>
<b>Named Animal Fats</b>	Copper and Iron	AOAC 990.05 / ISO 8294 / AOCS Ca 18b-91	Atomic absorption Spectrophotometry (direct graphite furnace)	II
<del>Named Vegetable Oils</del>	<del>Crismer value</del>	<del>AOCS Cb 4-35 and AOCS Ca 5a-40</del>	<del>Turbidity</del>	<del>†</del>
<b>Named Vegetable Oils</b>	Crismer value	AOCS Cb 4-35 and AOCS Ca 5a-40	Calculation from individual fatty acid composition (gas chromatography of methyl esters) and turbidity	I



<del>Named Vegetable Oils</del>	<del>GLC ranges of fatty acid composition</del>	<del>ISO 5508 and ISO 12966-2; or AOCS Ce 2-66 and Ce 1-62 or Ce 1h-05</del>	<del>Gas chromatography of methyl esters</del>	<del>II</del>
Named Vegetable Oils	Fatty acid composition	ISO 12966-2 and ISO 12966-4 / AOCS Ce 2-66 and AOCS Ce 1h-05	Gas Chromatography of methyl esters	II
Named Vegetable Oils	Free fatty acids	ISO 660 / AOCS Cd 3d-63 / AOCS Ca 5 <sup>a</sup> -40	Titrimetry	I
Named Vegetable Oils	Halphen test	AOCS Cb 1-25	Colorimetry	I
<del>Named Vegetable Oils</del>	<del>Insoluble impurities</del>	<del>ISO 663</del>	<del>Gravimetry</del>	<del>+</del>
Named Vegetable Oils	Insoluble impurities	ISO 663	Calculation from total insoluble content in <i>n</i> -hexane or light petroleum. Gravimetry, drying at 103 °C	I
<del>Named Vegetable Oils</del>	<del>Iodine value (IV)</del>	<del>ISO 3961; or AOAC 993.20; or AOCS Cd 1d-92; or NMKL 39</del>	<del>Wijs Titrimetry</del>	<del>+</del>
Named Vegetable Oils	Iodine value	ISO 3961 / AOAC 993.20 / AOCS Cd 1d-92 / NMKL 39	Titrimetry (Wijs)	I
<del>Named Vegetable Oils</del>	<del>Lead</del>	<del>AOAC 994.02; or ISO 12193; or AOCS Ca 18c-91</del>	<del>Atomic Absorption</del>	<del>II</del>
Named Vegetable Oils	Lead	AOAC 994.02 / ISO 12193 / AOCS Ca 18c-91	Atomic absorption spectrophotometry (direct graphite furnace)	II
<del>Named Vegetable Oils</del>	<del>Moisture &amp; volatile matter at 105°C</del>	<del>ISO 662</del>	<del>Gravimetry</del>	<del>+</del>
Named Vegetable Oils	Moisture and volatile matter	ISO 662	Gravimetry, drying at 105 °C	I
<del>Named Vegetable Oils</del>	<del>Peroxide value (PV)</del>	<del>AOCS Cd 8b-90; or ISO 3960</del>	<del>Titrimetry</del>	<del>+</del>
Named Vegetable Oils	Peroxide value	AOCS Cd 8b-90 / ISO 3960	Titrimetry (Colorimetric)	I
<del>Named Vegetable Oils</del>	<del>Refractive index</del>	<del>ISO 6320; or AOCS Cc 7-25</del>	<del>Refractometry</del>	<del>II</del>
Named Vegetable Oils	Refractive index	ISO 6320 / AOCS Cc 7-25	Refractometry	II
<del>Named Vegetable Oils</del>	<del>Reichert value and Polenske value</del>	<del>AOCS Cd 5-40</del>	<del>Titrimetry</del>	<del>+</del>
Named Vegetable Oils	Reichert-Meissl value and Polenske value	AOCS Cd 5-40	Calculation from soluble and insoluble volatile fatty acids. Titrimetry (Colorimetric).	I
<del>Named Vegetable Oils</del>	<del>Relative density</del>	<del>ISO 6883, with the appropriate conversion factor; or AOCS Ce 10c-95</del>	<del>Pycnometry</del>	<del>+</del>
Named Vegetable Oils	Relative density	ISO 6883, with the appropriate conversion factor / AOCS Cc 10c-95	Pycnometry	I

<del>Named Vegetable Oils</del>	<del>Saponification value (SV)</del>	<del>ISO 3657; or AOCS Cd 3-25</del>	<del>Titrimetry</del>	<del>I</del>
Named Vegetable Oils	Saponification value	ISO 3657 / AOCS Cd 3-25	Titrimetry (Colorimetric)	I
<del>Named Vegetable Oils</del>	<del>Slip point</del>	<del>ISO 6321 for all oils; AOCS Cc-3b-92 for all oils except palm oils; AOCS Cc 3-25 for palm oils only</del>	<del>Open ended capillary tube</del>	<del>I</del>
Named Vegetable Oils	Slip point	ISO 6321 / AOCS Cc 3b-92 for all oils except palm oils or AOCS Cc 3-25 for palm oils only	Open ended capillary tube	I
<del>Named Vegetable Oils</del>	<del>Soap content</del>	<del>BS 684 Section 2.5 withdrawn for BS EN ISO 10539 or AOCS Cc-17-95</del>	<del>Gravimetry</del>	<del>I</del>
<del>Named Vegetable Oils</del>	<del>Sterol content</del>	<del>ISO 12228; or AOCS Ch 6-91</del>	<del>Gas chromatography</del>	<del>II</del>
Named Vegetable Oils	Sterol composition and total sterols	ISO 12228-1 / AOCS Ch 6-91	Thin-layer chromatography and gas chromatography	II
<del>Named Vegetable Oils</del>	<del>Tocopherol content</del>	<del>ISO 9936; or AOCS Ce 8-89</del>	<del>HPLC</del>	<del>II</del>
Named Vegetable Oils	Tocopherol content	ISO 9936 / AOCS Ce 8-89	Liquid chromatography	II
<del>Named Vegetable Oils</del>	<del>Unsaponifiable matter</del>	<del>ISO 3596; or ISO 18609; or AOCS Ca 6b-53</del>	<del>Gravimetry</del>	<del>I</del>
Named Vegetable Oils	Unsaponifiable matter	ISO 3596 / ISO 18609 / AOCS Ca 6b-53	Gravimetry, drying at 103 °C and titrimetry (colorimetry)	I
	<i>*Canada: solvents differ between methods</i>			
<del>Olive Oils and Olive Pomace Oils</del>	<del>Absorbency in ultra-violet</del>	<del>COI/T.20/Doc. No. 19; or ISO 3656; or AOCS Ch 5-91</del>	<del>Absorption in ultra-violet</del>	<del>II</del>
Olive Oils and Olive Pomace Oils	Absorbency Absorbance in ultra-violet	COI/T.20/Doc. No. 19 / ISO 3656 / AOCS Ch 5-91	Spectrophotometry	II
<del>Olive Oils and Olive Pomace Oils</del>	<del>Acidity, free (acid value)</del>	<del>ISO 660; or AOCS Cd 3d-63</del>	<del>Titrimetry</del>	<del>I</del>
Olive Oils and Olive Pomace Oils	Acidity: acid value	ISO 660 / AOCS Cd 3d-63	Titrimetry	I
<del>Olive Oils and Olive Pomace Oils</del>	<del>Alpha-tocopherol</del>	<del>ISO 9936</del>	<del>HPLC</del>	<del>II</del>
Olive Oils and Olive Pomace Oils	Alpha-tocopherol	ISO 9936	Liquid chromatography	II
	<i>**add AOCS Ce 8-89</i>			
<del>Olive Oils and Olive Pomace Oils</del>	<del>Iron and copper</del>	<del>ISO 8294; or AOAC 990.05</del>	<del>AAS</del>	<del>II</del>
Olive Oils and Olive Pomace Oils	Copper and Iron	AOAC 990.05 / ISO 8294	Atomic absorption Spectrophotometry (direct graphite furnace)	II

	<i>**AOAC 990.05 removed, addition of not endorsed methods ISO 21033 and AOCS Ca 18b-91</i>			
<del>Olive Oils and Olive Pomace Oils</del>	<del>Difference between the actual and theoretical ECN 42 triglyceride content</del>	<del>COI/T.20/Doc. No. 20; or AOCS-Ce 5b-89</del>	<del>Analysis of triglycerides of HPLC and calculation</del>	<del>I</del>
Olive Oils and Olive Pomace Oils	Difference between the actual and theoretical ECN 42 triglyceride content	COI/T.20/Doc. No. 20	Calculation from experimental values of triacylglycerols with equivalent carbon number 42 (liquid chromatography) and theoretical value of triacylglycerols with an equivalent carbon number of 42 (calculated from the fatty acid composition obtained with gas chromatography). Calculation from individual fatty acids composition (gas chromatography of methyl esters), triacylglycerols (liquid chromatography) and theoretical composition of triacylglycerols.	I
<del>Olive Oils and Olive Pomace Oils</del>	<del>Erythrodiol + uvaol</del>	<del>COI/T.20/Doc.no. 30</del>	<del>Gas chromatography</del>	<del>II</del>
Olive Oils and Olive Pomace Oils	Erythrodiol and uvaol	COI/T.20/Doc.no. 26	Calculation of relative percentage of the sum of erythrodiol and uvaol with respect to the sum of all sterols, erythrodiol, and uvaol. Thin-layer chromatography and gas chromatography (trimethylsilyl esters)	II
<del>Olive Oils and Olive Pomace Oils</del>	<del>Halogenated solvents, traces</del>	<del>COI/T.20/Doc. No. 8</del>	<del>Gas chromatography</del>	<del>II</del>
Olive Oils and Olive Pomace Oils	Tetrachloroethylene, traces	COI/T.20/Doc. No. 8	Gas chromatography	II
<del>Olive Oils and Olive Pomace Oils</del>	<del>Insoluble impurities in light petroleum</del>	<del>ISO 663</del>	<del>Gravimetry</del>	<del>I</del>
Olive Oils and Olive Pomace Oils	Insoluble impurities	ISO 663	Calculation from total insoluble content in <i>n</i> -hexane or light petroleum. Gravimetry, drying at 103 °C	I
<del>Olive Oils and Olive Pomace Oils</del>	<del>Iodine value</del>	<del>ISO 3961; or AOAC 993.20; or AOCS Cd 1d-92; or NMKL 39</del>	<del>Wijs-Titrimetry</del>	<del>I</del>
Olive Oils and Olive Pomace Oils	Iodine value	ISO 3961 / AOAC 993.20 / AOCS Cd 1d-92 / NMKL 39	Titrimetry (Wijs)	I

<del>Olive Oils and Olive Pomace Oils</del>	Lead-	AOAC 994.02; or ISO 12193; or AOCS Ca 18c-91	AAS-	II-
Olive Oils and Olive Pomace Oils	Lead	AOAC 994.02 / ISO 12193 / AOCS Ca 18c-91	Atomic absorption spectrophotometry (direct graphite furnace)	II
<del>Olive Oils and Olive Pomace Oils</del>	Moisture and volatile matter-	ISO 662-	Gravimetry-	I-
Olive Oils and Olive Pomace Oils	Moisture and volatile matter	ISO 662	Gravimetry, drying at 105 °C	I
<del>Olive Oils and Olive Pomace Oils</del>	Organoleptic characteristics-	COI/T.20/Doc. No. 15-	Panel test-	I-
Olive Oils and Olive Pomace Oils	Organoleptic characteristics	COI/T.20/Doc. No. 15	Sensory analysis by a trained panel	I
<del>Olive Oils and Olive Pomace Oils</del>	Peroxide value-	ISO 3960; or AOCS Cd 8b-90-	Titrimetry-	I-
Olive Oils and Olive Pomace Oils	Peroxide value	AOCS Cd 8b-90 / ISO 3960	Titrimetry (Colorimetric)	I
	<i>**USA/Australia: prefer usage of method not using chloroform. No COI defined.</i>			
<del>Olive Oils and Olive Pomace Oils</del>	Refractive index-	ISO 6320; or AOCS Cc 7-25-	Refractometry-	II-
Olive Oils and Olive Pomace Oils	Refractive index	ISO 6320 / AOCS Cc 7-25	Refractometry	II
<del>Olive Oils and Olive Pomace Oils</del>	Relative density-	ISO 6883, with the appropriate conversion factor; or AOCS Cc 40c-95-	Pycnometry-	I-
Olive Oils and Olive Pomace Oils	Relative density	ISO 6883, with the appropriate conversion factor / AOCS Cc 10c-95	Pycnometry	I
<del>Olive Oils and Olive Pomace Oils</del>	Saponification value-	ISO 3657; or AOCS Cd 3-25-	Titrimetry-	I-
Olive Oils and Olive Pomace Oils	Saponification value	ISO 3657 / AOCS Cd 3-25	Titrimetry (Colorimetric)	I
<del>Olive Oils and Olive Pomace Oils</del>	Sterol composition and total sterols-	COI/T.20/Doc. No. 30; or ISO 12228-2; or AOCS Ch 6-91	Gas chromatography	II-
Olive Oils and Olive Pomace Oils	Sterol composition and total sterols	COI/T.20/Doc. No. 26 / ISO 12228-2 / AOCS Ch 6-91	Thin-layer chromatography and gas chromatography	II
	<i>**Australia/USA/USP: concerns about COI/T.20/Doc. No. 26</i>			
<del>Olive Oils and Olive Pomace Oils</del>	Stigmastadienes-	Col/T.20/Doc. No. 11; or ISO 15788-1; or AOCS Cd 26-96	Gas chromatography-	II-

Olive Oils and Olive Pomace Oils	Stigmastadienes	Col/T.20/Doc. No. 11 / ISO 15788-1 / AOCS Cd 26-96	Preparative column chromatography and gas chromatography	II
<del>Olive Oils and Olive Pomace Oils</del>	<del>Stigmastadienes</del>	<del>ISO 15788-2</del>	<del>HPLC</del>	<del>III</del>
Olive Oils and Olive Pomace Oils	Stigmastadienes	ISO 15788-2	Preparative column chromatography and gas chromatography	III
<del>Olive Oils and Olive Pomace Oils</del>	<del>Trans fatty acids content</del>	<del>COI/T.20/Doc no. 17; or ISO 15304; or AOCS Ch 2a-94</del>	<del>Gas chromatography of methyl esters</del>	<del>II</del>
Olive Oils and Olive Pomace Oils	Trans fatty acids content	COI/T.20/Doc no. 33	Gas chromatography of methyl esters	II
Olive Oils and Olive Pomace Oils	Trans fatty acids content	<del>ISO 15304</del> ISO 12966-2 and 12966-4	Gas chromatography of methyl esters	III
Olive Oils and Olive Pomace Oils	Trans fatty acids content	AOCS Ch 2a-94	Gas chromatography of methyl esters	III
<del>Olive Oils and Olive Pomace Oils</del>	<del>Unsaponifiable matter</del>	<del>ISO 3596; or ISO 18609; or AOCS Ca 6b-53</del>	<del>Gravimetry</del>	<del>I</del>
Olive Oils and Olive Pomace Oils	Unsaponifiable matter	ISO 3596 / ISO 18609 / AOCS Ca 6b-53	Gravimetry, drying at 103 °C and titrimetry (colorimetry)	I
<del>Olive Oils and Olive Pomace Oils</del>	<del>Wax content</del>	<del>COI/T.20/Doc. no. 18; or AOCS Ch 8-02</del>	<del>Gas chromatography</del>	<del>II</del>
Olive Oils and Olive Pomace Oils	Wax content	COI/T.20/Doc. no. 18-28 / AOCS Ch 8-02	Gas chromatography	II

## APPENDIX II

## PART A – METHODS OF ANALYSIS BY COMMODITY CATEGORIES AND NAMES

Commodity	Provision	Method	Principle	Type
<del>Named Vegetable Oils</del>	<del>Apparent density</del>	<del>ISO 6883, with the appropriate conversion factor; or AOCS Cc 10c-95</del>	<del>Pycnometry</del>	<del>I</del>
Named Vegetable Oils	Apparent density	ISO 6883, with the appropriate conversion factor / AOCS Cc 10c-95	Pycnometry	I
<del>Named Vegetable Oils</del>	<del>Relative density</del>	<del>ISO 6883, with the appropriate conversion factor; or AOCS Cc 10c-95</del>	<del>Pycnometry</del>	<del>I</del>
Named Vegetable Oils	Relative density	ISO 6883, with the appropriate conversion factor / AOCS Cc 10c-95	Pycnometry	I
<del>Olive Oils and Olive Pomace Oils</del>	<del>Relative density</del>	<del>ISO 6883, with the appropriate conversion factor; or AOCS Cc 10c-95</del>	<del>Pycnometry</del>	<del>I</del>
Olive Oils and Olive Pomace Oils	Relative density	ISO 6883, with the appropriate conversion factor / AOCS Cc 10c-95	Pycnometry	I
<del>Named Animal Fats</del>	<del>Relative density</del>	<del>ISO 6883, with the appropriate conversion factor; or AOCS Cc 10c-95</del>	<del>Pycnometry</del>	<del>I</del>
Named Animal Fats	Relative density	ISO 6883, with the appropriate conversion factor / AOCS Cc 10c-95	Pycnometry	I
<del>Named Vegetable Oils</del>	<del>Carotenoids, total</del>	<del>BS 684 Section 2.20</del>	<del>Spectrophotometry</del>	<del>II</del>
Named Vegetable Oils	Carotenoids, total	BS684-2.20	Spectrophotometry	II

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