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MS 2043 (2007) (English): VIRGIN COCONUT OIL – SPECIFICATION
VIRGIN COCONUT OIL – SPECIFICATION

ICS: 67.200.10

Descriptors: virgin coconut oil, specification, test method, composition, quality factor

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Committee representation

The Food and Food Products Industry Standards Committee (ISC U) under whose authority this Malaysian Standard was developed, comprises representatives from the following organisations:

Department of Agriculture Malaysia
Department of Chemistry Malaysia
Department of Standards Malaysia
Federal Agricultural Marketing Authority
Federation of Malaysian Manufacturers
Malaysian Agricultural Research and Development Institute
Malaysian Association of Standards Users
Malaysian Institute of Food Technology
Malaysian Palm Oil Association
Malaysian Palm Oil Board
Ministry of Agriculture and Agro-Based Industry
Ministry of Health Malaysia
Ministry of International, Trade and Industry
Ministry of Science, Technology and Innovation (National Biotechnology Division)
Universiti Kebangsaan Malaysia
Universiti Putra Malaysia

The Working Group on Virgin Coconut Oil which developed this Malaysian Standard consists of representatives from the following organisations:

Federal Agricultural Marketing Authority
Malaysian Agricultural Research and Development Institute
Malaysian Palm Oil Board
Ministry of Health Malaysia
SIRIM Berhad (Secretariat)
Universiti Kebangsaan Malaysia
Universiti Putra Malaysia
FOREWORD

This Malaysian Standard was developed by the Working Group on Virgin Coconut Oil under the authority of the Food and Food Products Industry Standards Committee.

Compliance with a Malaysian Standard does not of itself confer immunity from legal obligations.
VIRGIN COCONUT OIL – SPECIFICATION

1. Scope

This Malaysian Standard prescribes the commercial quality requirements of Virgin Coconut Oil (VCO) for human consumption.

2. Normative references

The following normative references are indispensable for the application of this standard. For dated references, only the edition cited applies. For undated references, the latest edition of the normative references (including any amendments) apply.

MS 252: Part 3, Animal and vegetable fats and oils — Part 3: Determination of saponification value

MS 817: Part 2, Methods of test for palm oil and palm oil products — Part 2: Determination of moisture and volatile matter content

MS 817: Part 3, Method of test for palm oil and palm oil products — Part 3: Determination of iodine value

MS 817: Part 7: Section 1, Methods of test for palm oil and palm oil products — Part 7: Determination of unsaponifiable matter: Section 1: Method using diethyl ether extraction (Reference method)

MS 817: Part 7: Section 2, Methods of test for palm oil and palm oil products — Part 7: Determination of unsaponifiable matter: Section 2: Rapid method using hexane extraction

MS 817: Part 11, Palm oil and palm oil products — Part 11: Determination of peroxide value

MS 817: Part 12, Palm oil and palm oil products — Part 12: Determination of lovibond colour

MS 1515: Part 3, Methods of sampling and test for palm glycerine — Part 3: Determination of Refractive Index

MS ISO 6321, Animal and vegetable fats and oils — Determination of melting point in open capillary tubes (Slip point)

ISO 662, Animal and vegetable fats and oils — Determination of moisture and volatile matter content

ISO 6883, Animal and vegetable fats and oils — Determination of conventional mass per volume (litre weight in air)


3. Definition

For the purpose of this Malaysian Standard, the following definition shall applies.

Virgin coconut oil

Virgin coconut oil is obtained from the mature kernel of the coconut (Cocos nucifera L.) by mechanical or natural means with or without the application of minimal heat which does not lead to alteration of the product. Extra virgin coconut oil is also considered as virgin coconut oil.

4. Identity characteristics

The product shall meet the chemical and physical properties as specified in Table 1.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relative density, ( \times \text{CI} ) water at 20 °C</td>
<td>0.908 - 0.926</td>
</tr>
<tr>
<td>Refractive index, at 40 °C</td>
<td>1.447 - 1.450</td>
</tr>
<tr>
<td>Saponification value, mg KOH/g oil</td>
<td>248 - 265</td>
</tr>
<tr>
<td>Iodine value, Wijs method</td>
<td>5.5 - 10.6</td>
</tr>
<tr>
<td>Slip Melting Point, °C</td>
<td>24 - 26</td>
</tr>
<tr>
<td>Unsaponifiable matter, %</td>
<td>( \leq 0.2 )</td>
</tr>
</tbody>
</table>

5. Essential composition and quality characteristics

5.1 Fatty acid composition

Fatty acid composition of the product shall fall within the appropriate ranges as specified in Table 2.
Table 2. Fatty acid composition

<table>
<thead>
<tr>
<th>Fatty acid</th>
<th>Carbon number</th>
<th>Composition, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caproic acid</td>
<td>C₆:0</td>
<td>0.80 – 0.95</td>
</tr>
<tr>
<td>Caprylic acid</td>
<td>C₈:0</td>
<td>8.00 – 9.00</td>
</tr>
<tr>
<td>Capric acid</td>
<td>C₁₀:0</td>
<td>5.00 – 7.00</td>
</tr>
<tr>
<td>Lauric acid</td>
<td>C₁₂:0</td>
<td>47.00 – 50.00</td>
</tr>
<tr>
<td>Myristic acid</td>
<td>C₁₄:0</td>
<td>17.00 – 18.50</td>
</tr>
<tr>
<td>Palmitic acid</td>
<td>C₁₆:0</td>
<td>7.50 – 9.50</td>
</tr>
<tr>
<td>Palmitoleic acid</td>
<td>C₁₆:1</td>
<td>Non-detectable</td>
</tr>
<tr>
<td>Stearic acid</td>
<td>C₁₈:0</td>
<td>2.50 – 3.50</td>
</tr>
<tr>
<td>Oleic acid</td>
<td>C₁₈:1</td>
<td>4.50 – 6.00</td>
</tr>
<tr>
<td>Linoleic acid</td>
<td>C₁₈:2</td>
<td>0.70 – 1.50</td>
</tr>
<tr>
<td>Linolenic acid</td>
<td>C₁₈:3</td>
<td>Non-detectable</td>
</tr>
</tbody>
</table>

5.2 Quality characteristics

VCO shall meet the quality characteristics as specified in Table 3.

Table 3. Quality characteristics

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Range/Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clarity</td>
<td>Water clear (A fully transparent oil at above 30 °C)</td>
</tr>
<tr>
<td>Odour and taste</td>
<td>Free from foreign and rancid odour and taste</td>
</tr>
<tr>
<td>Free fatty acids</td>
<td>&lt; 0.5 %</td>
</tr>
<tr>
<td>Peroxide value</td>
<td>&lt; 3 meq/kg oil</td>
</tr>
<tr>
<td>Moisture content</td>
<td>&lt; 0.15 %</td>
</tr>
<tr>
<td>Total Plate Count</td>
<td>&lt; 10 cfu/mL</td>
</tr>
<tr>
<td>Insoluble impurities</td>
<td>&lt; 0.02 %</td>
</tr>
<tr>
<td>Colour</td>
<td>0.1 R ≤ 0.5 Y</td>
</tr>
</tbody>
</table>
6. **Contaminants**

6.1 **Volatile matter**

The product shall contain < 0.2 % volatile matter at 105 °C.

6.2 **Pesticide residues**

The product shall be free from any pesticide residues.

6.3 **Others**

The product shall comply with maximum limits as follows:

a) Iron (Fe): ≤ 5.0 mg/kg  
b) Copper: ≤ 0.4 mg/kg  
c) Lead: ≤ 0.1 mg/kg  
d) Arsenic: ≤ 0.1 mg/kg

7. **Hygiene**

The product shall be processed and packed under hygienic conditions in premises licensed in accordance with the public health legislations currently enforced in Malaysia.

8. **Packaging and labelling**

Each individual pack shall be marked to give the following information:

a) name of product “virgin coconut oil”;  
b) brand name or trade name;  
c) nett content;  
d) lot identification;  
e) name and address of the manufacturer and/or packer, or distributor;  
f) product of Malaysia;  
g) date of manufacture;  
h) best before;  
i) ingredients; and  
j) nutritional values.
9. Method of analysis

Product analysis shall be carried out according to the method specified in Table 4.

Table 4. Method of analysis

<table>
<thead>
<tr>
<th>Type of determination</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relative Density</td>
<td>ISO 6883</td>
</tr>
<tr>
<td>Refractive Index</td>
<td>MS 1515: Part 3</td>
</tr>
<tr>
<td>Saponification Value (SV)</td>
<td>MS 252: Part 3</td>
</tr>
<tr>
<td>Iodine Value (IV)</td>
<td>MS 817: Part 3</td>
</tr>
<tr>
<td>Unsaponifiable matter</td>
<td>MS 817: Part 7: Section 1</td>
</tr>
<tr>
<td></td>
<td>MS 817: Part 7: Section 2</td>
</tr>
<tr>
<td>Slip Melting Points (SMP)</td>
<td>MS ISO 6321</td>
</tr>
<tr>
<td>Moisture and Volatile matter content</td>
<td>MS 817: Part 2</td>
</tr>
<tr>
<td>Moisture and Matter volatile</td>
<td>ISO 662</td>
</tr>
<tr>
<td>Peroxide Value (PV)</td>
<td>MS 817: Part 11</td>
</tr>
<tr>
<td>Colour</td>
<td>MS 817: Part 12</td>
</tr>
</tbody>
</table>

10. Compliance with the specification

Upon testing, when each sample is found to conform to the requirements specified in this standard, the lot, batch or consignment from which the sample has been drawn shall be deemed to comply with this standard.

11. Legal requirements

The product, in all other aspects, shall comply with the requirements of the legislation currently in force in Malaysia.
Bibliography


Acknowledgements

Members of Working Group on Virgin Coconut Oil

Dr Kamariah Long (Chairman)  Malaysian Agricultural Research and Development Institute
Ms Rafidah Abd Hamid (Secretary)  SIRIM Berhad
Mr Mat Ridzuan Zakaria  Federal Agricultural Marketing Authority
Dr Sivapragasam  Malaysian Agricultural Research and Development Institute
Dr Siew Wai Lin  Malaysian Palm Oil Board
Mr Abdul Malek Manan  Ministry of Health Malaysia
Assoc Prof Dr Mamot Said  Universiti Kebangsaan Malaysia
Dr Tan Chin Ping  Universiti Putra Malaysia