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SPECIFICATION FOR
OIL OF NUTMEG, SRI LANKA (CEYLON)

BUREAU OF CEYLON STANDARDS

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SLS 388 : 1976

Gr. 4

BUREAU OF CEYLON STANDARDS
53,Dharmapala Mawatha,
Colombo 3,
Sri Lanka.

Sri Lanka Standards are subject to periodical revision in order to accommodate the progress made by industry. Suggestions for improvement will be recorded and brought to the notice of the Committees to which the revisions are entrusted.

This Standard does not purport to include all the necessary provisions of a contract.

SRI LANKA STANDARD

SPECIFICATION FOR OIL OF NUTMEG, SRI LANKA (CEYLON)

FOREWORD

This Sri Lanka Standard Specification has been prepared by the Drafting Committee of the Bureau on Essential Oils. It was approved by the Agricultural and Chemicals Divisional Committee of the Bureau of Ceylon Standards and was authorised for adoption and publication by the Council of the Bureau on 1976-07-07.

The oil of nutmeg is commonly used in the food, pharmaceutical and perfumery industries.

The standard values are given in SI units. For the purpose of deciding whether a particular requirement of this standard complies with the final value, observed or calculated, expressing the result of the test, shall be rounded off in accordance with CS 102 Presentation of numerical values. The number of figures to be retained in the rounded off value shall be the same as that of the specified value in this standard.

This standard requires reference to the following:

CS 102 Presentation of numerical values.

SLS 210 Method for the preparation of test samples of essential oils.

SLS 211 Methods for labelling and marking of containers for essential oils.

SLS 212 Method for packing of essential oils.

SLS 213 Methods for the sampling of essential oils.

In the preparation of this standard, the assistance derived from the publications of the British Standards Institution is acknowledged.

1 SCOPE

This standard prescribes requirements and methods of test for oil of nutmeg.

2 DEFINITION

The oil shall be the product obtained by steam distillation of the dried kernels of *Myristica fragrans Houttn.*

3 REQUIREMENTS

3.1 Description

The oil shall be colourless to yellow in colour. It shall have the characteristic odour of nutmeg and shall be of a mild flavour of the spice.

3.2 Relative density at 30 ^{o}C/30 ^{o}C

The relative density of the oil at 30 ^{o}C when determined by the method described in Appendix A shall be not less than 0.885 and not greater than 0.915.

3.3 Optical rotation

Optical rotation of the oil at 30 ^{o}C when determined by the method described in Appendix B shall be within the range + 8.0^{o} to + 25.0^{o}.

3.4 Refractive index

The refractive index of the oil at 30 ^{o}C when determined by the method described in Appendix C shall be not less than 1.4750 and not greater than 1.4880.

3.5 Solubility in ethanol

When tested by the method described in Appendix D the solubility in 90 per cent (v/v) ethanol shall be 1 volume in 3 volumes.

3.6 Residue on evaporation

The oil shall not leave more than 3 per cent by mass of residue when tested by the method described in Appendix E using 4.8 g to 5.2 g of sample and heating for 5 hours.

4 PACKAGING AND MARKING

These shall be shipped preferably in glass containers or in any other suitable container as agreed to between the buyer and the seller. SLS 212 and SLS 211 are broadly applicable to all essential oils.

5 SAMPLING AND SIZE OF SAMPLE

A representative sample or samples as required, each measuring not less than 50 ml shall be taken preferably from original containers or from the bulk for the purpose of examination. The samples shall be placed in clean, dry, air-tight, non-absorbent containers on which the sample has no action. The containers shall be of such size that they are nearly filled by the sample. Each container so filled shall be marked with full details and date of sampling and protected from light. SLS 213 and SLS 210 are broadly applicable to all essential oils.

6 STORAGE

Store in air-tight, full containers, in a cool place protected from light.

APPENDIX A

DETERMINATION OF RELATIVE DENSITY

A.1 GENERAL

The relative density of the material shall be expressed as the ratio of the density of oil at a specified temperature to that of distilled water at the same temperature.

A.1.1 The buyer and the seller may, by mutual agreement fix any convenient temperature for the determination of relative density. A temperature of 30 °C is recommended, unless otherwise agreed to. Usually the relative density decreases with increase in temperature, and so the value for the specified temperature is calculated as given below:

a) If the temperature of testing is higher than the specified temperature to the value found add for each degree celsius of the difference between the two temperatures, the correction factor 0.000 64.

b) If the temperature of testing is lower than the specified temperature, from the value found subtract for each degree celsius of the difference between the two temperatures, the correction factor 0.000 64.

c) The specified correction factor holds good within ± 3 degrees of the specified temperature.

A.1.2 Relative density may be determined with a specific gravity bottle or a pyknometer and in case of dispute, the determination shall be made at the specified temperature.

A.3 PROCEDURE

A.3.1 *With pyknometer or specific gravity bottle*

Clean the pyknometer or specific gravity bottle of at least 5-ml capacity using a saturated solution of chromium trioxide in concentrated sulphuric acid; dry and allow to stand for at least 3 hours. Empty the pyknometer or specific gravity bottle and rinse thoroughly with distilled water. Fill the pyknometer or specific gravity bottle with recently boiled distilled water which has been cooled to a temperature 3 degrees lower than the test temperature. Keep the pyknometer or specific gravity bottle with contents in a water-bath at the test temperature for 30 minutes. Adjust the level of the water up to the mark, removing any excess with clean filter paper or cloth, and put the ground glass cap in place. Remove the pyknometer or specific gravity bottle from the water bath, dry carefully with a clean cloth, permit it to stand for 30 minutes and weigh accurately. Empty the pyknometer or specific gravity bottle; rinse several times with ethanol and finally with ether. Remove the ether vapour with the aid of an air blast and permit the pyknometer or specific gravity bottle to dry thoroughly. Weigh accurately after standing for 30 minutes. Fill the clean, dried pyknometer or specific gravity bottle with the nutmeg oil previously cooled to a temperature 3 degrees lower than the test temperature. Following the same procedure as above, place the pyknometer or specific gravity bottle in a water-bath and permit it to warm slowly to the test temperature. As before, adjust the material to the proper level, put the cap in place and wipe the specific gravity bottle or pyknometer dry. Weigh accurately after 30 minutes.

A.3.2 The ratio of the mass of the oil to the mass of the distilled water contained in the pyknometer or specific gravity bottle gives the relative density of the oil at the test temperature.

A.4 REPORT

The temperature at which the test was carried out and the correction factor, if used, shall be stated in the report.

APPENDIX B

DETERMINATION OF OPTICAL ROTATION

B.1 GENERAL

For the purpose of this determination, the optical rotation of the material is taken as the angle in degrees through which the plane of polarization is turned when plane-polarized sodium light is passed through a layer of oil, 100 mm in thickness.

B.2 APPARATUS

B.2.1 *Polarimeter,* of suitable type with a precision of $\pm$ 0.03°. It should give a reading of 0° and also 180° with distilled water when properly adjusted.

B.2.2 *Light source :* Any apparatus giving monochromatic light from sodium vapour lamp.

B.2.3 *Polarimeter tubes,* 100 $\pm$ 0.05 mm.

B.3 PROCEDURE

B.3.1 *Calibration of the polarimeter*

Check the apparatus by finding out the optical rotation of a solution of sucrose containing 26 grams of sucrose in 100 ml of solution at a temperature of 30 °C and the optical rotation should be + 25.9°.

B.3.2 Switch the light source on , and wait until full luminosity is obtained. Fill the polarimeter tube with the material at 30 ± 1 °C and ensure the absence of air bubbles. Place the tube in the polarimeter and read the dextrorotatory (+) or laevorotatory (-) optical rotation of the material on the scale of the instrument. Conduct the determination preferably in a dark room. Record the results as the average of at least three readings which should agree within 0.08 degrees and rounded to first decimal place.

B.3.3 If the material is found to be excessively coloured, shake a portion of the sample of the material with powdered tartaric acid for about 5 minutes and filter. This treatment improves the colour of the material.

APPENDIX C

DETERMINATION OF REFRACTIVE INDEX

C.1 GENERAL

For the purpose of this determination, the refractive index of the material is taken as the ratio of the sine of the angle of incidence to the sine of the angle of refraction when a ray of light of wavelength 589.3 nm (the mean of the D lines of sodium) passes from air into the material.

The notation is refractive index n_D^t, t being the temperature (°C) at which the determination is made.

C.2 PROCEDURE

Determine the refractive index in a standard instrument* employing the principle of the critical angle, using diffused daylight or any convenient artificial light as illuminant. Maintain the prisms at the specified temperature and allow the material to stay on the prism surface for a couple of minutes to attain the required temperature. Take a second reading after the lapse of a few minutes.

C.2.1 A temperature of 30 °C is recommended. Carry out the determination at or as near as possible to the temperature specified.

C.2.2 Since moisture in the air may condense on the cooled prisms, great care shall be exercised when determining refractive indices during hot, humid weather. Occasionally, the instrument should be checked by means of the quartz plate that accompanies it, using monobromonaphthalene, or if such a plate is not available, by means of distilled water at 30 °C. The refractive index of distilled water at 30 °C is 1.332 00.

C.2.3 If, for any reason, the refractive index cannot be determined at the specified temperature, apply the correction factor of 0.000 38 per degree celsius. If the refractive index is determined at a temperature above the specified temperature, add the appropriate correction; if determined below the specified temperature, subtract the appropriate correction.

C.2.4 *Report*

Report the refractive index at 30 °C, as a number correct to four decimal places.

**A suitable type of instrument for this purpose is the Abbe refractometer.*

APPENDIX D

DETERMINATION OF SOLUBILITY IN ETHANOL

D.1 SOLVENT

Reagent quality ethanol of 95 per cent (v/v) at 30 °C shall be used. The strength of the ethanol at this temperature shall be checked.

D.2 APPARATUS

A 10-ml glass-stoppered cylinder, graduated at 0.1 ml intervals.

D.3 PROCEDURE

Introduce exactly 1 ml of the oil into the cylinder and add, slowly and in small proportions, the ethanol, shaking the contents of the cylinder thoroughly after each addition. When a clear solution is first obtained, record the number of volumes of ethanol added. Continue the addition of ethanol until the 4-ml mark on the cylinder has been reached.

D.4 REPORT

Report 1 volume of sample as being soluble in 3 volumes of 95 per cent (v/v) ethanol at 30 °C if the mixture obtained by procedure D.3 is clear.

APPENDIX E

DETERMINATION OF RESIDUE ON EVAPORATION

E.1 APPARATUS

Water-bath with cover having holes of 70 mm diameter and provision for keeping the water level at approximately 50 mm below the cover throughout the test.

Evaporating basin of nominal capacity of 50 ml, made of heat-resisting glass inert towards essential oils, and conforming to the dimensions shown in Figure 1.

E.2 PROCEDURE

Heat the evaporating basin on the vigorously boiling water bath for one hour, wipe the exterior, place it in a desiccator for 20 minutes and weigh it to the nearest milligram. Weigh into the basin, to an accuracy of 1 mg, 4.8 g to 5.2 g of the oil, place it on the vigorously boiling water bath, screened from draughts, and heat for a continuous period of 5 hours. Remove the basin, wipe it and place it in a desiccator, and after 20 minutes weigh to the nearest milligram.

E.3 CALCULATION

Residue on evaporation, per cent by mass = $\frac{100\ m_2}{m_1}$

where,

m_2 = mass, in grams, of residue, and

m_1 = mass, in grams, of sample taken.

Express the result to the first decimal place.

All dimensions are in millimetres

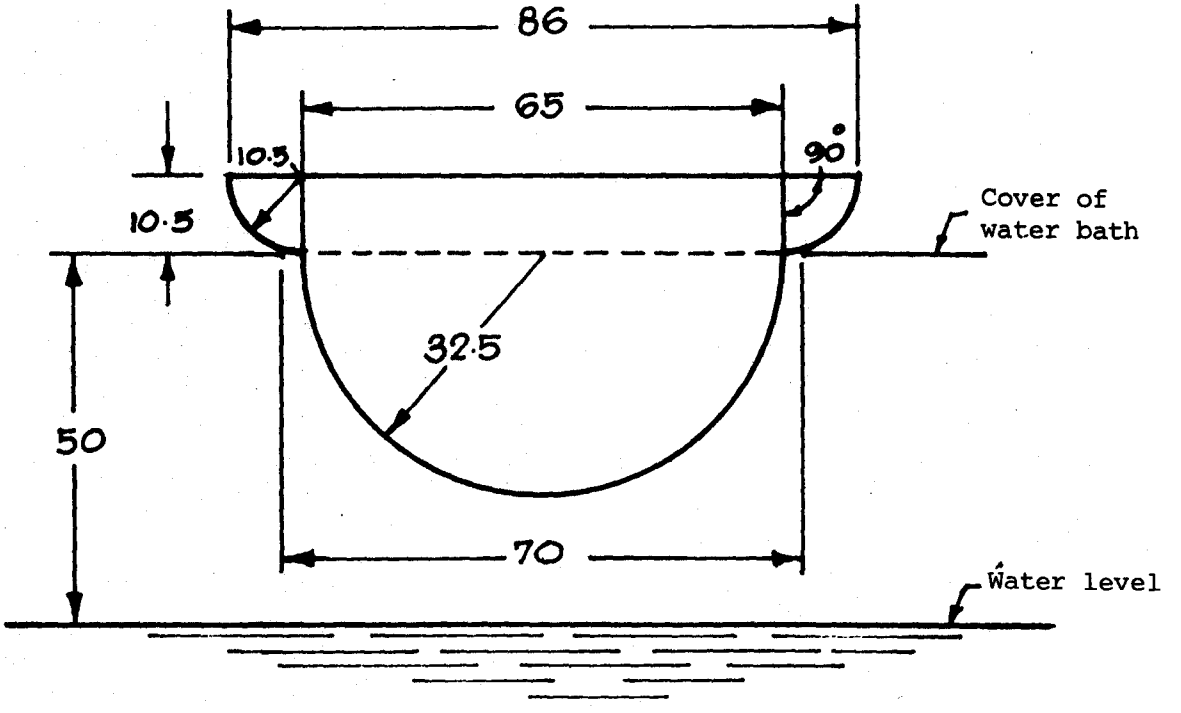

FIG. 1 Evaporating basin for the determination of residue on evaporation.

ERRATUM

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Page 6 - Substitute the Clause Number A.2 to the existing Clause Number A.1.2.

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