# SRI LANKA STANDARD 919: 2020
**UDC 663.551.5: 634.61**

# SPECIFICATION FOR
# ARRACK
## (*First Revision*)

**SRI LANKA STANDARDS INSTITUTION**

Sri Lanka Standard
# SPECIFICATION FOR ARRACK
(*First Revision*)

**SLS 919: 2020**

**Gr: 9**

**SRI LANKA STANDARDS INSTITUTION**
**17, Victoria Place**
**Elvitigala Mawatha**
**Colombo 8**
**Sri Lanka**

# Sri Lanka Standard
# SPECIFICATION FOR ARRACK
(*First Revision*)

## FOREWORD

This Sri Lanka Standard was approved by the Sectoral Committee on Food Products and was authorized for adoption and publication as a Sri Lanka Standard by the Council of the Sri Lanka Standards Institution on 2020-05-27.

Arrack is a distilled alcoholic drink produced in Sri Lanka. This product is made from the fermented sap of coconut/ palmyrah/ kithul palm inflorescence (unopened). The alcoholic beverages industry is a well-established industry in Sri Lanka.

This Standard is first published in 1991. In this first revision, definitions and arrack types have been revised and necessary changes were made. New chemical parameters have been introduced to safeguard the consumers. In addition, new product types have been introduced to cater to trade requirements.

This Standard is subject to the restrictions imposed under the Excise Ordinance of 2009 and the regulations framed thereunder.

For the purpose of deciding whether a particular requirement of this Standard is complied with the final value, observed or calculated, expressing the results of a test or an analysis shall be rounded off in accordance with **SLS 102**. The number of significant places retained in the rounded off value shall be the same as that of the specified value in this Standard.

## 1 SCOPE

This Standard prescribes the requirements and methods of sampling and test for arrack.

## 2 REFERENCES

| | | |
|---|---|---|
| SLS | 102 | Rules for rounding off numerical values |
| SLS | 143 | Code of practice for general principles of food hygiene |
| SLS | 290 | Glass liquor bottles |
| SLS | 351 | Rectified spirit |
| SLS | 301 | Method for the determination of Copper |
| SLS | 311 | Method for the determination of Lead |
| SLS | 315 | Method for the determination of Tin |
| SLS | 428 | Random sampling methods |
| SLS | 614 | Potable water |

Official Methods of Analysis of the Association of Official Analytical Chemists (AOAC), 20th Edition, 2016

Practical Alcohol Tables, Volume II, 1978, Commission of European Communities

## 3 DEFINITIONS

For the purpose of this Standard, the following definitions shall apply:

**3.1 arrack:** An alcoholic liquor made by the distillate from fermented sap of cocount palm (*Cocos nucifera*) (Sinhala: Pol; Tamil: Tennai), Palmyrah palm (*Borassus flabellifer*) (Sinhala: Tal; Tamil: Panai), or kithul palm (*Caryota urenus*) (Sinhala: kithul; Tamil: Tippllipanai)

**3.2 old arrack:** Arrack prepared by matured (aged) spirit under strict controlled conditions for not less than one year

**3.3 maturation/ ageing:** Allowing certain reactions to occur naturally in appropriate containers, thereby allowing to develop characteristic organoleptic qualities previously absent

**3.4 blended arrack:** Arrack prepared by blending of minimum 3 per cent of coconut/ palmyrah/ kithul spirits and other potable alcohol (rectified spirit)

**3.5 flavoured blended arrack:** Blended arrack to which spices or essences or concentrates or maturing agents are added to obtain a distinctive bouquet and taste

## 4 TYPES

**4.1** Arrack
**4.2** Old arrack
**4.3** Blended arrack
**4.4** Flavoured blended arrack

## 5 REQUIREMENTS

### 5.1 Hygiene

The product shall be processed, packaged, stored and distributed under hygienic conditions as prescribed in **SLS 143**. Holding vats/ casks (mash vats/ casks, fermenting vats/ casks, conditioning and storage vats/ casks) and handling equipment (filters, conveyor ducts and packaging equipment) shall be clean.

### 5.2 Quality of spirits

### 5.2.1 *Rectified spirit*

The potable alcohol used for blending shall conform to all requirements given in **SLS 351** except that the ethyl alcohol content shall be a minimum of 95.8 per cent (V/ V).

### 5.2.2 *Palm spirits*

Palm spirits (coconut/ palmyrah/ kithul) used for blending shall have a maximum of 80 per cent (V/ V) ethyl alcohol.

## 5.3 Quality of water

Water used for dilution at any stage of the process shall be of potable quality conforming to **SLS 614**.

**NOTE**
*Water used for cooling during distillation may not be of potable quality.*

## 5.4 Ethyl alcohol

**5.4.1** The ethyl alcohol content of arrack, old arrack, blended arrack and flavoured blended arrack shall be between 20.0 per cent (V/ V) and 48.5 per cent (V/ V) when determined by the method given in appendix **B**.

**5.4.2** The allowable tolerance on the declared strength shall be ± 0.2 per cent (V/ V) of ethyl alcohol.

## 5.5 Colouring substances

The colouring substances, if used, shall only be caramel (INS 150a, 150c or 150d).

## 5.6 Taste and aroma

The product shall possess the characteristic taste and aroma.

## 5.7 Maturity of old arrack

The final distillate shall be matured for at least one year in wooden containers (vats/ casks).

## 5.8 Sediments

The product shall be free from sediments, suspended matter and foreign substances.

## 5.9 Chemical requirements

The product shall comply with the requirements specified in Table **1,** when tested according to the methods given in Column **4** of the table.

**TABLE 1 - Chemical requirements for arrack**

| **Sl No** (1) | **Characteristic** (2) | **Requirement** (3) | **Method of test** (4) |
|---|---|---|---|
| i) | Total solids, in grams per 100 1itres of absolute alcohol, max. | 1000 | Appendix **C** |
| ii) | Total acids as Acetic acid*, in grams per 100 litres of absolute alcohol, max. | 100 | Appendix **D** |

Table 1 cont;

| | | | |
|---|---|---|---|
| iii) | Fixed acids as Acetic acid, in grams per 100 1itres of absolute alcohol, max. | 10.0 | Appendix **E** |
| iv) | Esters as Ethyl acetate, in grams per 100 litres of absolute alcohol, max. | 300 | Appendix **F** |
| v) | Higher alcohol as Amyl alcohol, in grams per 100 litres of absolute alcohol, max. | 250 | Appendix **G** |
| vi) | Aldehydes as Acetaldehyde in grams per 100 litres of absolute, alcohol, max. | 20 | Appendix **H** |
| vii) | Furfural, in grams per 100 litres of absolute alcohol, max. | 1.0 | Appendix **J** |
| viii) | Methyl alcohol, mg/ litres, max. | 20 | **AOAC 972.11** |

**For old arrack, the level is* 150.

## 6 CONTAMINANTS

The product shall not exceed the limits given in Table **2**, when tested according to the methods given in Column **4** of the table.

**TABLE 2 – Limits for metals**

| **Sl No** (1) | **Metal** (2) | **Limit** (3) | **Method of test** (4) |
|---|---|---|---|
| i) | Copper, as Cu, mg/ kg, max. | 3 | **SLS 301** or **AOAC 967.08** |
| ii) | Iron, as Fe, mg/ kg, max. | 2 | **AOAC 970.12** |
| iii) | Lead, as Pb, mg/ kg, max. | 1 | **SLS 311** or **AOAC 999.10** |
| iv) | Tin, as Sn, mg/ kg, max. | 1 | **SLS 315** |

**NOTE**
*It is not necessary to carry out this determination as a routine for all the samples. This should be tested in case of dispute and when required by the purchaser or vendor or when there is any suspicion of pesticide contamination.*

## 7 PACKAGING

The product may be filled in glass bottles conforming to **SLS 290**. The product may also be filled in any other suitable food grade containers which do not affect the quality and safety of the product. The bottles or containers shall be securely sealed in order to prevent any adulteration of the product.

## 8 MARKING AND/ OR LABELLING

**8.1** The following shall be marked and/ or labeled legibly and indelibly on each package or container:

a) Common name and type of the product;
b) Brand name and/ or trade mark;
c) Name and address of the manufacturer and/ or distributor;
d) Alcohol content per cent (V/V);
e) In case of blended arrack, minimum palm based alcohol content;
f) Source(s) of spirit(s);
g) Batch number or code number or a decipherable code marking;
h) Net content in “ml”, “cl”, or “l”;
j) Date of manufacture; and
k) Period of maturity, in case of old arrack.

## 9 SAMPLING

Representative samples of arrack shall be drawn according to the method prescribed in Appendix **A**.

## 10 METHODS OF TEST

Tests shall be carried out as given in Appendix **B** to **J** of this Standard, **SLS 351** and Methods of Analysis of the Association of Official Analytical Chemists (**AOAC**), 20th edition, 2016.

## 11 CRITERIA FOR CONFORMITY

A lot shall be declared as conforming to the requirements of this Standard if the following conditions are satisfied:

### 11.1 Bulk containers

The product shall be considered as conforming to the Standard when the samples tested as in **A.4.3** satisfy the requirements given in the Standard.

### 11.2 Retail containers

A lot shall be considered as conforming with the requirements of this Standard if the following conditions are satisfied.

**11.2.1** The volume of each container/ bottle measured as in **A.6.1** does not vary by more than 1 per cent of declared volume and the total volume of 12 bottles does not vary by more than ± 0.3 per cent of the total declared volume.

**11.2.2** All the containers/ bottles examined as in **A.6.2** satisfy packaging and marking and/ or labelling requirements.

**11.2.3** The test results on individual samples tested as in **A.6.3** satisfy the relevant requirements.

**11.2.4** The composite sample tested as in **A.6.4** satisfies the relevant requirements.

# APPENDIX A
# SAMPLING

## A.1 LOT

In any consignment all the containers/ bottles of the same size containing arrack of the same type from one batch of manufacture shall constitute a lot.

## A.2 GENERAL REQUIREMENTS OF SAMPLING

In drawing, preparing, handling and storing samples, the following precautions and directions shall be observed.

**A.2.1** Samples shall be taken in a protected place not exposed to damp air, dust and soot.

**A.2.2** The sampling instruments used shall be clean and dry.

**A.2.3** Precautions shall be taken to protect the samples, the material being sampled, the sampling instrument and the containers for samples from extraneous contamination.

**A.2.4** Samples shall be placed in suitable clean, dry and air-tight glass containers.

**A.2.5** The sample containers shall be of such a size that sufficient head space to allow for expansion of the liquid is left after pouring the sample.

**A.2.6** Each sample container shall be sealed air-tight with a suitable stopper after filling and marked with the required information.

**A.2.7** Samples shall be stored in a cool, dark and dry place.

## A.3 SAMPLING INSTRUMENTS

**A.3.1** The following forms of sampling instrument may be used.

a) Weighed sampling can; and
b) Sampling tube.

**A.3.2** All the material used for fabricating the sampling instrument shall be such as not to contaminate or chemically affect the sample or the material being sampled.

## A.4 SAMPLING FROM BULK CONTAINER OR VAT/ CASK

**A.4.1** One sample shall be taken from each bulk container or vat/ cask using an appropriate sampling instrument and transferred to the sample container.

**A.4.2** Before drawing the sample, the material shall be thoroughly mixed by stirring.

**A.4.3** Each sample shall be individually tested for all the relevant requirements of this Standard.

## A.5 SAMPLING FROM RETAIL CONTAINERS/ BOTTLES

### A.5.1 *Scale of sampling*

The samples shall be selected and tested from each lot separately for ascertaining their conformity to the requirements of this Standard.

**A.5.2** The number of containers/ bottles to be selected from a lot shall be in accordance with Table **3**.

**TABLE 3 - Scale of sampling**

| **Number of containers/ bottles in the lot** (1) | **Number of containers/ bottles to be selected** (2) |
|---|---|
| up to 1 000 | 8 |
| 1 001 to 3 000 | 10 |
| 3 001 to 10 000 | 13 |
| 10 001 and above | 15 |

**A.5.3** In addition to the containers/ bottles drawn as in **A.5.2** another 12 containers/ bottles shall be drawn from each lot to determine the volume of the contents of the containers/ bottles.

**A.5.4** The containers/ bottles shall be selected at random, in order to ensure randomness of selection, random number tables as given in **SLS 428** shall be used.

**A.5.5** If a reference sample is required, the scale of sampling shall be correspondingly increased and one third of the sample retained by the purchaser, one third by the testing authority (or referee) for future reference and one third handed over to the supplier.

## A.6 NUMBER OF TESTS

**A.6.1** The volume of the contents of 12 containers/ bottles selected as in **A.5.3** shall be measured (this may be done at the place of sampling). The volume shall be measured at 27 ± 2 °C.

**A.6.2** All the containers/ bottles in the sample selected as in **A.5.2** shall be examined for packaging and marking and/ or labelling requirements.

**A.6.3** After examining as in **A.6.2** each container/ bottle shall be individually tested for the requirements given in Clauses **5.4**, **5.5**, **5.6**, **5.7**, **5.8**, **5.9** and the requirement given for Copper in Table **2**.

**A.6.4** After testing as in **A.6.3** an equal quantity of material shall be drawn from each container/ bottle and mixed together to form a composite sample. Test for metal contaminants other than copper shall be done on this composite sample.

## APPENDIX B
## DETERMINATION OF ETHYL ALCOHOL

### B.1 METHOD 1 - PYCNOMETER METHOD (REFERENCE METHOD)

### B.1.1 APPARATUS

**B.1.1.1** Distillation assemble as shown in Figure **1**. The delivery end of the condenser is attached to a glass tube with a bulb by means of a ground glass joint. The lower part of this tube should reach the bottom of the receiver and dip into the minimum quantity of distilled water.

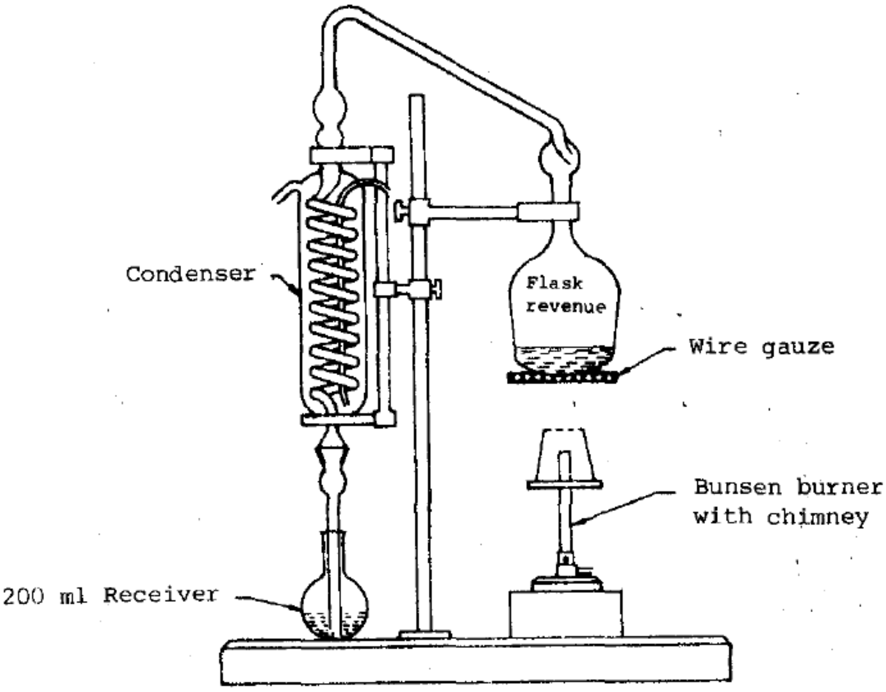

**FIGURE 1 - Distillation Assemble**

**B.1.1.2** *Pycnometer (specific gravity bottle*, 25-ml or 50-ml capacity

**B.1.1.3** *Thermometer* 0 °C to 50 °C

**B.1.1.4** *Standard volumetric flask*, 200-ml or 500-ml capacity

### B.1.2 PROCEDURE

**B.1.2.1** Take, 200 ml or 500 ml of sample in a 500-ml or 1-litre distillation flask respectively containing about 25 ml of distilled water and a few pieces of pumice stone. Complete the distillation in about 35 minutes and collect the distillate in a 200-ml or 500-ml standard volumetric flask till the volume in the flask near to the mark. Allow the distillate to come to room temperature and make up the volume to 200 ml or 500 ml with distilled water and mix thoroughly.

**B.1.2.2** Determine the specific gravity of the distillate at 25 ± 2 °C with the help of the pycnometer. Obtain percentage of alcohol by volume from Table **AOAC 913.02**.

## B.2 METHOD 2 - HYDROMETER METHOD (ROUTINE METHOD)

### B.2.1 PROCEDURE

**B.2.1.1** When several tests are carried out, rinse the interior of the glass cylinder, hydrometer, thermometer with the portion of the distillate to be tested after each test so that the previous liquid which has wetted the sides of the cylinder may not alter the density of the liquid under test.

**B.2.1.2** Pour the sample into a suitable glass cylinder until its level is about 50 mm below the rim of the latter. Immerse thermometer and hydrometer together in the liquid and stir until the mercury column becomes stationary. Then note down the temperature. If the surface of the mercury stands between any two readings of the scale, record the nearest reading above it as the temperature of the sample. Keeping the eye in level of the surface of the liquid note down the reading, that is cut by the surface of the liquid. If the surface of the liquid is between any two readings, the reading to the nearest division below the surface of the sample (see through the liquid) is taken as the reading.

Obtain percentage of alcohol by volume as described in the below reference.

Refer Practical Alcohol Tables, Volume II, 1978 published by the Commission of European Communities.

**B.2.1.3** The temperature shall be recorded to the nearest 0.5 °C above the surface of the mercury when it stands between any two consecutive divisions of the thermometer, and the hydrometer reading to the nearest division below the surface of the sample.

## B.3 METHOD 3 – DENSITY METER METHOD (ROUTINE METHOD)

### B.3.1 APPARATUS

**B.3.1.1** *Density meter* DMA 4100M

**B.3.1.2** *Waste vessel*

**B.3.1.3** *Sample vessel*

### B.3.2 PROCEDURE

**B.3.2.1** Assemble the apparatus.

**B.3.2.2** First, immerse the needle in the sample vessel with adequate amount of sample. Place the pump lever in the vertical position and pump the sample into the measuring cell. Avoid air bubbles at the suction process. At the end of the filling, take the constant value displayed on the screen as the percentage value of ethyl alcohol.

## APPENDIX C
## DETERMINATION OF TOTAL SOLIDS

### C.1 PROCEDURE

Evaporate 50 ml of the sample in a dried, tared dish on a water bath. Dry the dish in an oven at 103 ± 2 °C. Cool in a desiccator and weigh the dish. Repeat till constant mass is obtained. Calculate the total solids expressed as in grams per 100 litre of absolute alcohol.

### C.2 CALCULATION

Total solids, expressed as in grams per 100 1itre of absolute alcohol = $2 \times 10^3 \times m \times f$

where,

$m$ is the mass, in grams, of the residue; and
$f$ is 100/ per cent of Ethyl alcohol in the sample.

## APPENDIX D
## DETERMINATION OF TOTAL ACIDITY

### D.1 REAGENTS

**D.1.1** *Sodium hydroxide,* 0.1 mol/ 1

**D.1.2** *Phenolphthalein indicator,* l per cent (v/ v)

### D.2 PROCEDURE

Take, 50 ml of the sample and add about 100 ml of distilled water. Titrate against Sodium hydroxide solution **(D.1.1)** using Phenolphthalein **(D.l.2)** as indicator.

## D.3 CALCULATION

Calculation on the basis that 1 ml of 1 mol/ 1 Sodium hydroxide solution is equivalent to 0.06009 g of Acetic acid.

$$\left.\begin{array}{l}\text{Total acidity expressed as Acetic acid,}\\ \text{grams per 100 1iter of absolute alcohol}\end{array}\right\} = 120 \times v \times c \times f$$

where,

$v$ is the volume, in ml, of standard Sodium hydroxide used for titration;
$c$ is the concentration, in mol/ 1, of the Sodium hydroxide solution; and
$f$ is 100/ per cent of Ethyl alcohol in the sample.

# APPENDIX E
# DETERMINATION OF FIXED ACIDITY

## E.l REAGENTS

**E.1.1** *Sodium hydroxide*, 0.1 mol/ 1 (0.1 N)

**E.1.2** *Phenolphthalein indicator*, 1 per cent (V/ V)

**E.1.3** *Rectified spirit*, neutralized with 0.1 mol/ 1 sodium hydroxide solution

## E.2 PROCEDURE

To the residue obtained in **C.l**, add 50 ml of water and titrate against 0.1 mol/ 1 Sodium hydroxide solution (**E.1.1**) using Phenolphthalein **(E.l.2**) as indicator.

## E.3 CALCULATION

Calculation on the basis that 1 ml of 1 mol/ Sodium hydroxide solution equivalent to 0.06009 g of Acetic acid.

Fixed acidity expressed as Acetic acid, grams per 100 1 of absolute alcohol = $120 \times v \times c \times f$

where,
$v$ is the volume, in ml, of standard Sodium hydroxide for titration;
$c$ is the concentration, in mol/ 1, of the Sodium hydroxide solution; and
$f$ is 100/ per cent of Ethyl alcohol in the sample.

# APPENDIX F
# DETERMINATION OF ESTERS AS ETHYL ACETATE

## F.l REAGENTS

**F.1.1** *Sodium hydroxide*, 0.1 mol/ 1

**F.1.2** *Sulphuric acid*, 0.05 mol/ 1

## F.2 PROCEDURE

**F.2.1** Take 50 ml of distillate from (**B.1.2.1)** add few drops of Phenolphthalein and neutralize with Sodium hydroxide **(F.1.1).** Add 25 ml of 0.1 mol/ 1 Sodium hydroxide **(F.1.1)** and reflux for 2 h. Cool and back titrate with Sulfuric acid **(F.l.2).** One milliliter of 1 mol/1 Sodium hydroxide is equivalent to 0.088 g of Ethyl acetate.

**F.2.2** Simultaneously run a blank taking 50 ml of water in place of the distillate of the sample in the same way. The difference in titration value of the blank and the test sample in milliliters of standard acid solution gives the equivalent ester.

## F.3 CALCULATION

$$\left.\begin{array}{l}\text{Esters expressed as ethyl acetate grams}\\ \text{per 100 litres of absolute alcohol}\end{array}\right\} = 176 \times v \times c \times f$$

where,

$v$ is the difference, in ml, of Standard acid used for blank and test ;
$c$ is the concentration, in mol/ 1, of the Sodium hydroxide solution; and
$f$ is 100/ per cent of Ethyl alcohol in the sample.

# APPENDIX G
# DETERMINATION OF HIGHER ALCOHOL AS AMYL ALCOHOL
## EXTRACTION/ TITRIMETRIC METHOD

## G.1 APPARATUS

Assemble the apparatus as in Figure **2**.

**G.1.1** *Separatory funnel*, 250-ml

**G.1.2** *Volumetric flask*, 1-L

**G.1.3** *Distillation assembly having Kjeldhal flask*, 800-ml

**G.1.4** *With splash head, Liebig condenser, Receiver of capacity* 250-ml

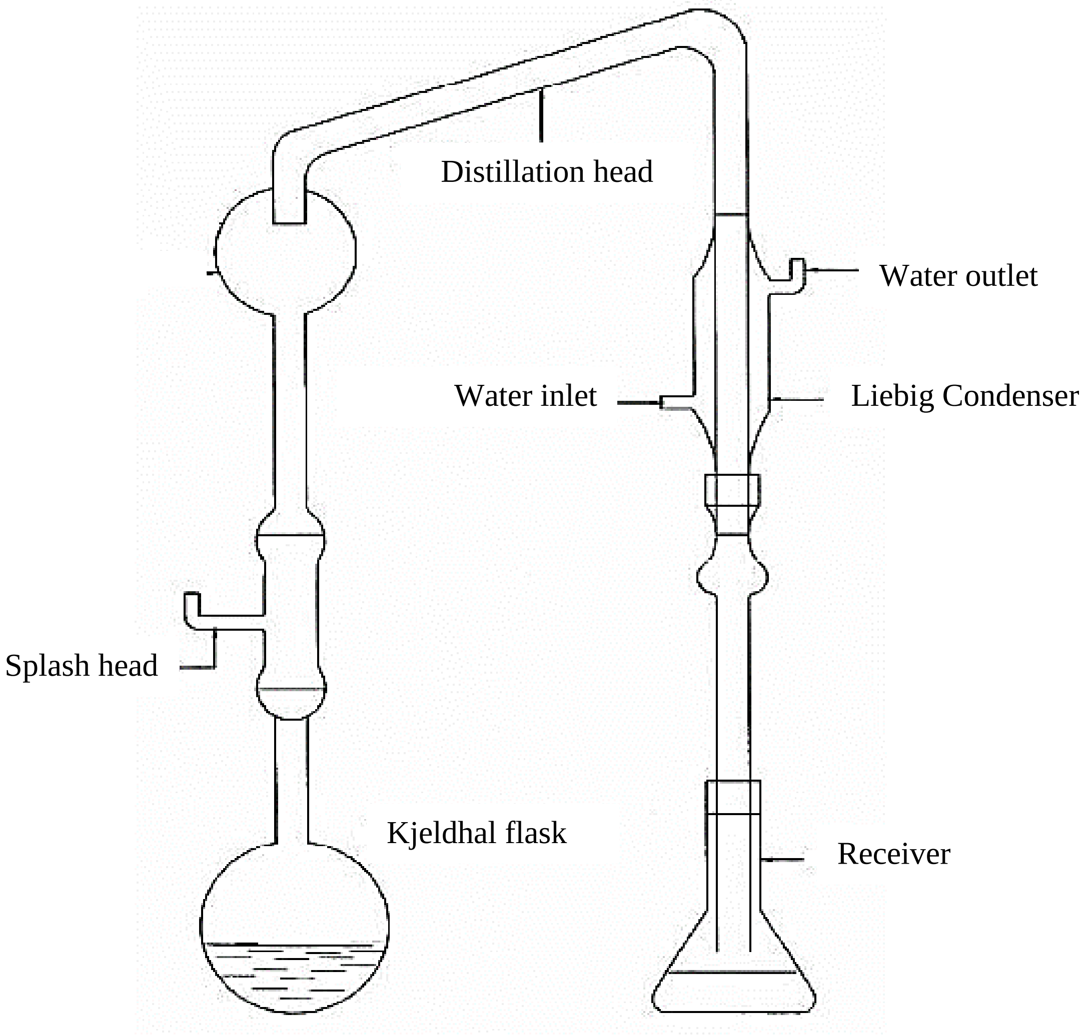

**FIGURE 2 – Extraction apparatus**

## G.2 REAGENTS

**G.2.1** *Sulphuric acid GR grade*

**G.2.2** *Oxidizing mixture:* Dissolve 100 g of Potassium dichromate in 500 ml of distilled water, add 100 ml of Sulphuric acid and make up to 1 L volume with distilled water

**G.2.3** *Standard Sodium hydroxide,* 0.1 N

**G.2.4** *Carbon tetrachloride GR grade, distilled*

**G.2.5** *Sodium chloride GR grade*

**G.2.6** *Sodium sulphate AR grade*

**G.2.7** *Phenolphthalein indicator*

**NOTE**

1 *ml of* 0.1 *N Sodium hydroxide is equivalent to* 0.0088 *g of Amyl alcohol.*

## G.3 PROCEDURE

Transfer the solution obtained from the determination of esters (**F.2.1**) into a separatory funnel and add 50 ml of distilled water. Saturate it with Sodium chloride and extract four times with successive portions of 40, 30, 20 and 10 ml of Carbon tetrachloride. Pool all the extracts and wash three times with saturated Sodium chloride solution and twice with saturated Sodium sulphate solution. Filter the extract and add 50 ml of oxidizing mixture. Reflux for 2 hours, cool and wash the reflux with 50 ml of distilled water. Transfer it to the distillation assembly using 50 ml of distilled water. Distil about 100 ml and see that no charring takes place. Titrate the distillate against standard Sodium hydroxide using Phenolphthalein indicator.

Run a blank in the same way taking 50 ml of distilled water in place of the distillate of the liquor.

## G.4 CALCULATION

$$\left.\begin{array}{l}\text{Higher alcohol as Amyl alcohol, in g}\\ \text{per 100 litres of absolute alcohol}\end{array}\right\} = 176 \times v \times c \times f$$

where,

$v$ is the difference, in ml, of Standard acid used for blank and test ;
$c$ is the concentration, in mol/ 1, of the Sodium hydroxide solution; and
$f$ is 100/ per cent of Ethyl alcohol in the sample.

# APPENDIX H
# DETERMINATION OF ALDEHYDES AS ACETALDEHYDE

## H.1 APPARATUS

**H.1.1** *Iodine flask,* 500-ml capacity

## H.2 REAGENTS

**H.2.1** *Solution A,* Iodine solution 0.05 mol/ 1 (0.1 N)

**H.2.2** *Solution B*

Dissolve, 17 g of Sodium metabisulfite ($Na_2S_2O_5$) or 15 g Potassium metabisulfite ($K_2S_2O_5$) in distilled water and make up to a litre. The solution must be 0.3 mol/ l when used.

**H.2.3** *Solution C* (Neutral buffer)

Dissolve, 24 g of Disodium hydrogen phosphate ($Na_2PO_412H_2O$) in 25 ml of 0.5 mol/ 1 Sulphuric acid and dilute to a litre with distilled water.

**H.2.4** *Solution D*

Dilute, 250 ml Hydrochloric acid (relative density 1.18) with distilled water and make up to a litre.

**H.2.5** *Solution E*

Dissolve, 17.5 g of Boric acid in 800 ml of normal soda solution and make up to 2 litre with distilled water.

**H.2.6** *Solution F*, starch solution, 1 per cent

## H.3 PROCEDURE

Carry out the test within 24 hours of distillation.

Transfer 50 ml of solution C (neutral buffer) (**H.2.3**) into 500-ml flask **(H.1.1)** with a measuring cylinder and add 10 ml of solution B **(H.2.2).**

Pipette 25 ml of distillate from **B.1.2.1** and transfer it into the mixture, stopper the flask, shake and leave for 20 minutes.

Add 1 ml of solution F **(H.2.6)**, about 100 ml of distilled water and 10 ml of solution D (**H.2.4**) using a measuring cylinder.

Add solution A **(H.2.1)** with a burette until a blue colour appears.

Add about 100 ml of the solution E **(H.2.5)** until the blue colour disappears (until the solution gets slightly alkaline). Titrate with solution A **(H.2.1)** to the same blue colour appears as before. Note the volume of iodine used in the last stage of titration. The final solution should be alkaline to phenolphthalein. If it is not, determination has to be repeated. Carry out a blank with 25 ml of distilled water. The volume of iodine corresponds to the amount of aldehyde present.

One millilitre of solution A is equivalent to 2.2 mg of Acetaldehyde.

**NOTE**

*Second burette used should be calibrated to* 0. 01 *ml.*

## H.4 CACULATION

Aldehydes expressed as acetaldehyde in grams per 100 1 of, absolute alcohol = $88 \times v \times c \times f$

where,
$v$ is the volume, in ml, of solution A used at the last stage;
$f$ is 100/ per cent of ethyl alcohol in the sample; and
$c$ is the molarity of Iodine solution.

# APPENDIX J
# DETERMINATION OF FURFURAL

## J.1 REAGENTS

**J.1.1** *Aniline,* distilled and colourless

**J.1.2** *Hydrochloric acid,* concentrated, (relative density 1.18)

**J.1.3** *Furfural-free alcohol*

Dissolve 5 g of m-phenylene diamine hydrochloride in 1 litre of ethyl alcohol. Allow to stand at least 24 hours with frequent shaking (previous treatment with potassium hydroxide is not necessary). Reflux for at least 8 hours and shake if necessary. Allow to stand an overnight and distill. Collect the distillate rejecting first 100 ml and last 200 ml.

**NOTE**
*If this distillate forms a colouration with aniline hydrochloride, repeat the treatment, Report the treatment.*

**J.1.4** *Furfural Stock solution*

Dissolve 1 g of colourless furfural in 100 ml of furfural free alcohol **(J.l.3)** 50 per cent (V/V).

**J.1.4.1** *Furfural working solution*

Pipette 1 ml of (**J.l.4**) and dilute to 100 ml with furfural free alcohol.
One millilitre of this solution contents 0.0001 g of furfural.

## J.2 PROCEDURE

Pipette 10 ml of the sample and dilute to 50 ml with Furfural-free alcohol **(J.l.3)** in a Nessler tube. Take 0 ml, 0.1 ml, 0.2 ml, 0.3 ml up to 0.4 ml of the furfural working solution **(J.l.4)** into Nessler tubes and dilute to 50 ml with Furfural free alcohol. To each of the Nessler. tube add 2 ml of aniline (**J.1.1**) and 0.5 ml of Hydrochloric acid **(J.1.2)** and shake well, till a reddish brown colour develops.

Compare the colour of sample solution with the standard solutions after 15 minutes, select the standard solution which matches the sample solution.

## J.3 CALCULATION

$$\text{Furfural, in grams per 100 litres of absolute alcohol} = v \times f$$

where,

$v$ is the volume, in ml of the standard Furfural solution which matches the sample; and
$f$ is 100/ per cent of ethyl alcohol in the sample.

------------------------------

# SLS CERTIFICATION MARK

The Sri Lanka Standards Institution is the owner of the registered certification mark shown below. Beneath the mark, the number of the Sri Lanka Standard relevant to the product is indicated. This mark may be used only by those who have obtained permits under the SLS certification marks scheme. The presence of this mark on or in relation to a product conveys the assurance that they have been produced to comply with the requirements of the relevant Sri Lanka Standard under a well designed system of quality control inspection and testing operated by the manufacturer and supervised by the SLSI which includes surveillance inspection of the factory, testing of both factory and market samples.

Further particulars of the terms and conditions of the permit may be obtained from the Sri Lanka Standards Institution, 17, Victoria Place, Elvitigala Mawatha, Colombo 08.

Printed at SLSI (Printing Unit)

# SRI LANKA STANDARDS INSTITUTION

The Sri Lanka Standards Institution (SLSI) is the National Standards Organization of Sri Lanka established under the Sri Lanka Standards Institution Act No. 6 of 1984 which repealed and replaced the Bureau of Ceylon Standards Act No. 38 of 1964. The Institution functions under the Ministry of Science & Technology.

The principal objects of the Institution as set out in the Act are to prepare standards and promote their adoption, to provide facilities for examination and testing of products, to operate a Certification Marks Scheme, to certify the quality of products meant for local consumption or exports and to promote standardization and quality control by educational, consultancy and research activity.

The Institution is financed by Government grants, and by the income from the sale of its publications and other services offered for Industry and Business Sector. Financial and administrative control is vested in a Council appointed in accordance with the provisions of the Act.

The development and formulation of National Standards is carried out by Technical Experts and representatives of other interest groups, assisted by the permanent officers of the Institution. These Technical Committees are appointed under the purview of the Sectoral Committees which in turn are appointed by the Council. The Sectoral Committees give the final Technical approval for the Draft National Standards prior to the approval by the Council of the SLSI.

All members of the Technical and Sectoral Committees render their services in an honorary capacity. In this process the Institution endeavours to ensure adequate representation of all view points.

In the International field the Institution represents Sri Lanka in the International Organization for Standardization (ISO), and participates in such fields of standardization as are of special interest to Sri Lanka.

---

Printed at the Sri Lanka Standards Institution, 17, Victoria Place, Elvitigala Mawatha,
Colombo 08.