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METHODS OF TEST FOR
MEAT AND MEAT PRODUCTS, DETERMINATION OF CHLORIDE CONTENT (FIRST REVISION)

SRI LANKA STANDARDS INSTITUTION

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DETERMINATION OF CHLORIDE CONTENT
(FIRST REVISION)

SLS 330:1987

Gr. 5

SRI LANKA STANDARDS INSTITUTION
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This standard does not purport to include all the necessary provisions of a contract.

SRI LANKA STANDARD

METHODS OF TEST FOR MEAT AND MEAT PRODUCTS DETERMINATION OF CHLORIDE CONTENT (FIRST REVISION)

FOREWORD

This Sri Lanka Standard was authorized for adoption and publication by the Council of the Sri Lanka Standards Institution on 1987-01-07, after the draft, finalized by the Drafting Committee on Meat and Meat Products, had been approved by the Agricultural and Food Products Divisional Committee.

This standard is one of a series of standards on testing on meat and meat products. A complete list of standards may be obtained from the Sri Lanka Standards Institution.

This revision prescribes two methods for the determination of chlorides. The method given in the original standard has been retained as method 1 and is recommended for use as the reference method. Method 2 describes a quicker procedure for use in routine determinations.

In reporting the result of a test or analysis made in accordance with this standard, if the final value, observed or calculated is to be rounded off, it shall be done in accordance with CS 102.

In the preparation of this standard, the assistance derived from the publication of the International Organization for Standardization and Pearson's Chemical Analysis of Food (8th edition) is gratefully acknowledged.

1 SCOPE

This Standard prescribes methods of test for the determination of the chloride content of meat and meat products.

2 METHOD 1 (REFERENCE METHOD)

2.1 Principle

Extraction of the test portion with hot water and precipitation of the protein.

After filtration and acidification, addition of an excess of silver nitrate solution to the extract, and titration with potassium thiocyanate solution.

2.2 Reagents

All reagents shall be of analytical reagent quality. Water used shall be distilled water or water of at least equivalent purity.

2.2.1 *Nitrobenzene*

2.2.2 *Nitric acid* - approximately 4 mol/l

Mix 1 volume of concentrated nitric acid (density at 20 °C = 1.39 g/ml to 1.42 g/ml) with 3 volumes of water.

2.2.3 *Solutions used for precipitation of proteins*

2.2.3.1 Reagent 1 - Dissolve 106 g of potassium ferrocyanide ($K_4Fe(CN)_6.3H_2O$) in water and dilute to 1 litre.

2.2.3.2 Reagent 2 - Dissolve 220 g of zinc acetate ($Zn(CH_3COO)_2.2H_2O$) and 30 ml of glacial acetic acid in water and dilute to 1 litre.

2.2.4 *Silver nitrate*, 0.1 mol/l standard volumetric solution. Dry silver nitrate ($AgNO_3$) for 2 hours at 150 °C and allow to cool in a desiccator. Dissolve 16.989 g of the dried salt in water and dilute to 1 litre.

2.2.5 *Potassium thiocyanate*, 0.1 mol/l standard volumetric solution. Dissolve about 9.7 g of potassium thiocyanate (KSCN) in water and dilute to 1 litre. Standardize the solution to the nearest 0.0001 mol/l against silver nitrate, using the solution specified in Clause **2.2.4** and the indicator solution specified in Clause **2.2.7**.

2.2.6 *Sodium hydroxide solution*, 1 mol/l

2.2.7 *Ferric ammonium sulfate*, $(NH_4)_2SO_4.Fe_2(SO_4)_3.24H_2O$, saturated solution in water.

2.2.8 *Activated charcoal*

2.3 Apparatus

Usual laboratory apparatus not otherwise specified, and the following items:

2.3.1 *Mechanical meat mincer*, laboratory size, fitted with a plate having holes of diameter not exceeding 4 mm.

2.3.2 *One-mark volumetric flasks*, 200-ml

2.3.3 *Conical flasks*, about 250-ml

2.3.4 *Burette*, 25 ml or 50-ml

2.3.5 *Two one-mark pipettes*, 20-ml

2.3.6 *pH meter*

2.4 Sample

2.4.1 Use a representative sample of at least 200 g.

2.4.2 Store the sample in such a way that deterioration and change in composition are prevented.

2.5 Procedure

2.5.1 *Preparation of the sample*

Render the sample uniform by passing it at least twice through the meat mincer (**2.3.1**) and mixing. Keep it in a completely filled, air-tight container in such a way that deterioration and change in composition are prevented. Analyse the sample as soon as possible, but always within 24 hours.

2.5.2 *Test portion*

Weigh to the nearest mg, about 10 g of the prepared sample and transfer it quantitatively to a conical flask **(2.3.3)**.

2.5.3 *Deproteination*

Add successively 0.5 g of activated charcoal **(2.2.8)**and 100 ml of hot water to the test portion in the flask. Heat the flask with contents for 15 minutes in a boiling water bath. Shake the contents of the flask repeatedly. Allow the flask with contents to cool to room temperature, then add successively 2 ml of Reagent I **(2.2.3.1)** and 2 ml of Reagent II **(2.2.3.2)**. Mix thoroughly after each addition. By means of the sodium hydroxide solution **(2.2.6)** adjust the pH to between 7.5 and 8.3, using the pH meter **(2.3.6)**. Allow the flask to stand for 30 minutes at room temperature, transfer the contents quantitatively to the volumetric flask **(2.3.2)** and dilute to the mark with water. Mix the contents thoroughly and filter through a fluted filter paper.

NOTE - The filtrate may also be used for the determination of the nitrate and nitrite content. If ascorbic acid is present in quantities below 0.1 per cent in the sample, or if the extract is to be used only for the chloride determination, the activated charcoal can be omitted in preparing the extract. Furthermore, the pH adjustment is not necessary if only chloride determination is to be performed.

2.5.4 *Determination*

Transfer 20 ml of the filtrate to a conical flask (2.3.3) by means of a pipette (2.3.5) and add 5 ml of the nitric acid solution (2.2.2) and 1 ml of the indicator solution (2.2.7) by means of a measuring cylinder.

Transfer 20 ml of the silver nitrate solution (2.2.4) to the conical flask by means of a pipette. Add 3 ml of nitrobenzene (2.2.1) by means of a measuring cylinder and mix thoroughly. Shake vigorously to coagulate the precipitate. Titrate the contents of the conical flask with the potassium thiocyanate solution (2.2.5). Record to the nearest 0.02 ml the volume of the potassium thiocyanate solution required.

Carry out two determinations on the same prepared sample.

2.6 Expression of results

2.6.1 *Method of calculation and formula*

The chloride content of the sample, expressed as sodium chloride (NaCl),

$$\text{per cent by mass} = 0.005844\ (20-v) \times \frac{200}{20} \times \frac{100}{m} = 5.844\ \left(\frac{20 - v}{m}\right)$$

where,

v - the volume, in millilitres, of 0.1 mol/l potassium thiocyanate solution required ; and

m - the mass, in grams, of the test portion.

NOTE - If the standard volumetric solution of potassium thiocyanate solution is not exactly 0.1000 mol/l, a suitable correction factor should be used to correct the value of v in calculating the result.

Take as the result the arithmetic mean of the two determinations, if the requirements of Clause 2.6.2 *is satisfied.*

Report the result rounded to the nearest 0.05 g per 100 g of sample.

2.6.2 *Repeatability*

The difference between the results of two determinations carried out simultaneously or in rapid succession by the same analyst should not be greater than 0.2 g of sodium chloride per 100 g of sample.

2.7 Test report

The test report should show the method used and the result obtained. It should also mention any operating conditions not specified in this standard, or regarded as optional as well as any circumstances that may have influenced the result.

The report should include all details required for complete identification of the sample.

3 METHOD 2 (ROUTINE METHOD)

3.1 Principle

The sample is ashed and dissolved in nitric acid. The solution is diluted and chlorides are precipitated with the addition of silver nitrate in excess. The excess silver nitrate is titrated with potassium thiocyanate solution.

3.2 Reagents

3.2.1 *Nitrobenzene*

3.2.2 *Magnesium acetate*

3.2.3 *Nitric acid*, 4 mol/l (see 2.2.2)

3.2.4 *Silver nitrate solution*, 0.1 mol/l, (see 2.2.4)

3.2.5 *Potassium thiocyanate*, 0.1 mol/l (see 2.2.5)

3.2.6 *Ferric ammonium sulfate*, (see 2.2.7)

3.3 Preparation of sample, prepare the sample as given in 2.5.1.

3.4 Procedure

Mix 5 g of the test portion prepared as in **2.5.1** and weighed to the nearest milligram, with 1 ml of magnesium acetate in a dish of approximately 60 mm in diameter and 25 mm deep. Heat the dish on a steam bath for 30 minutes and incinerate for 1 hour in a muffle furnace controlled at 500 °C to 550 °C, till a white ash is obtained. Dissolve the ash in 10 ml of nitric acid (3.2.3) add 10 ml water and 25.0 ml of silver nitrate solution (3.2.4) by means of a pipette. Boil gently with a small funnel placed in the neck of the flask for about 10 minutes until the solution is pale yellow. Cool, add 50 ml of water 5 ml of saturated ammonium ferric sulfate solution (3.2.6) and a few drops of nitrobenzene (3.2.1). Shake the flask to coat the precipitated silver chloride with nitrobenzene and titrate the excess silver nitrate with potassium thiocyanate solution (3.2.5), until a permanent reddish colour persists for 15 seconds. 0.5 g of urea may be added to the hot solution to remove yellow nitrous fumes. Carry out a blank determination on the reagents alone.

4 CALCULATION

Chloride content of the sample expressed as sodium chloride (NaCl)

$$\text{per cent by mass} = \frac{5.85 \times (c_1 V_1 - c_2 V_2)}{m} \times 100$$

where,

V_1 = volume, in ml, of potassium thiocyanate solution;

c_1 = concentration, in mol/l, of the potassium thiocyanate solution;

V_2 = volume, in ml, of silver nitrate solution;

c_2 = concentration, in mol/l, of the silver nitrate solution; and

m = mass, in g, of the test portion.

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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.*

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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.