
Butter — Determination of salt content

Beurre — Détermination de la teneur en sel

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Foreword

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This second edition cancels and replaces the first edition (ISO 1738:1980), which has been technically revised.

Annex A of this International Standard is for information only.

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Butter — Determination of salt content

1 Scope

This International Standard specifies a method for the determination of the salt content of butter. The method is applicable to all types of butter containing more than 0,1% (m/m) of salt.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreement based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 385-1:1984, *Laboratory glassware — Burettes — Part 1: General requirements*.

ISO 648:1977, *Laboratory glassware — One-mark pipettes*.

ISO 4788:1980, *Laboratory glassware — Graduated measuring cylinders*.

3 Definition

For the purposes of this International Standard, the following definition applies.

3.1

salt content

mass fraction of substances, determined by the method specified in this International Standard

NOTE — It is expressed as the equivalent content of sodium chloride as a percentage by mass.

4 Principle

Melting of a test portion of butter by adding boiling water. Titration of the dissolved chlorides in the mixture with a solution of silver nitrate, using potassium chromate as indicator (the Mohr procedure).

5 Reagents

Use only reagents of recognized analytical grade, unless otherwise specified, and distilled or demineralized water or water of equivalent purity, free from chlorides.

5.1 Silver nitrate standard volumetric solution (AgNO_3), of known concentration in the range 0,08 mol/l to 0,10 mol/l.

Dissolve an amount of between 13,6 g to 20,4 g of silver nitrate in water which is practically free from carbon dioxide in a 1000 ml volumetric flask and dilute to the mark with water. Calibrate the silver nitrate solution against 100 ml of a solution containing 0,400 g/l of sodium chloride (NaCl), which has previously been dried at 300 °C, following the procedure specified in 9.2.2 and 9.3. Express the concentration of the silver nitrate solution in moles per litre to four decimals. Store the solution away from direct sunlight.

NOTE — If a solution containing 14,53 g/l (0,0855 mol/l) of silver nitrate is used, 1 ml of this solution is equivalent to 5 mg of sodium chloride, thus making the calculation of the salt content of the butter easier.

5.2 Potassium chromate indicator solution

Dissolve 50 g of potassium chromate (K_2CrO_4) in 1 000 ml of water.

WARNING — Hexavalent chromium is a carcinogenic agent.

6 Apparatus

Usual laboratory apparatus and, in particular, the following.

- 6.1 **Analytical balance**, capable of being read to the nearest 0,001 g.
- 6.2 **Titration vessel**, of glass, for example, a conical flask or beaker of capacity 250 ml.
- 6.3 **Graduated measuring cylinder**, of capacity 100 ml, complying with ISO 4788.
- 6.4 **Pipette**, capable of delivering 2,0 ml, complying with ISO 648.
- 6.5 **Burette**, of capacity 50 ml, complying with ISO 385, Class B.
- 6.6 **Greaseproof paper or plastic film**, chloride free or of sufficiently low chloride content as to not affect the results; the use of filter paper is not recommended.

7 Sampling

Sampling is not part of the method specified in this International Standard. A recommended sampling method is given in ISO 707.

It is important that the laboratory receive a sample which is truly representative and has not been damaged or changed during transport or storage. Store the sample in such a way that deterioration and change in composition are prevented.

8 Preparation of test sample

Take a representative sample of butter to be tested.

If the test sample is visibly not homogeneous, or if the history of the test sample (age, storage conditions) is such that inhomogeneity is to be expected, mix the test sample as follows. Warm the test sample in the original unopened container, which should be from one-half to two-thirds full, to a temperature that preferably should not exceed 30 °C. At this temperature the sample will be soft enough to facilitate thorough mixing to a homogeneous state (either by a mechanical shaker or by hand).

Cool the sample to ambient temperature, continuing to mix until cooling is complete. Immediately after cooling open the sample container and stir briefly with a suitable device, for example a spoon or spatula, for no longer than 10 s before weighing.

9 Procedure

NOTE — If it is required to check whether the repeatability limit (11.1) is met, carry out two single determinations in accordance with 9.1 and 9.2.

9.1 Test portion

Weigh a test portion of between 4,5 g to 5,5 g to the nearest 0,05 g, either directly into the titration vessel (6.2) or on a piece of greaseproof paper or plastic film (6.6) which is transferred with the test sample to the titration vessel. Add 100 ml of boiling water or 100 ml of cold water and heat to boiling. Mix the contents of the vessel.

9.2 Determination

9.2.1 The titration may be carried out on the hot solution or after cooling. It is essential, however, that each laboratory should standardize its own procedure for the determination by always bringing the contents of the titration vessel to approximately the same temperature before titration.

NOTE — The titration should preferably be carried out at a temperature of about 50 °C. This temperature may (partially) prevent coagulation of the butterfat which influences the orange tint.

9.2.2 Cool, while mixing, the contents of the titration vessel to the laboratory standardized temperature. Add 2,0 ml of the potassium chromate indicator (5.2).

Titrate the solution with the silver nitrate solution (5.1), with stirring, until an orange tint is obtained which persists for 30 s. Record the volume, in millilitres, of silver nitrate used.

9.3 Blank test

Carry out a blank test using all reagents but omitting the test portion.

10 Calculation and expression of results

10.1 Calculation

10.1.1 Calculate the salt content of butter, w , expressed as a percentage by mass, using the following equation:

$$w = \frac{5,844 c_s (V_s - V_0)}{m} \%$$

where

V_s is the numerical value of the volume, in millilitres, of silver nitrate solution used in the titration of the test portion (9.2.2);

V_0 is the numerical value of the volume, in millilitres, of silver nitrate solution used in the titration of the blank test (9.3);

c_s is the numerical value of the concentration of the silver nitrate solution, in moles per litre;

m is the numerical value of the mass, in grams, of the test portion;

5,844 is the mass of NaCl equivalent to 1 ml of standard volumetric solution, $c(\text{AgNO}_3) = 1 \text{ mol/l}$, divided by factor 10 [obtained by dividing 100 (%) by 1000 (ml)].

10.1.2 If a solution containing 14,53 g/l of silver nitrate is used and 5 g of the test portion is weighed to the nearest 0,01 g, the calculation of w , the salt content of butter, may be simplified using the following equation:

$$w = \frac{V_s - V_0}{10} \%$$

where V_s is the numerical value of the volume, in millilitres, of a silver nitrate solution containing 14,53 g/l of silver nitrate.

10.2 Expression of results

Round the result to the nearest 0,01 % (m/m).

11 Precision

Details of an interlaboratory test on the precision of the method are summarized in reference [5]. The study was carried out in accordance with ISO 5725 [2]. The values derived from this interlaboratory test may not be applicable to concentration ranges and matrices other than those given.

11.1 Repeatability

The absolute difference between two independent single test results, obtained using the same method on identical test material in the same laboratory by the same operator using the same equipment within a short interval of time, will in not more than 5 % of cases be greater than 0,03 % (m/m).

11.2 Reproducibility

The absolute difference between two single test results, obtained using the same method on identical test material in different laboratories with different operators using different equipment, will in not more than 5 % of cases be greater than 0,05 % (m/m).

12 Test report

The test report shall specify:

- all information necessary for the complete identification of the sample;
- the sampling method used, if known;
- the test method used, with reference to this International Standard;
- all operating details not specified in this International Standard, or regarded as optional, together with details of any incidents that may have influenced the test result(s);
- the test results obtained;
- if the repeatability has been checked, the final quoted result obtained.