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**Cheese and processed cheese  
products — Determination of chloride  
content — Potentiometric titration  
method**

*Fromages et fromages fondus — Détermination de la teneur en  
chlorures — Méthode par titrage potentiométrique*



Reference numbers  
ISO 5943:2006(E)  
IDF 88:2006(E)

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Published in Switzerland

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## Foreword

**ISO (the International Organization for Standardization)** is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 5943|IDF 88 was prepared by Technical Committee ISO/TC 34, *Food products*, Subcommittee SC 5, *Milk and milk products*, and the International Dairy Federation (IDF). It is being published jointly by ISO and IDF.

This edition of ISO 5943|IDF 88 cancels and replaces ISO 5943|IDF 88:2004, of which it constitutes a minor revision. There was an error in the calculation given in 9.1. A factor of 1 000 has been added and molar mass is now used.

## Foreword

**IDF (the International Dairy Federation)** is a worldwide federation of the dairy sector with a National Committee in every member country. Every National Committee has the right to be represented on the IDF Standing Committees carrying out the technical work. IDF collaborates with ISO in the development of standard methods of analysis and sampling for milk and milk products.

Draft International Standards adopted by the Action Teams and Standing Committees are circulated to the National Committees for voting. Publication as an International Standard requires approval by at least 50 % of the IDF National Committees casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. IDF shall not be held responsible for identifying any or all such patent rights.

ISO 5943|IDF 88 was prepared by the International Dairy Federation (IDF) and Technical Committee ISO/TC 34, *Food products*, Subcommittee SC 5, *Milk and milk products*. It is being published jointly by IDF and ISO.

All work was carried out by the former Joint ISO/IDF/AOAC Group of Experts, *Nitrate, nitrite and phosphorus in cheese*, under the aegis of its chairman, Mr G. Bråthen (NO).

This edition of ISO 5943|IDF 88 cancels and replaces ISO 5943|IDF 88:2004, of which it constitutes a minor revision. There was an error in the calculation given in 9.1. A factor of 1 000 has been added and molar mass is now used.



# Cheese and processed cheese products — Determination of chloride content — Potentiometric titration method

## 1 Scope

This International Standard specifies a potentiometric titration method for the determination of the chloride content of cheese and processed cheese products.

The method is applicable to all cheeses and processed cheese products containing more than 0,2 % (mass fraction) of chloride ion.

## 2 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

### 2.1

#### **chloride content of cheese and processed cheese products**

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

NOTE It is expressed as a mass fraction, in percent, of chloride ion or sodium chloride or any other chloride.

## 3 Principle

A test portion is suspended in water. The suspension is acidified with nitric acid then the chloride ions are titrated potentiometrically with a silver nitrate standard solution.

## 4 Reagents

Use only reagents of recognized analytical grade, unless otherwise specified, and distilled or demineralized water or water of at least equivalent purity.

### 4.1 Silver nitrate standard solution, $c(\text{AgNO}_3) = 0,08 \text{ mol/l}$ to $0,12 \text{ mol/l}$ .

Dissolve 13,6 g to 20,4 g of silver nitrate in water which is practically free from carbon dioxide and dilute to 1 000 ml. Standardize the solution against sodium chloride (NaCl), which has previously been dried at 300 °C, expressing the concentration of the silver nitrate standard solution to four decimal places.

Store the solution away from direct light.

### 4.2 Nitric acid, $c(\text{HNO}_3) \approx 4 \text{ mol/l}$ .

## 5 Apparatus

- 5.1 **Device for grinding or grating cheese**, capable of being cleaned easily.
- 5.2 **Analytical balance**, capable of weighing to the nearest 1 mg, with a readability of 0,1 mg.
- 5.3 **Blender**.
- 5.4 **Potentiometer**, provided with a measuring electrode suitable for the determination of chloride (e.g. a silver electrode) and a reference electrode [e.g. a mercury(I) sulfate electrode].
- 5.5 **Vessel**, suitable for blending and titrating.
- 5.6 **Graduated cylinders**, of capacity 10 ml and 50 ml.
- 5.7 **Burette**, graduated in divisions of 0,1 ml, of capacity 50 ml, or an **automatic plunger burette**, readable to the nearest 0,01 ml. The burette, or automatic plunger burette, should preferably be made of brown glass.
- 5.8 **Stirrer**.

## 6 Sampling

A representative sample should have been sent to the laboratory. It should not have been damaged or changed during transport or storage.

Sampling is not part of the method specified in this International Standard. A recommended sampling method is given in ISO 707 | IDF 50<sup>[1]</sup>.

## 7 Preparation of test sample

Prior to analysis, remove the rind or smear or mouldy surface layer of the cheese, in such a way as to provide a sample representative of the cheese as it is usually consumed. Grind or grate the sample by means of an appropriate device (5.1). Mix the ground or grated mass quickly, and if possible grind or grate a second time and again mix thoroughly. If the sample cannot be ground or grated, mix it thoroughly by intensive stirring and kneading.

Transfer the test sample to an airtight container to await analysis, which should be carried out as soon as possible after grinding. If delay is unavoidable, take all precautions to ensure proper preservation of the sample and to prevent condensation of moisture on the inside surface of the container. The storage temperature should be 10 °C to 12 °C.

Clean the device after grinding or grating each sample.

## 8 Procedure

### 8.1 Test portion

Weigh, to the nearest 0,001 g, 2 g to 5 g of the test sample (Clause 7) into the vessel (5.5).



## 8.2 Determination

**8.2.1** Add 30 ml of water at about 55 °C. Suspend the test portion using the blender (5.3). Rinse the blender with approximately 10 ml of water, collecting the rinsings in the vessel.

**8.2.2** Add 2 ml to 3 ml of the nitric acid (4.2). Put the measuring electrode and the reference electrode into the suspension.

Titrate the contents of the vessel with the silver nitrate standard solution (4.1) using the burette (5.7), stirring continuously, until the endpoint has nearly been reached. Then titrate cautiously until reaching the endpoint, which corresponds to the maximum potential difference observed between two successive equal additions (of about 0,05 ml) of the silver nitrate standard solution.

## 8.3 Blank test

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

## 9 Calculation and expression of results

### 9.1 Calculation

Calculate the chloride content,  $w_{\text{Cl}}$ , as a mass fraction in percent, by means of the equation:

$$w_{\text{Cl}} = \frac{(V_1 - V_0) \times \frac{c}{1000} \times M}{m} \times 100 \%$$

where

$V_0$  is the volume, in millilitres, of the silver nitrate standard solution used in the blank test (8.3);

$V_1$  is the volume, in millilitres, of the silver nitrate standard solution used in the determination (8.2.2);

$c$  is the actual concentration, expressed in moles per litre ( $\approx 1\,000$  ml), of the silver nitrate standard solution (4.1);

$m$  is the mass, in grams, of the test portion (8.1);

$M$  is the molar mass used for expressing the result as a mass fraction in percent of the chloride concerned, for example,

$M = 35,5$  for expression as %  $\text{Cl}^-$ ,

$M = 58,4$  for expression as %  $\text{NaCl}$ ,

$M = 74,6$  for expression as %  $\text{KCl}$ .

### 9.2 Expression of results

Report the result to the second decimal place.

## 10 Precision

### 10.1 Interlaboratory test

The values for repeatability and reproducibility were derived from the results of an interlaboratory test (see [4]) carried out in accordance with ISO 5725:1986<sup>1)</sup>.

### 10.2 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 0,02 g of Cl<sup>-</sup> ion (for the equivalent quantity of any chloride) per 100 g of product.

### 10.3 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 0,06 g of Cl<sup>-</sup> ion (or the equivalent quantity of any chloride) per 100 g of product.

## 11 Test report

The test report shall specify:

- a) all information necessary for the complete identification of the sample;
- b) the sampling method used, if known;
- c) the test method used, with reference to this International Standard;
- d) all operating details not specified in this International Standard, or regarded as optional, together with details of any incidents which may have influenced the test results;
- e) the test results obtained, mentioning clearly the way in which they are expressed.

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1) ISO 5725:1986, *Precision of test methods — Determination of repeatability and reproducibility for a standard test method by inter-laboratory tests* (now withdrawn), was used to calculate the precision data.

## Bibliography

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**IDF 88:2006(E)**

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**ICS 67.100.30**

Price based on 5 pages