

Australian Standard®

Methods of chemical and physical testing for the dairying industry

Method 1.1: General methods and principles— Determination of total solids and moisture

PREFACE

This Standard was prepared by the Standards Australia Committee, FT-024, Food Products and Subcommittee FT-024-05, Dairy Products to supersede AS 2300.1.1—1988, as a general method for testing a range of dairy products for total solids and moisture content.

The Committee did not recommend the adoption of ISO Standards, which were outdated and published in 1977. ISO Standards are product specific standards and, for some products there are no ISO standards. Hence, it recommended to revise the Australian Standard with the following technical changes:

- (a) Clause 13.5, Evaporated milk—Method B was used.
- (b) Clause 13.6, Cheese—Whey cheese was included under this Clause with the drying conditions.
- (c) Clause 13.7, Ice cream and frozen milk products (total solids)—More details were included for the preparation of test sample.
- (d) Clause 13.11, Yoghurts—Frozen milk desserts were included.

AS 2300 comprises a series of methods and related Standards for chemical and physical testing of milk and dairy products, including the preparation of samples for testing.

Standards in the AS 2300 series are divided into categories according to type of product to be tested, as follows:

AS

2300.1	General methods and principles
2300.2	Liquid milks
2300.4	Dried milk and dried milk products
2300.5	Condensed milk
2300.6	Cheese
2300.7	Butter
2300.8	Anhydrous milk fat
2300.9	Analysis of ice-cream and frozen milk products
2300.10	Caseins, caseinates and coprecipitates
2300.11	Cultured milk products

METHOD

1 SCOPE

This Standard sets out two methods for the determination of total solids and moisture contents of dairy products as follows:

Method A—requires the use of sand as a drying aid.

Method B—does not require the use of sand.

The preparation of test samples of specific products for testing by the methods is also given.

2 APPLICATION

The methods are applicable to a wide range of liquid and solid dairy products. The use of sand as a drying aid (Method A) is necessary for some products.

3 REFERENCED DOCUMENTS

The following documents are referred to in this Standard.

AS

1152 Specification for test sieves

1166 Milk and milk products—Guidance on sampling

4 DEFINITIONS

For the purpose of this Standard, the definitions below apply.

4.1 Total solids content

The percentage by mass of residue obtained on drying the material in accordance with the procedure described.

4.2 Moisture content

The percentage decrease in mass obtained on drying the material in accordance with the procedure described.

5 PRINCIPLE

A prescribed amount of sample is dried at specified temperature to constant mass. Admixture with sand to promote complete drying, or preliminary drying of high moisture products on a steam bath, is sometimes necessary.

6 REAGENTS

The following reagents are required:

6.1 Water

Use only freshly distilled, or water of equivalent purity.

6.2 Sand

Use only quartz sand, substantially free from iron, which passes through a sieve with openings of 500 μm and is retained by a sieve with openings of 180 μm (see AS 1152).

Prepare the sand by heating with portions of concentrated hydrochloric acid until the acid liquor is nearly colourless, removing the acid by decantation. Rinse once with dilute hydrochloric acid, then thoroughly with water. Dry the sand and heat to dull red heat.

Test the prepared sand for suitability by carrying out duplicate blank determinations using 5 mL water. In each test the mass of the dish plus sand shall not differ from the original mass by more than 0.5 mg.

NOTE: Suitable sand is available commercially.

7 APPARATUS

The following apparatus is required:

- (a) Dishes made of suitable material, e.g. nickel, aluminium, stainless steel or glass, flat-bottomed, with readily removable but close fitting lids. A suitable size has a diameter of about 75 mm and a depth of 20 mm to 25 mm. For Method A, provide each dish with a short glass stirring rod having a flattened bottom end with a hooked handle to rest over the side of the dish. The total length of the rod shall be less than the diameter of the dish.
- (b) Drying oven, electrically heated, with natural or mechanically assisted convection.
- (c) Steam bath.

8 SAMPLES

8.1 Laboratory sample

It is assumed that the laboratory sample has been taken, transported to the laboratory, and stored in accordance with the requirements of AS 1166.

8.2 Preparation and testing of samples

Specific products, depending on their texture and moisture content, require different methods for preparing samples for testing. Methods of preparing test samples of specific products are given in Clause 14. These methods are suitable, generally, for preparing products for a variety of analyses, of which determination of total solids or moisture may be one.

NOTE: Specific products will require the use of Method A or Method B, different quantities of test portion and different initial oven drying times. Details of these requirements for various products are also given in Clause 14.

9 METHOD A (USING SAND)

9.1 Blank test

At the same time as the determination on the sample, perform a blank determination using the procedure described below for Method A, but omitting the test portion of the sample. The blank value shall not exceed 0.5 mg. If the blank value exceeds this limit, check the quality of the sand in particular, and the temperature of the dish at the time of weighing.

9.2 Procedure

The procedure shall be as follows:

- (a) Place a dish containing about 25 g of the prepared sand into the oven at $102 \pm 2^\circ\text{C}$ alongside its corresponding lid, on which the glass stirring rod is placed. Dry for at least 1 h.
- (b) Replace the lid with the rod still on top, remove the dish from the oven and allow to cool to within 1°C of balanced room temperature, in a desiccator charged with an efficient desiccant such as freshly dried silica gel. Cooling will generally take 30 min to 75 min, depending on the number of dishes. Weigh rapidly to the nearest 0.1 mg.

NOTE: The temperature of the dishes may be ascertained by placing a thermometer in the desiccator adjacent to the dishes. Weigh the dishes when the temperature reading remains within 1°C of room temperature for about five minutes.

- (c) Repeat the procedure described in Clause 9.2(a) and Clause 9.2(b), drying for periods of 1 h, until constant mass is achieved, i.e. until the change in mass between successive weighings does not exceed 0.5 mg. Record the mass (m_1), (m_4 for blank).
- (d) Remove the lid and stirring rod, tilt the sand to one side of the dish and place, on the clear space, the appropriate test portion of the test sample prescribed in Clause 14. Replace the lid and rod and weigh rapidly to the nearest 0.1 mg. Record the mass (m_2).
- (e) For liquid and semi-liquid products add water to the sample to bring the total mass of sample plus water to approximately 6.5 g. Mix by means of the rod, heating if necessary to dissolve lactose crystals, then thoroughly mix the diluted sample with the sand. Leave the stirring rod in the mixture with the handle resting on the side of the dish.
- (f) For cheese and products of similar texture, add to the sand sufficient water to saturate the sand (typically 6 mL to 7 mL), thoroughly mix wet sand with the sample by macerating with the glass stirring rod, and distribute the mixture over the bottom of the dish. Leave the stirring rod in the mixture with the handle resting on the side of the dish.
- (g) Place the dish on a steam bath for approximately 30 min. Stir carefully during the early period so that the sample mass, when dry, does not form a cake but is well aerated and, in the case of cheese, has a crumbly appearance. Ensure that the sample is spread evenly over the bottom of the dish. When dry, place the stirring rod flat in the dish.

With cheeses which form a hornlike mass during drying remove the dish from the steam bath as soon as the mixture becomes difficult to stir. Continue stirring until the mass again becomes friable. Continue this process of heating and stirring until the mixture is apparently dry.
- (h) Dry the bottom of the dish and transfer it, with its lid alongside, to the oven at $102 \pm 2^\circ\text{C}$. After the initial drying period prescribed for the product in Clause 14, place the lid on the dish, transfer the dish to the desiccator, allow to cool as before and reweigh.
- (i) Remove the lid and repeat the drying procedure outlined in Clause 9.2(h), heating for periods of 1 h, until the change in mass between successive weighings does not exceed 0.5 mg. Record the lowest mass (m_3), (m_5 for blank).

10 METHOD B (WITHOUT SAND)

The procedure shall be as follows:

- (a) Place the dish in the oven at $102 \pm 2^\circ\text{C}$ alongside its corresponding lid and dry for at least 1 h.
- (b) Replace the lid, remove the dish from the oven and allow to cool to within 1°C of balance room temperature in a desiccator charged with an efficient desiccant such as freshly dried silica gel. Cooling will generally take 30 min to 75 min depending on the number of dishes. Weigh rapidly to the nearest 0.1 mg. Record the mass (m_1).
- (c) Remove the lid and place into the dish the appropriate test portion of the prepared sample prescribed in Clause 14. Replace the lid and rapidly determine the mass to the nearest 0.1 mg. Record the mass (m_2).
- (d) If preliminary drying on a steam bath is required (see Clause 14) proceed as in Clause 10(e), otherwise proceed to Clause 10(f).
- (e) Place the uncovered dish on a steam bath for 30 min. Ensure that the sample is spread evenly over the bottom of the dish.