

Australian Standard®

AS 2300.2.6—2010

Methods of chemical and physical testing for the dairying industry

Method 2.6: Liquid milks—Determination of lactose

PREFACE

This Standard was prepared by the Standards Australia Committee, FT-024, Food Products and Subcommittee FT-024-05, Dairy Products (Constituted), to supersede AS 2300.2.6—1988.

After a periodic review, the Committee recommended a new edition. This edition confirms the method without technical changes, but updates the referenced documents and reflects the current editorial style and includes a clause on uncertainty of measurement.

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 a method for the determination of the lactose content of liquid milks.

NOTE: Instrumental methods are available, such as HPLC.

2 APPLICATION

The method is applicable to raw milk, pasteurized milk, homogenized milk, reconstituted milk, skim or low fat milk, UHT milk and sterilized milk.

3 REFERENCED DOCUMENTS

The following documents are referred to in this Standard.

AS

2166 Laboratory glassware—One-mark pipettes

AS/NZS

2243 Safety in laboratories

2243.2 Part 2: Chemical aspects

4 PRINCIPLE

The protein in the milk is precipitated, and the lactose content determined indirectly by titrimetric estimation of the amount of halogen reduced in the reaction between lactose and chloramine T/potassium iodide.

5 REAGENTS

WARNING: THE USE OF THIS STANDARD MAY INVOLVE THE USE OF HAZARDOUS MATERIALS, OPERATIONS, AND EQUIPMENT. THIS STANDARD DOES NOT PURPORT TO ADDRESS ALL THE SAFETY RISKS ASSOCIATED WITH ITS USE. IT IS THE RESPONSIBILITY OF THE USER OF THIS STANDARD TO ESTABLISH APPROPRIATE SAFETY AND HEALTH PRACTICES AND DETERMINE THE APPLICABILITY OF LOCAL REGULATORY LIMITATIONS PRIOR TO USE. SEE AS/NZS 2243.2 FOR MORE DETAILS REGARDING LABORATORY SAFETY.

Use only reagents of recognized analytical reagent quality, and freshly distilled water or water of equivalent purity. The following reagents are required:

(a) *Chloramine T solution (5.7 g/L)*

Made up using reagent before each batch of assays.

NOTE: Solid chloramine T deteriorates over time and will need to be replaced when it liberates insufficient chlorine to react with the lactose in test portions with an excess of chlorine remaining (as indicated by no iodine being produced).

(b) *Hydrochloric acid solution*

Approximately 2 mol/L.

(c) *Potassium iodide solution (100 g/L)*

Freshly prepared, colourless.

(d) *Sodium thiosulphate solution*

Standardized slightly above 0.04 mol/L.

The concentration of the sodium thiosulphate solution shall be determined regularly by titrating into 10.00 mL of 0.0400 mol/L potassium iodate to which 5 mL of the potassium iodide solution and 5 mL of the hydrochloric acid solution have been added.

NOTE: The strength of the thiosulphate solution is so chosen that a burette reading of between 12.0 mL and 13.5 mL is obtained for most milk samples, and of between 19.5 mL and 19.7 mL for the 'blank'.

(e) *Iodine indicator of suitable type*

For example, starch solution.

(f) *Tungstic acid reagent*

Dissolve 7 g of sodium tungstate di-hydrate ($\text{Na}_2\text{WO}_4 \cdot 2\text{H}_2\text{O}$) in 870 mL of water, add 0.1 mL of orthophosphoric acid solution (88 percent, *m/m*) and 70 mL of 0.5 mol/L sulphuric acid solution.

6 APPARATUS

The following apparatus is required:

(a) *Burette*

Capacity 25 mL, graduated to 0.02 mL.

(b) *Conical flasks with ground-glass stoppers*

150 mL capacity.

(c) *Filter papers*

Acid washed, medium speed, 100 mm to 125 mm diameter.

(d) *Volumetric flasks*

Capacity 100 mL.

(e) *One-mark pipette (A grade)*

Capacity 10 mL and 20 mL. (See AS 2166.)

7 PREPARATION OF TEST SAMPLE

Warm the sample to $35 \pm 5^\circ\text{C}$ and mix thoroughly but gently by repeated inversion of the container, so that any cream layer is uniformly dispersed without churning the fat. After mixing, cool the sample to $22 \pm 3^\circ\text{C}$. Invert the container three or four times immediately before taking a test portion for the determination. Discard the sample if it cannot be mixed satisfactorily.

8 PROCEDURE

8.1 Blank test

Carry out a blank test corresponding to the procedure described below using 10 mL of water instead of filtrate obtained in Step 8.2(c).

8.2 Analytical method

The procedure shall be as follows:

- Transfer 10 mL of the prepared sample into a tared 100 mL graduated flask and reweigh the flask and contents to the nearest milligram. Add 25 mL of water, 40 mL of the tungstic acid reagent and mix gently.
- Dilute to volume with water, mix and allow the precipitate to settle.
- Filter through a dry, pleated filter paper into a dry flask.
- Pipette 10.0 mL of the filtrate into a 150 mL conical flask fitted with a ground-glass stopper. Add 5 mL of the potassium iodide solution and pipette 20.0 mL of the chloramine T solution into the flask. Mix.
- Close the flask with its stopper moistened with a little potassium iodide solution and leave it in the dark at room temperature for 1.5 hours.
- Remove the stopper and rinse any liquid adhering to the stopper and neck back into the flask with a little water.