Australian Standard®

Method of chemical and physical testing for dairying industry

Method 2.9: Liquid milks—Determination of phosphorus

PREFACE

This Standard was prepared by the Standards Australia Committee FT-024, Food Products and Subcommittee FT-024-05, Dairy Products, to supersede AS 2300.2.9—1988.

After a periodic review, the Committee recommended a new edition. This edition confirms the method without technical changes, but updates the reference 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

FOREWORD

This method is based on a classical procedure but it should be recognized that other procedures using more advanced instrumentation are available, for example atomic absorption, and inductively coupled plasma spectrophotometry.

METHOD

1 SCOPE

This Standard sets out a method for the determination of total phosphorus in liquid milks.

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 PRINCIPLE

The organic substances in the milk sample are destroyed by dry ashing. Condensed phosphates are acid-hydrolysed to orthophosphate which is reacted with molybdic acid to form molybdophosphoric acid. The molybdophosphoric acid is selectively reduced by diaminophenol to form molybdenum blue and the absorbance of the complex is measured spectrophotometrically at 750 nm. The phosphorus concentration is calculated by reference to a standard curve prepared using standard orthophosphate solutions.

4 REFERENCED DOCUMENTS

The following documents are referred to in this Standard.

AS

2300 Methods of chemical and physical testing for the dairying industry

2300.1.5 Method 1.5: General methods and principles—Determination of ash

AS/NZS

2243 Safety in laboratories

2243.2 Part 2: Chemical aspects

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 REPONSIBILITY OF THE USER OF THIS STANDARD TO ESTABLISH APPROPRIATE SAFETY AND HEALTHY PRACTICES AND DETERMINE THE APPLICABILITY OF LOCAL REGULATORY LIMITATIONS PRIOR TO USE. SEE AS/NZS 2243.2 FOR MORE DETAIL 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) *Perchloric acid* (ρ_{20} 1540 kg/m3)—60 percent *m/m* to 62 percent *m/m*.

(b) *Hydrochloric acid* (100 mL/L)—dilute 100 mL of hydrochloric acid (ρ_{20} 1160 kg/m^3) to 1 L with water.

(c) *Diaminophenol solution*—dissolve 1 g of 2,4-diaminophenol dihydrochloride ($(NH_2)_2C_6H_3OH.2HCl$) and 20 g of sodium metabisulphite ($Na_2S_2O_5$) in water and dilute to 100 mL. Prepare daily.

(d) *Molybdate solution*—dissolve 8.3 g of ammonium molybdate tetrahydrate ($(NH_4)_6Mo_7O_{24}.4H_2O$) in water and dilute to 100 mL.

(e) *Standard phosphorus solution* (1 g/L phosphorus)—dissolve 4.393 g to 4.394 g of potassium dihydrogen orthophosphate (KH_2PO_4), previously dried at 105 ±5°C for 2 h, in water and dilute to 1 L.