

Methods for

Analysis of dried milk and dried milk products —

Part 3: Determination of insolubility index

[ISO title: Dried milk and dried milk products — Determination of
insolubility index]

IMPORTANT NOTE. It is essential that this Part be read in conjunction with Part 1
“General introduction, including preparation of laboratory samples”, published
separately.

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The Committees responsible for this British Standard are shown in Part 1
The following BSI references relate to the work on this standard:
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National foreword

This Part of BS 1743, which has been prepared under the direction of the Dairying Standards Committee, is identical with ISO 8156:1987 “*Dried milk and dried milk products — Determination of insolubility index*”, prepared by ISO/TC 34, Agricultural food products, of the International Organization for Standardization (ISO).

The method described in ISO 8156 was developed jointly with the International Dairy Federation (IDF) and the Association of Official Analytical Chemists (AOAC).

It is now considered more appropriate to determine the insolubility index, rather than the solubility of dried milk and dried milk products. As a result BS 1743 “*Methods for analysis of dried milk and dried milk products — Part 2: Determination of the solubility of dried milk, dried whey and dried buttermilk (reference method)*”, has been withdrawn.

Terminology and conventions. The text of the International Standard has been approved as suitable for publication as a British Standard without deviation. Some terminology and certain conventions are not identical with those used in British Standards; attention is drawn especially to the following.

The comma has been used as a decimal marker. In British Standards it is current practice to use a full point on the baseline as the decimal marker. Also in British Standards it is current practice to use the symbol “mL” for millilitre, rather than “ml”.

Wherever the words “International Standard” appear, referring to this standard, they should be read as “British Standard”.

Cross-references

International Standard	Corresponding British Standard
ISO 707:1985	BS 809:1985 <i>Methods for sampling of milk and milk products</i> (Identical)
ISO 5725:1986	BS 5497 <i>Precision of test methods</i> Part 1:1987 <i>Guide for the determination of repeatability and reproducibility for a standard test method by inter-laboratory tests</i> (Identical)

Additional information. Although not specified in the ISO text, it is strongly recommended that duplicate determinations are undertaken. Provided that the duplicate values, calculated as described in 9.1, comply with the repeatability requirement of 9.2.1, the result should be reported as the mean value, and in such cases, the test report (see clause 11) should include a reference to the fact that such a result has been reported.

When results reported are the mean of two values that comply with the repeatability requirement, the difference between the results reported for insolubility index, obtained on samples of the same test material by two different analysts in two different laboratories should not exceed the value stated in 9.2.2.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 8, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

0 Introduction

0.1 There are several rather elaborate gravimetric methods for determining the solubility of dried milk (for example Van Kreveld & Verhoog^[1], 1963; British Standard 1743-2:1980^[2]) but, for routine purposes, including grading, the most widely used procedure is the so-called solubility index method of the American Dry Milk Institute (ADMI^[3], 1971) in which a test portion is mixed with water and the reconstituted product is centrifuged; the volume, in millilitres, of the sediment finally obtained (i.e. insoluble residue) is the solubility index. Since solubility index is thus inversely related to solubility it seems more direct and more rational to use the term “insolubility index” to describe what is determined by a “solubility” method such as that of ADMI. Accordingly, “insolubility index” was adopted to designate what is determined in the sediment-volume solubility method described in this International Standard; the use of this new expression also serves to differentiate the method described in this International Standard from the solubility index method of ADMI.

Although the ADMI solubility index method has been in use in many countries for a considerable period, it became evident some time ago that its precision (repeatability, reproducibility), which is not stated by ADMI, is unsatisfactory with some types of spray-dried whole milk and with roller-dried milk and milk products. This led to the conclusion that the apparatus and technique of the ADMI method are inadequately defined, and are unsuitable for some dried milks, and consequently either the ADMI method should be more closely specified, and possibly modified in some respects, or an alternative method developed. The latter approach was at first favoured because of difficulty in obtaining the special mixer (and spare parts) manufactured in the USA for the ADMI method. However, when improved models of this mixer came to be manufactured in several countries and hence were readily available, it was decided to concentrate on improving the precision of the ADMI method while retaining its principal features so that most of the existing ADMI solubility index specifications for grading would still be applicable.

0.2 In any sediment-volume solubility method applied to a dried milk or a dried milk product, the temperature at which the test portion is reconstituted is the main factor influencing what the result will be. In the ADMI solubility index method, a reconstituting temperature of 75 °F (23,9 °C) is used with spray-dried or roller-dried whole milk, skimmed milk and buttermilk, instant or non-instant as appropriate. But for the insolubility index method, it was decided to adopt the principle that the reconstituting temperature should be either 24 °C or 50 °C depending on whether the product, in normal usage or from its quality specification, is expected to be reconstitutable in “cold” water or “warm” water respectively. **This means that the reconstituting temperature to be used in the insolubility index method will, in general, be 24 °C for spray-dried products and 50 °C for roller-dried products.** Exceptions to this general rule may be spray-dried milk-based baby food, and, in some instances, spray-dried whole milk or partly skimmed milk, intended to be reconstituted in warm water. However, it is important to note that if the insolubility index of spray-dried fat-containing milks is determined at 50 °C, the values obtained will all tend to be very small because the method will no longer detect products which have been subjected to excessive dry heat through faulty manufacture or storage. This is because milk protein denatured by dry heat is insoluble at 24 °C and, along with entrapped or combined fat, is precipitated as sediment when centrifuging is performed; at 50 °C, the dry-heat-denatured protein is soluble and this, with the release of the associated fat, can cause a marked reduction in the volume of sediment (Wright^[4], 1932; Howat & Wright^[5], 1933; Waite & White^[6], 1949).

0.3 The insolubility index method described in this International Standard is thus basically the same as the ADMI solubility index method but with all the apparatus and experimental conditions as closely defined as practicable and the reconstituting temperature either 24 °C or 50 °C, as appropriate (see **0.2**). The latter innovation means that an insolubility index value will require to be accompanied by the reconstituting temperature used, for example 0,25 ml (24 °C), 0,10 ml (50 °C). The precision of the insolubility index method has been determined in an inter-laboratory collaborative study and is considered to be satisfactory.