

Methods for

Determination of the freezing-point depression of milk —

Part 1: Methods —

Section 1.2 Hortvet method

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- Dairy Trade Federation
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- Milk Marketing Board
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Foreword

This Section of BS 3095 has been prepared under the direction of the Dairying Standards Committee, and together with Section 1.1 is a revision of BS 3095-1:1980. This Section of BS 3095 together with Section 1.1 supersedes BS 3095-1:1980, which is withdrawn.

This Section of BS 3095 describes the method for determination of the freezing-point depression of milk based on the work of J. Hortvet first described in 1921¹⁾ and 1922²⁾ with subsequent modifications. A standard mercury-in-glass thermometer is used in the procedure. Section 1.1 describes a method using a thermistor cryoscope, in which the temperature sensor is a semiconductor. Experimental work carried out at the National Institute for Research in Dairying (now the AFRC Institute of Food Research, Reading Laboratory) Shinfield has shown the results obtained by the two methods are comparable.

Part 2 provides some guidance on the interpretation of results of the freezing-point depression of herd milk.

Part 3 describes the preservation of milk samples during transport to the laboratory and during subsequent short-term or long-term storage prior to testing for freezing-point depression.

The freezing-point depression of genuine fresh milk is the extent to which the milk solutes cause the freezing point to be lower than that of water. It is virtually a biological constant: its determination provides a test for the presence or absence of extraneous water. The values for the freezing-point depression of genuine milk, however, vary naturally over a narrow range and are influenced by developed acidity and, consequently, this variation and the titratable acidity have to be taken into account in the interpretation of results.

In the methods described in Sections 1.1 and 1.2 the apparatus requires calibration. This is carried out using solutions of fixed composition. The freezing-point depressions of several standard solutions have been established by experimental programmes undertaken in both the UK and USA. In these studies the compositions of the standard solutions were based on the addition of an exact mass of solute to 1 kg of water. In practice, it is sufficiently accurate if these standard solutions are prepared to contain weighed amounts of solute in a known volume of solution. The compositions given in this standard are equivalent to the proper exact mass ratios if the solute is weighed in air using brass or stainless steel weights, and the solution is prepared at 20 °C.

The precision values quoted in clause 10 are based on a collaborative study involving eight laboratories using a Hortvet apparatus calibrated by the graphical sodium chloride procedure. It is to be noted that the reproducibility values quoted are calculated on the mean results of two determinations carried out in each laboratory. The extent of the study satisfied the requirements set out in the draft IUPAC/ISO guidelines for the development of standard methods of collaborative study.

In addition seven other laboratories took part in the collaborative study using Hortvet apparatus calibrated using a graphical sucrose procedure or a single sodium chloride or sucrose solution procedure. In view of the limited numbers of participants involved for each type of calibration procedure, it was not possible to draw firm conclusions about the repeatability or reproducibility of any of them. However, as the results obtained when the apparatus was calibrated using the single sodium chloride solution procedure were sufficiently different from results obtained using the other procedures, the procedure for calibrating the Hortvet apparatus using a single sodium chloride solution has been omitted from this revision of the method.

Appendix A describes the calculation of means of duplicate values.

¹⁾ Hortvet J.J. *Ind. Eng. Chem.*, 1921, **13**.

²⁾ Hortvet J.J. *Ass. Off. Agric. Chem.*, 1922, **5**.

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Summary of pages

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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.

