INTERNATIONAL STANDARD

ISO 5519

Second edition
2008-02-15

Fruits, vegetables and derived products — Determination of sorbic acid content

Fruits, légumes et produits dérivés — Détermination de la teneur en acide sorbique

Reference number
ISO 5519:2008(E)

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Published in Switzerland

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Foreword

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The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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ISO 5519 was prepared by Technical Committee ISO/TC 34, *Food products*, Subcommittee SC 3, *Fruit and vegetable products*.

This second edition cancels and replaces the first edition (ISO 5519:1978), which has been technically revised.

Introduction

The determination of the sorbic acid content of fruits, vegetables and derived products has been studied in numerous projects during the acid's use as a fungicide, especially in wines. Because of its great volatility (very similar to that of acetic acid), the simplest extraction process is its entrainment by steam. This method has the advantage of producing an almost pure aqueous solution of sorbic acid.

Two techniques for the determination of the quantity of sorbic acid contained in this solution are described in this International Standard, namely:

— Technique A: spectrophotometry in the ultraviolet range, carried out after oxidation of sulfur dioxide, which would interfere. The oxidation occurs spontaneously in a few minutes in air, after the addition of a trace of a copper catalyst.

— The natural essential oils of citrus fruits do not interfere with the determination, provided that they are present in the small quantities normal in juice not enriched with essential oils. When the quantities of essential oils are significant, they may be eliminated beforehand by the same method as that applied in technique B.

— Technique B: colorimetry based on Schmidt's reaction, which requires the elimination of ethanol and essential oils by the evaporation of an aliquot portion of the distillate. This technique, not as rapid as technique A, but giving comparable results, is provided for use when a spectrophotometer allowing measurements in the ultraviolet range is not available.

The interference caused by essential oils of garlic, onion or leek may be eliminated, when using either technique, by the evaporation of an aliquot portion of the distillate.

Fruits, vegetables and derived products — Determination of sorbic acid content

1 Scope

This International Standard specifies a method for extracting the sorbic acid present in fruits, vegetables and derived products, and two techniques for determining the sorbic acid extracted.

2 Principle

Homogenization of the product, followed by quantitative entrainment, by steam, of the sorbic acid present in a test portion. Determination of this acid in the distillate obtained, either by spectrophotometry in the ultraviolet range (technique A), or by measuring by photocolorimetry or by spectrophotometry, the pink colour obtained after oxidation by chromic acid and then treatment with thiobarbituric acid (technique B).

3 Reagents

Use only reagents of recognized analytical quality, and distilled water or water of at least equivalent purity.

3.1 Tartaric acid [COOH (CH OH)$_2$ COOH], crystalline.

3.2 Sorbic acid [$CH_3(CH{:}CH)_2COOH$], 0,010 g/l standard solution, prepared by one of the following methods (3.2.1 or 3.2.2).

3.2.1 Dissolve 0,100 g of sorbic acid in 10 ml to 12 ml of a 0,1 N sodium hydroxide solution. Transfer quantitatively into a 1 000 ml volumetric flask, and dilute to the mark with water. Introduce 100 ml of the solution obtained into a second 1 000 ml flask, and dilute to the mark with water.

3.2.2 Dissolve 0,134 g of potassium sorbate, $CH_3(CH{:}CH)_2COOK$, (previously recrystallized and dried to constant mass in a drier at 105 °C or in a desiccator over concentrated sulfuric acid) in water in a 1 000 ml volumetric flask, and dilute to the mark with water. Introduce 100 ml of the solution obtained into a second 1 000 ml flask, and dilute to the mark with water.

3.3 Calcium hydroxide [$Ca(OH)_2$] (if necessary), about 0,04 N (1,48 g/l) solution.

3.4 Acetic acid (CH_3COOH), 0,1 N solution.

3.5 Lactic acid [$CH_3CH(OH)COOH$], 1 N solution.

3.6 Copper, catalyst solution, for technique A.

In a 1 000 ml volumetric flask, dissolve, in a little water, 0,5 g of sodium hydrogen carbonate ($NaHCO_3$), and 0,001 g of pure copper(II) sulfate pentahydrate ($CuSO_4{\cdot}5H_2O$). Dilute to the mark with water.

3.7 Chromic/sulfuric acid solution, for technique B.

Dissolve 0,050 g of potassium dichromate ($K_2Cr_2O_7$) in approximately 90 ml of water. Transfer quantitatively into a 200 ml volumetric flask. Add 100 ml of a 0,3 N sulfuric acid (H_2SO_4) solution. Dilute to the mark with water.

1 litre of 0,3 N sulfuric acid solution contains 14,7 g of sulfuric acid, i.e. 8,4 ml of sulfuric acid, $\rho_{20} = 1{,}84$ g/ml.