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**Animal and vegetable fats and oils —  
Cocoa butter equivalents in cocoa butter  
and plain chocolate —**

**Part 2:  
Quantification of cocoa butter  
equivalents**

*Corps gras d'origines animale et végétale — Équivalents au beurre  
de cacao dans le beurre de cacao et dans le chocolat de ménage —*

*Partie 2: Quantification des équivalents au beurre de cacao*



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Published in Switzerland

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## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

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.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 23275-2 was prepared by Technical Committee ISO/TC 34, *Food products*, Subcommittee SC 11, *Animal and vegetable fats and oils*.

ISO 23275 consists of the following parts, under the general title *Animal and vegetable fats and oils — Cocoa butter equivalents in cocoa butter and plain chocolate*:

- *Part 1: Determination of the presence of cocoa butter equivalents*
- *Part 2: Quantification of cocoa butter equivalents*

## Introduction

“Cocoa butter equivalents” is the general term for fats used to replace cocoa butter in chocolate. They resemble the chemical composition and physical properties of cocoa butter very closely, making them therefore extremely difficult to quantify and even in some cases to detect. In principle, cocoa butter equivalents must by definition be fats low in lauric acid, rich in symmetrical mono-unsaturated triacylglycerols of the type 1,3-dipalmitoyl-2-oleoylglycerol, 1-palmitoyl-2-oleoyl-3-stearoylglycerol and 1,3-distearoyl-2-oleoylglycerol, miscible with cocoa butter, and obtained only by refining and fractionation.

Within the European Union, the following vegetable fats, obtained from the plants listed below, may be used singly or in blends, according to Directive 2000/36/EC [1]:

- illipé, Borneo tallow or tangkawang (*Shorea* spp.),
- palm oil (*Elaeis guineensis*, *Elaeis olifera*),
- sal (*Shorea robusta*),
- shea (*Butyrospermum parkii*),
- kokum gurgi (*Garcinia indica*), and
- mango kernel (*Mangifera indica*).

ISO 23275-1 specifies a procedure for the detection of these fats (restrictions are only made for pure illipé fat samples) in cocoa butter and plain chocolate. This part of ISO 23275 specifies a procedure allowing a reliable quantification of these fats at the level of 5 %, complying with the statutory limit laid down in Directive 2000/36/EC [1] of the European Parliament and the Council.

To facilitate the usage of both parts of ISO 23275, an analytical toolbox named “CoCal-1” has been established. “CoCal-1” contains the validated methods for detection (part 1) and quantification (part 2) of CBEs in plain chocolate, and also a certified cocoa butter reference material (IRMM-801) to calibrate the analyst’s instruments and an electronic evaluation sheet for Microsoft Excel® to calculate the final result. An analyst working on CBE detection and quantification has only to calibrate the gas chromatographic separation system using IRMM-801, separate the triglyceride fractions of the sample in question, and use the electronic evaluation sheet for subsequent data treatment to detect and quantify CBEs.

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# Animal and vegetable fats and oils — Cocoa butter equivalents in cocoa butter and plain chocolate —

## Part 2: Quantification of cocoa butter equivalents

### 1 Scope

This part of ISO 23275 specifies a procedure for the quantification of cocoa butter equivalents (CBEs) in cocoa butter (CB) and plain chocolate by high-resolution capillary gas chromatography (HR-GC) of triacylglycerols, and subsequent data evaluation by partial least-squares regression analysis.

**NOTE** The presence of CBEs in CB and plain chocolate down to a level of 0,6 % (fat content of chocolate assumed to be 30 %) can be determined by using the procedure explained in ISO 23275-1. Differences in the procedure of the two methods exist in the number of individual triacylglycerols used for data treatment and in the mathematical evaluation principle of the data. The presence of CBEs is detected by linear regression analysis applied to the relative proportions of the three main triacylglycerol fractions of the fat analysed. The amount of the CBE admixture is estimated by partial least squares regression analysis applied to the relative proportions of the five main triacylglycerols.

### 2 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

#### 2.1

##### **cocoa butter equivalents**

##### **CBEs**

fats detected in cocoa butter and plain chocolate

#### 2.2

##### **CBE content of cocoa butter**

mass fraction of substances in cocoa butter determined by the procedure specified in this part of ISO 23275

**NOTE** It is expressed in grams per 100 g of cocoa butter.

#### 2.2

##### **CBE content of chocolate**

mass fraction of substances in chocolate determined by the procedure specified in this part of ISO 23275

**NOTE** It is expressed in grams per 100 g of chocolate.

### 3 Principle

Cocoa butter, or the fat obtained from plain chocolate, is separated by HR-GC into triacylglycerol fractions according to their molecular mass and degree of unsaturation. The added amount of CBEs is estimated by partial least squares regression analysis applied to individual triacylglycerol fractions of the fat analysed.