



**JOINT FAO/WHO FOOD STANDARDS PROGRAMME
CODEX COMMITTEE ON METHODS OF ANALYSIS AND SAMPLING**

44th Session

Virtual

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**REVIEW OF METHODS OF ANALYSIS IN CXS 234:
COCOA PRODUCTS AND CHOCOLATE WORKABLE PACKAGE**

(Prepared by the EWG led by Serbia)

Codex Members and Observers wishing to submit comments on the recommendations in this document should do so as instructed in CL 2025/17-MAS available on the Codex webpage/Circular Letters: <https://www.fao.org/fao-who-codexalimentarius/resources/circular-letters/en/>

INTRODUCTION

1. CCMAS38 (2017) agreed to continue the review and update of the *Recommended methods of analysis and sampling* (CX/234-1999) as workable packages as described in CX/MAS 17/38/6.
2. Noting that the Codex Committee on Cocoa Products and Chocolate is adjourned *sine die*, CCMAS43 (2024) agreed to proceed with the update on workable packages for cocoa and chocolate products (CCP). All interested Members and Standards Development Organizations (SDOs) were invited to assist in this work.
3. This report is based on the activities in the electronic working group (EWG) following CCMAS43.

EWG-CCP PROCESS 2024/25

4. The terms of reference of the EWG-CCP review were to ensure that the methods of analysis listed in CXS 234-1999 are fit-for-purpose and to re-type, if necessary, to facilitate the review process, but not to add new methods unless necessary.
5. The EWG review was completed using workbooks containing information provided by the relevant SDOs (International Confectionery Association (ICA), AOAC International, and American Oil Chemists' Society (AOCS)). All Codex Members and Observers were welcome to join the review of CCP methods and it was operated through the online Codex forum. The list of participants in the EWG is presented in Appendix III.
6. The EWG Chair prepared assignments and shared them with participants. Each participant was assigned methods of analysis to review and was reminded of the guidelines for the work and general guidance on how to proceed. The EWG Chair expressed the desire to have each method assigned to two independent experts. Members of the EWG were then asked to review a small number of methods for all appropriate commodities and to provide feedback.
7. The EWG Chair circulated the workbooks, collected responses, collated them, and prepared a summary of progress. This review process also identified some issues that may require further deliberation by CCMAS.

RESULTS OF THE EWG CONSULTATION

8. Appendix I lists the methods for analysis of cocoa and chocolate products, as identified in CXS 234-1999 and/or relevant commodity standards considered by the EWG. Where methods should be considered Type I (e.g. moisture, cocoa shell, fat), it is important to evaluate whether they are **identical** in cases where more than one of them is listed for the same commodity and provision. Evaluation of multiple Type I methods requires consideration of all parameters in the method including sample weights, grind size, time, temperature and other conditions (e.g. reagents, solutions, solvents).
9. Many of the comments received related to the method for fat-free milk solids. Considering that both lactose and minerals constitute a significant part of fat-free milk solids, it was the opinion of the EWG that determining only protein cannot provide accurate measurement of fat-free milk solids in cocoa and chocolate products. Those methods may require further work and suggestions.

10. From the responses of the EWG experts, the following observations were made:
- i. The International Office of Cocoa, Chocolate and Sugar Confectionery (IOCCC) has been renamed to International Confectionary Association (ICA) and the method names have been updated accordingly.
 - ii. Method principles have been updated as needed.
 - iii. Moisture is currently in CXS 234-1999 method measured by both loss upon oven drying, and by Karl Fischer titration. Both methods are currently listed as Type I. The EWG decided to retain the loss upon drying methods as Type I, but to also include a provision for Moisture (Determined as Water) by Karl Fischer as Type II.
 - iv. Where needed, minor editorial details have been added for clarification purposed. E.g. parenthetical added to clarify that “Fat-free milk solids” are determined as milk protein, “Cocoa butter” is determined as fat.
 - v. Methods for proximate analyses (e.g. moisture) tend to be of considerable age and were developed by SDOs to meet the needs of industry at the time of development. Nonetheless, most of the methods have received positive reviews from the experts. Many of the reviewed methods are in use globally and are the subject of regular proficiency testing.
11. Appendix I was prepared based on the feedback received from EWG members and it explains and tracks proposed changes to CXS 234-1999. For ease of review and comparison, Appendix I provides the information (Commodity, Provision, Codex Standard, Method, Principle, Type, Committee) following the new format for CXS 234-1999. A column has been added to identify comments for consideration.
12. Some EWG reviewers recommended addition of a provision to the *Standard for Chocolate and Chocolate Products* ([CXS 87-1981](#)). Participants were reminded that according to CCMAS guidance¹, changes should be proposed through the appropriate commodity committee or, if adjourned *sine die*, directly to the CCMAS for consideration by the WG on endorsement of methods of analysis and sampling plans. The suggestions for new provisions received in the EWG are included for CCMAS information in Appendix II.
13. It is noted that there might be additional methods of analysis that were only in the relevant commodity standards, and they can be raised for further consideration in the next round of discussion of the EWG.

RECOMMENDATIONS

14. CCMAS44 is invited to:
- consider Appendix I and endorse the proposed changes to CXS 234-1999; and
 - examine the suggestion to revise CXS 87-1981, part 6.8.2 ‘Quantitative Determination of Non-Cocoa Butter Vegetable Fats,’ with the provisions ‘Cocoa butter equivalents in cocoa butter and plain chocolates’ and ‘Cocoa Butter Equivalents in Milk Chocolate’ shown in Appendix II in accordance with CCMAS procedures.

¹ [Comprehensive guidance for the process of submission, consideration and endorsement of methods for inclusion in CXS 234](#)

APPENDIX I

Note: Proposed amendments are indicated in **bold**, ~~strike through~~ and/or underline. Unformatted text indicates that no change was required from the current listing in CXS 234-1999.

Cocoa products and chocolate

Commodity	Provision	Method	Principle	Type	Standard	Committee
Chocolate and chocolate products	Cocoa butter	<u>ICA No. 26 / AOAC 977.10</u> and AOAC 963.15 / <u>ICA No.14</u> IOCC 14	<u>Calculation from moisture (Determined as Water) and Gravimetry</u> (Soxhlet extraction)	I	<u>CXS 87-1981</u>	<u>CCCPC</u>
Chocolate and chocolate products	Fat-free cocoa solids	<u>ICA No. 26 / AOAC 977.10 and AOAC 931.05 and AOAC 930.20</u>	Oven evaporation and factor <u>Calculation from moisture (Determined as Water) and gravimetry (ether, alcohol and aqueous extraction)</u>	I	<u>CXS 87-1981</u>	<u>CCCPC</u>
Chocolate and chocolate products	Fat-free milk solids <u>(Determined as Milk Protein)</u>	<u>ICA No. 26 and ICA No.17 and ICA method No.13 or / AOAC 977.10 and AOAC 955.04C and IOCC 17 or AOAC 939.02</u>	Titrimetry, Kjeldahl digestion; after extraction of milk proteins <u>Calculation from moisture content, and Titrimetry (Kjeldahl N) content of extracted and precipitated milk protein.</u>	II	<u>CXS 87-1981</u>	<u>CCCPC</u>
Chocolate and chocolate products	Fat, total <u>on dry basis</u>	<u>ICA No. 26 / AOAC 977.10 and AOAC 963.15</u>	<u>Calculation from moisture (Determined as Water) and Gravimetry</u> (Soxhlet extraction)	I	<u>CXS 87-1981</u>	<u>CCCPC</u>
<u>Chocolate and chocolate products</u>	<u>Cocoa butter (Determined as Fat)</u>	<u>ICA No. 26 / AOAC 977.10 and AOAC 963.15</u>	<u>Calculation from moisture (Determined as Water) and Gravimetry (Soxhlet extraction)</u>	I	<u>CXS 87-1981</u>	<u>CCCPC</u>
Chocolate and chocolate products	Milk Fat	<u>ICA No. 5</u> IOCC 5 AOAC 945.34; 925.41B; 920.80	Titrimetry/Distillation	+ IV	<u>CXS 87-1981</u>	<u>CCCPC</u>
Chocolate and chocolate products	Moisture	<u>ICA No. 1</u> IOCC 26 or AOAC 977.10 (Karl Fischer method)	Gravimetry- <u>drying at 100-102° C</u>	+ IV	<u>CXS 87-1981</u>	<u>CCCPC</u>

Cocoa products and chocolate

Commodity	Provision	Method	Principle	Type	Standard	Committee
<u>Chocolate and chocolate products</u>	<u>Moisture (Determined as Water)</u>	<u>ICA No 26 / AOAC 977.10</u>	Gravimetry <u>Titrimetry - Karl Fischer</u>	II	<u>CXS 87-1981</u>	<u>CCCPC</u>
Chocolate and chocolate products	Non-cocoa butter vegetable fat	AOCS Ce 10/02 and described in the standard	Described in the standard <u>Gas chromatography</u>	+ IV	<u>CXS 87-1981</u>	<u>CCCPC</u>
Cocoa (cacao) mass or cocoa/ chocolate liquor, and cocoa cake	Cocoa shell	AOAC 968.10 and 970.23	Spiral vessel count, stone cell count <u>Microscopy - Spiral vessel count</u>	I	<u>CXS 141-1983</u>	<u>CCCPC</u>
<u>Cocoa (cacao) mass or cocoa/ chocolate liquor, and cocoa cake</u>	<u>Cocoa shell</u>	<u>AOAC 970.23</u>	Spiral vessel count, stone cell count <u>Microscopy - Stone cell count</u>	IV	<u>CXS 141-1983</u>	<u>CCCPC</u>
Cocoa (cacao) mass or cocoa/ chocolate liquor, and cocoa cake	Fat	AOAC 963.15 / ICA No 10CCC 14 <u>ICA No. 26 / AOAC 977.10 and AOAC 963.15 / ICA No 10CCC 14</u>	Gravimetry <u>Calculation from moisture (Determined as Water) and Gravimetry (Soxhlet extraction)</u>	I	<u>CXS 141-1983</u>	<u>CCCPC</u>
Cocoa butter	Free fatty acids	ISO 660 or / AOCS Cd 3d-63	Titrimetry	I	<u>CXS 86-1981</u>	<u>CCCPC</u>
Cocoa butter	Unsaponifiable matter	ISO 3596 or / ISO 18609 or / AOCS Ca 6b-53	Titrimetry after extraction with diethyl ether	I	<u>CXS 86-1981</u>	<u>CCCPC</u>
Cocoa powders (cocoa) and dry cocoa-sugar mixtures	Moisture <u>(Determined as Water)</u>	AOAC 977.10 <u>ICA No. 26 / AOAC 977.10</u>	Gravimetry <u>Titrimetry - Karl Fischer</u>	I	<u>CXS 105-1981</u>	<u>CCCPC</u>

APPENDIX II

Cocoa products and chocolate

Commodity	Provision	Method	Principle	Type	Standard	Committee
Chocolate and chocolate products	Cocoa butter equivalents in cocoa butter and plain chocolate	ISO 23275-1,2:2006 / AOCS Ce 11-05	Gas chromatography	I	CXS 87-1981	CCCPC
Chocolate and chocolate products	Cocoa Butter Equivalents in Milk Chocolate	ISO 11053:2009 / AOCS Ce 11a-07	Gas chromatography	I	CXS 87-1981	CCCPC

List of relevant standards (for reference purposes)

CXS 86-1981	Standard for Cocoa Butter	CCCPC
CXS 87-1981	Standard for Chocolate and Chocolate Products	CCCPC
CXS 105-1981	Standard for Cocoa powders (cocoas) and dry mixtures of cocoa and sugars	CCCPC
CXS 141-1983	Standard for Cocoa (Cacao) Mass (Cocoa/Chocolate Liquor) and Cocoa Cake	CCCPC

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