

# codex alimentarius commission



FOOD AND AGRICULTURE  
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Agenda Item 6(a)

CX/PFV 06/23/11  
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## JOINT FAO/WHO FOOD STANDARDS PROGRAMME CODEX COMMITTEE ON PROCESSED FRUITS AND VEGETABLES

23<sup>rd</sup> Session  
Arlington, VA (Washington DC metro area), U.S.A.,  
16 – 21 October 2006

### METHODS OF ANALYSIS AND SAMPLING FOR PROCESSED FRUITS AND VEGETABLES

#### BACKGROUND

#### CODEX COMMITTEE ON PROCESSED FRUITS AND VEGETABLES

#### 21<sup>st</sup> Session of the Codex Committee on Processed Fruits and Vegetables

1. The 21<sup>st</sup> Session of the CCPFV (September 2002) considered a number of methods of analysis for endorsement by the 24<sup>th</sup> Session of CCMAS (November 2002). The Committee endorsed<sup>1</sup> the following recommendations of the Working Group on Methods of Analysis and Sampling intended at reducing the time spent on this matter, facilitating their submission to CCMAS for endorsement, accelerating the process of final adoption of the draft Standards at Step 8, and inclusion of the new methods in the *Codex Alimentarius*:

- (a) When a proposed draft Standard or a revised draft Standard is created by the CCPFV, the working group on the project should clearly state the methods of analysis required. This would include both the analysis required for the item and also recommended methods to use.
- (b) When defining the methods to use, the group should include both an ISO method and an AOAC method. The option to use either of these methods would make the Standard more universally acceptable and also easier to use. The exact analysis required and the suggested method of analysis should be included in the draft Standard in the suitable Section.

#### 22<sup>nd</sup> Session of the Codex Committee on Processed Fruits and Vegetables

2. The last session of the Committee (September/October 2004) agreed to the following<sup>2</sup>:

- (a) Those methods of analysis, including Codex Recommended Methods (CAC/RMs), requiring further clarification by CCMAS would be sent to this Committee together with the clarification provided by the CCPFV as indicated in Appendix VIII-Part I of ALINORM 05/28/27.  
The methods of analysis for aqueous coconut products would be circulated for comments and further consideration at the next session of the CCPFV as indicated in Appendix VIII-Part II of ALINORM 05/28/27 (see para. 9).
- (b) Those methods of analysis, including Codex Recommended Methods (CAC/RMs), identified by the CCPFV for the commodity standards under consideration, would be inserted into the relevant standards and circulated for comments and further consideration by the next session of the CCPFV as indicated in Appendices II through IV of ALINORM 05/28/27.

<sup>1</sup> ALINORM 03/27, para. 100.

<sup>2</sup> ALINORM 05/28/27, paras. 100 - 102.

3. In addition, the Committee endorsed the recommendation of the Working Group on Methods of Analysis to refer to Sampling Plan I (Inspection Level I, AQL = 4.5) and Sampling Plan II (Inspection Level II, AQL = 6.5) of the revoked Codex Sampling Plans for Prepackaged Foods (CODEX STAN 233-1969) for inclusion as an Annex to the Codex standards for processed fruits and vegetables when applicable, as the recently adopted General Guidelines for Sampling Plans (CAC/GL 50-2004) did not provide any specific sampling plans for prepackaged foods.

#### **CODEX COMMITTEE ON METHODS OF ANALYSIS AND SAMPLING**

##### **20<sup>th</sup> Session of the Codex Committee on Methods of Analysis and Sampling**

4. The 20<sup>th</sup> Session of CCMAS (October 1995) advised the commodity committees to consider replacing Codex Methods of Analysis and Sampling (CAC/RMs) with more modern methods as appropriate and to replace the CAC/RM numbers with the original literature references, if possible<sup>3</sup>. The 21<sup>st</sup> CCMAS further recommended that when the original reference of a CAC/RM was available, this reference should replace the CAC/RM number, and when the original reference was not available, the full text of the method should be included in the *Codex Alimentarius* and the CAC/RM number reference deleted<sup>4</sup>. The Codex Alimentarius Commission at its 22<sup>nd</sup> Session agreed to the abolition of the CAC/RM Numbering System as recommended by CCMAS<sup>5</sup>.

##### **23<sup>rd</sup> Sessions of the Codex Committee on Methods of Analysis and Sampling**

5. The 23<sup>rd</sup> Session of CCMAS (March 2001) noted that it would not be procedurally correct to endorse a method before relevant Codex provisions had been established<sup>6</sup>. In view of this, those methods of analysis corresponding to products which are not being considered by the CCPFV have been deleted from the previous list agreed to by the 20<sup>th</sup> session of the CCPFV. They will be presented to the Committee as new work is undertaken on the commodities they apply to in the subsequent sessions of the CCPFV.

##### **24<sup>th</sup> Session of the Codex Committee on Methods of Analysis and Sampling**

###### ***Processed Fruits and Vegetables***

6. The 24<sup>th</sup> Session of CCMAS (February 2002) asked for clarification from the Committee on the provision and/or commodity concerned by the determination of pH and sulphites. It was noted that a general method for sulphites had been endorsed and that it applied to processed fruits and vegetables.

7. The Committee also recommended that the Committee consider ISO 1842:1991 as it was specific for pH in processed fruits and vegetables, if the determination of pH was required in a standard under consideration (see para. 13).

8. The Committee asked for clarification on the amendment proposed to AOAC 968.30 for the determination of drained weight, and on how sections 2.1 and 2.2 should be amended (see para. 13).

###### ***Aqueous Coconut Products - Coconut Cream and Coconut Milk***

9. The Committee did not endorse the methods for moisture, non-fat solids, total fat and total solids for aqueous coconut products as the methods applied to milk (see para. 2 a).

###### ***Pickled Products***

10. The Committee deleted the methods for acidity, salt and drained weight for pickles as no relevant provisions existed in the draft Standard. See Appendix I to this document.

11. It recalled that the method proposed as Type IV for lead was temporarily endorsed since 1998 and asked the Committee whether this method was necessary since a general Codex method already existed as Type II. See Appendix I to this document.

12. As regards the determination of benzoic acid and sorbates, it was recommended that the Committee consider more modern methods (liquid chromatography) such as NMKL 124 (1997). See Appendix I to this document.

##### **26<sup>th</sup> Session of the Codex Committee on Methods of Analysis and Sampling**

13. The 26<sup>th</sup> Session of CCMAS (April 2005) agreed to endorse temporarily ISO method for the determination of pH in processed fruits and vegetables as Type IV and to endorse the NMKL method as Type II (see Appendix II to this document). All other methods proposed by the CCPFV<sup>7</sup> were endorsed<sup>8</sup>.

<sup>3</sup> ALINORM 97/23, para. 52.

<sup>4</sup> ALINORM 97/23A, para. 44.

<sup>5</sup> ALINORM 97/37, para. 145.

<sup>6</sup> ALINORM 01/23, para. 87.

<sup>7</sup> ALINORM 05/28/27-Appendix VIII:Part I.

<sup>8</sup> ALINORM 05/28/23, para. 58 and Appendix III.

**CONSIDERATION OF METHODS OF ANALYSIS AND SAMPLING FOR PROCESSED FRUITS AND VEGETABLES**

14. Attached is the list of methods of analysis and sampling being recommended for inclusion in processed fruits and vegetables. They are distributed as follows:

(a) **Appendix I:**

Methods of analysis for those processed fruits and vegetables under study by the Committee (pickled fruits and vegetables; canned vegetables; jams, jellies and marmalades) including relevant Codex Recommended Methods (CAC/RMs);

(c) **Appendix II:**

List of methods of analysis and sampling endorsed by CCMAS for use in processed fruits and vegetables in general and in certain commodity standards including Codex Recommended Methods (CAC/RMs) (for information only).

15. The consideration of the Appendices should be done together with the standards under study including the discussion on methods of analysis for aqueous coconut products as contained in ALINORM 05/28/27-Appendix VIII-Part II and comments received on this matter (CX/PFV 06/23/12).

16. When considering methods of analysis, the Committee should give due consideration to the provisions contained in the Procedural Manual of the Codex Alimentarius Commission in particular the *General Criteria for the Selection of Methods of Analysis* as set out in the *Principles for the Establishment of Codex Methods of Analysis*<sup>9</sup> and the *Relations between Commodity Committees and General Committees (Methods of Analysis and Sampling)*<sup>10</sup>.

17. It is also noted that where there is a specification or labelling requirement in the Standard, it is necessary to recommend a method(s) for the provision. However, if there is no specification or labelling requirement, there is no need to select methods of analysis.

**ACTIONS TO BE TAKEN BY THE CCPFV**

18. The Committee is invited to revise the methods of analysis and sampling listed in Appendices I and II and:

- (a) propose methods of analysis for the combinations of standard/provision (specification and/or labelling requirement) requiring them. In doing so, the Committee should clearly indicate if the revision corresponds to an update of the reference or to a new method which replaces the current one in force;
- (b) provide further clarification on those methods of analysis which were temporarily endorsed or not endorsed by CCMAS (see paras. 6, 9 10 - 13);
- (c) identify which CAC/RMs should be deleted or replaced by the original reference available and report to CCMAS accordingly;
- (d) incorporate the methods of analysis into the relevant standards under study namely: pickled fruits and vegetables; canned vegetables and jams, jellies and marmalades.

It is noted that a number of adopted Codex standards for processed fruits and vegetables e.g. canned applesauce, canned pears, canned stone fruits, canned bamboo shoots, kimchi, etc. refer to "*Volume 13 of the Codex Alimentarius*". The Committee is requested to identify those methods of analysis and sampling relevant to these commodities and incorporate them in the Standards in compliance with its decision to maintain the reference to the methods of analysis in the individual standards. In addition, sampling plans may also needed to be identified for inclusion in the standards when appropriate.

18. The methods agreed to be used for the revised standards will need to be submitted to CCMAS for endorsement and will supersede the methods currently in force for the products to which they apply.

<sup>9</sup> Procedural Manual of the Codex Alimentarius Commission, Section II, 15<sup>th</sup> Edition.

<sup>10</sup> Procedural Manual of the Codex Alimentarius Commission, Section II, 15<sup>th</sup> Edition.

**APPENDIX I**

**METHODS OF ANALYSIS AND SAMPLING**  
**For inclusion in the relevant commodity standards under study**  
**Except for those methods already endorsed,**  
**the methods of analysis being proposed or requiring further clarification (e.g. deleted, TE, etc.)**  
**are subject to endorsement by the CCMAS**

**1. Draft Codex Standard for Pickled Fruits and Vegetables (CX/PFV 06/23/4)**

Provision	Method	Principle	Note	Recommendation CCPFV to CCMAS	Type	Status
Arsenic	AOAC 952.13 (Codex General Method)	Colorimetry, diethyldithiocarbamate			II	E <sup>1</sup>
Arsenic	ISO 6634:1982	Spectrophotometry, silver diethyldithiocarbamate			III	E <sup>1</sup>
Benzoic acid	NMKL 103 (1984) AOAC 983.16	Gas Chromatography	The CCPFV should consider more modern methods (LC method) such as NMKL 124 (1997). See para. 12.		II	E <sup>2</sup>
Lead	AOAC 972.25 (Codex General Method)	Atomic absorption spectrophotometry			II	E <sup>1</sup>
Lead	ISO 6633:1984	Flameless atomic absorption spectrophotometry	The CCMAS recalled that the method proposed as Type IV for lead was temporarily endorsed since 1998 and asked the CCPFV whether this method was necessary since a general Codex method AOAC 972.25 <sup>2</sup> already existed as Type II. See para. 11.		IV	TE <sup>1</sup>
Sorbate	NMKL 103 (1984) AOAC 983.16	Gas Chromatography	The CCPFV should consider more modern methods (LC method) such as NMKL 124 (1997). See para. 12.		II	E <sup>2</sup>

<sup>1</sup> 22<sup>nd</sup> CCMAS, November 1998, ALINORM 99/23, App. III, Part 1/B.

<sup>2</sup> 24<sup>th</sup> CCMAS, November 2002, ALINORM 03/23, App. VI/H 1& 2.

<b>Provision</b>	<b>Method</b>	<b>Principle</b>	<b>Note</b>	<b>Recommendation CCPFV to CCMAS</b>	<b>Type</b>	<b>Status</b>
Sulphur Dioxide	EN 1988-1:1998-02 AOAC 990.28 (sulphites)	Optimized Monier-Williams method	See General Method for sulphites (food additives/processed fruits and vegetables).	General method for sulphites as endorsed for food additives	III	E <sup>3</sup>
Tin	AOAC 980.19 (Codex General Method)	Atomic absorption spectrophotometry			II	E <sup>1</sup>
Tin ≤ 250.0 mg/kg	ISO 2447:1998	Spectrophotometry	The CCPFV should consider using the General Codex Method AOAC 980.19 and clarify why this method is proposed.			NE <sup>2</sup>

<sup>3</sup> 24<sup>th</sup> CCMAS, November 2002, ALINORM 03/13, App. VI/G.1.

In addition, the CCMAS deleted the methods for the determination of **acidity**, **salt**, and **drained weight** as these provisions are not specified in the draft Standard for Pickles. See para. 10.

Provision	Method	Principle	Note	Recommendation CCPFV to CCMAS	Type	Status
Acidity	AOAC 942.15	Titrimetry	The 21 <sup>st</sup> CCPFV repealed <sup>4</sup> ISO 750:1981 in view of the decision of CCMAS that there can only be one Type I method for the same provision. The 22 <sup>nd</sup> CCMAS endorsed <sup>1</sup> AOAC 942.15 as Type I. The 24 <sup>th</sup> CCMAS deleted <sup>2</sup> this methods as no relevant provisions existed in the draft Standard.		I	<b>DELETED</b>
Drained weight	AOAC 968.30	Gravimetry	The 22 <sup>nd</sup> CCMAS endorsed <sup>1</sup> this methods as Type I. The 24 <sup>th</sup> CCMAS deleted <sup>2</sup> this methods as no relevant provisions existed in the draft Standard.		I	<b>DELETED</b>
Salt	AOAC 971.27 (Codex General Method)	Potentiometry (Determination of chloride, expressed as sodium chloride)	The 22 <sup>nd</sup> CCMAS endorsed <sup>1</sup> this methods as Type II. The 24 <sup>th</sup> CCMAS deleted <sup>2</sup> this methods as no relevant provisions existed in the draft Standard.		II	<b>DELETED</b>
Salt	AOAC 939.10	Volumetry, gravimetry, titrimetry (3 methods) (Determination of chloride, expressed as sodium chloride)	The 22 <sup>nd</sup> CCMAS endorsed <sup>1</sup> this methods as Type III. The 24 <sup>th</sup> CCMAS deleted <sup>2</sup> this methods as no relevant provisions existed in the draft Standard.		III	<b>DELETED</b>

<sup>4</sup> 21<sup>st</sup> CCPFV, September 2002, ALINORM 03/27, App. VI.

**2. Draft proposed Codex Standard for Certain Canned Vegetables (CX/PFV 06/23/8)**

Provision	Method	Principle	Note	Recommendation CCPFV to CCMAS	Type	Status
Alcohol insoluble solids (canned green peas)	AOAC 938.10	Gravimetry	AOAC 938.10 is already contained in CX/STAN 234/1999 <sup>5</sup> for canned green peas (Type I). The 22 <sup>nd</sup> CC PFV agreed <sup>6</sup> to recommend CCMAS to replace CAC/RM 47-1972 with AOAC 938.10. The 26 <sup>th</sup> CCMAS endorsed <sup>7</sup> AOAC 938.10 (Type I) for canned green peas. This method replaces CAC/RM 47-1972.		I	E <sup>7</sup>
Calcium (canned green peas)	AOAC 968.31 (Codex General Method for processed fruits and vegetables)	Complexometry Titrimetry	AOAC 968.31 is already contained in CX/STAN 234/1999 <sup>5</sup> for canned green peas (Type II). The 24 <sup>th</sup> CCMAS endorsed <sup>2</sup> AOAC 968.31 (Type II) as a general method for the determination of calcium in processed fruits and vegetables. This method replaces <sup>2</sup> CAC/RM 38-1970.		II	E <sup>2</sup>
Drained weight	AOAC 968.30 (Codex General Method for processed fruits and vegetables)	Sieving	The 26 <sup>th</sup> CCMAS endorsed <sup>7</sup> AOAC 968/30 (Type I) as a general method for the determination of drained weight in processed fruits and vegetables. This method replaces CAC/RM 36/1970 (see para 13).		I	E <sup>7</sup>

<sup>5</sup> Codex Standards and related texts are available for downloading at: <http://www.codexalimentarius.net/search/advancedsearch.do>.

<sup>6</sup> 22<sup>nd</sup> CC PFV, September 2004, ALINORM 05/28/27, App. VIII-Part 1.

<sup>7</sup> 26<sup>th</sup> CCMAS, April 2005, ALINORM 05/28/23, para. 58 & App. III/B.

Provision	Method	Principle	Note	Recommendation CCPFV to CCMAS	Type	Status
Fill of containers	CAC/RM 46-1972 (Codex General Method for processed fruits and vegetables)	Weighing	<p>The 21<sup>st</sup> CCPFV retained<sup>4</sup> CAC/RM 46-1972 retained this method for the determination of fill of containers.</p> <p>The 24<sup>th</sup> CCMAS retained<sup>2</sup> the method while deleting the references to “metal containers” and refer to ISO 90:1:1986 for determination of water capacity in metal containers.</p>		I	E <sup>2</sup>
Mineral impurities (canned palmito)	ISO 762:1982 (confirmed 1992) Level (≤0.1% m/m)	Gravimetry	<p>ISO 762:1982 is already contained in CX/STAN 234/1999<sup>5</sup> for canned palmito (Type I).</p> <p>AOAC 971.33 is already contained in CX/STAN 234/1999<sup>5</sup> for the determination of mineral impurities in jams, jellies, and marmalades and processed tomato concentrates (Type I and IV respectively).</p> <p>The 22<sup>nd</sup> CCPFV agreed<sup>6</sup> to recommend CCMAS to replace CAC/RM 49-1972 with AOAC 971.33 for the determination of mineral impurities (sand).</p> <p>The 26<sup>th</sup> CCMAS endorsed<sup>7</sup> AOAC 971.33 (Type I) as a general method for the determination of mineral impurities in jams, jellies and marmalades and processed tomato concentrates.</p> <p>This method replaces CAC/RM 49/1972 (see para. 13).</p> <p><i>The CCPFV is invited to consider whether ISO 762:1982 should be replaced by AOAC 971.33 as Type I method for the determination of mineral impurities in canned palmito or canned vegetables or as a general method for processed fruits &amp; vegetables.</i></p>		I	E <sup>5</sup>



Provision	Method	Principle	Note	Recommendation CCPFV to CCMAS	Type	Status
Total solids (canned mature processed peas)	AOAC 964.22 Level $\geq$ 19.5% of the weight of distilled water at 20°C which the sealed container will hold when completely filled	Vacuum oven	AOAC 964.22 is already contained in CX/STAN 234/1999 <sup>5</sup> for mature processed peas (Type I). The 24 <sup>th</sup> CCMAS endorsed <sup>2</sup> AOAC 920.151 (Type I) as a general method for the determination of total solids in processed fruits and vegetables. <i>The CCPFV is invited to consider whether AOAC 964.22 should be replaced by AOAC 920.151 (Type I) as a general method for the determination of total solids in processed fruits and vegetables.</i>		I	E <sup>5</sup>
Method for distinguishing type of peas	CAC/RM 48-1972					
Proper fill in lieu of drained weight (canned peas only)	CAC/RM 45-1972					

Provision	Method	Principle	Note	Recommendation CCPFV to CCMAS	Type	Status
Tough string test	CAC/RM 39-1970		<p><b>RETAIN:</b>  <b>SUGGEST to DELETE:</b> The “French Method” that appears in square brackets as the test is not measurable due to differences in interpretation of a what is a “Tough String”.</p>	<p>This will remain the same until the French Method is reviewed.</p> <p>[Text for French Method which has not appeared in previous literature for review by CCPFV and CCMAS is as follows:</p> <p>The percentage of tough string beans is determined on the drained weight of the product.</p> <p>For containers ≤ 850ml all beans must be tested.</p> <p>For containers &gt; 850ml, the test will be made on 500g of drained beans.</p> <p>Each bean will be broken in its middle, between two fingers.</p> <p>Keep only the beans when appears a tough string longer than 3cm.</p> <p>Weigh the beans for which a tough string has been detected.</p> <p>Calculate the percentages of the tough string beans in relation to the drained weight.]</p>		

**CAC/RM 39-1970<sup>8</sup>**  
**TOUGH STRING TEST**

**1. DEFINITION**

A tough string is a string that will support the weight of 250 g for five seconds or longer when tested in accordance with the procedure described below.

**2. PRINCIPLE**

Strings are removed from individual pods, fastened through a clamp assembly weighing 250 g, and hung so that the string supports the entire weight. If the string supports the weight for five seconds or more it is considered a tough string.

**3. APPARATUS**

**3.1 Weighted clamp**

Use battery clamp (with teeth filed off or turned back), spring operated clothes pin, or binder clip which presents a flat clamping surface. Attach weight so that entire assembly of weight and clamp weighs 250 g. See Figure 1. A bag containing lead pellets is convenient as a weight.

**4. PROCEDURE**

4.1 From the drained product select a representative sample of not less than 285 g. Record the weight of this test sample.

4.2 Break the individual bean units and set aside those that show evidence of tough strings. Remove the strings from the pods and retain the pod material for weighing.

4.3 Fasten the clamp assembly to one end of the string. Grasp the other end of the string with the fingers (a cloth may be used to aid in holding the string) and lift gently.

4.4 If the string supports the 250 g assembly for at least five seconds consider the bean unit as containing tough string. If the string breaks in less than five seconds, retest the broken parts that are 13 mm or longer to determine if such portions are tough.

4.5 Weigh the bean units which contain tough strings.

**5. CALCULATION AND EXPRESSION OF RESULTS**

$$\% \text{ m/m pods containing tough strings} = \frac{\text{pods containing tough strings (g)}}{\text{test sample (g)}} \times 100$$

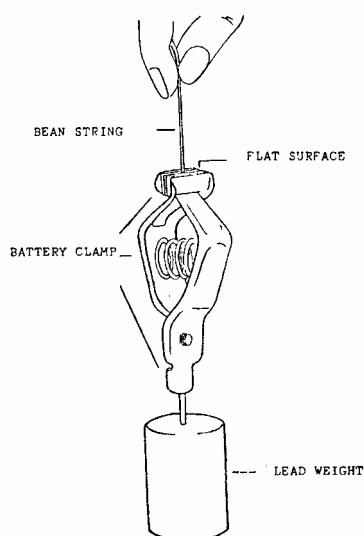


Figure 1 - Tough String Tester for Green or Wax Beans

<sup>8</sup> See the Section on Methods of Analysis and Sampling and indicate how to introduce the recommendation of the 22<sup>nd</sup> CCPFV into the method.

**CAC/RM 45-1972**  
**DETERMINATION OF PROPER FILL IN LIEU OF DRAINED WEIGHT**  
**(for canned peas only)**

**1. DEFINITION**

The method for determination of proper fill is an alternative method for determining a fill of canned peas in lieu of the drained weight.

**2. PROCEDURE**

2.1 Pour the contents of one container into an empty container of the same kind and size and return the contents completely to its original container.

2.2 Level off the contents thus returned irrespective of the quantity of liquid 15 seconds after the contents are so returned.

**3. EXPRESSION OF RESULTS**

3.1 A container with lid attached by double seam shall be considered to be completely filled when it is filled to the level 4.8 mm vertical distance below the top of the double seam.

3.2 A glass container shall be considered to be completely filled when it is filled to the level 12.7 mm vertical distance below the top of the container.

**CAC/RM 48-1972**  
**METHOD FOR DISTINGUISHING TYPE OF PEAS**

**1. DEFINITION**

This method is based on differentiation between starch granules of the wrinkled-seeded types and starch granules of the smooth-seeded types.

**2. REAGENTS AND MATERIALS**

- 2.1 Compound microscope - 100 to 250 magnification.  
- Phase contrast.
- 2.2 Microscope slide and cover glass.
- 2.3 Spatula.
- 2.4 Ethanol - 95% v/v.
- 2.5 Glycerine.

**3. PROCEDURE**

**3.1 Preparing mount**

- 3.1.1 Remove a small portion of the endosperm and place on glass slide;
- 3.1.2 Using a spatula grind the material with 95% v/v ethanol;
- 3.1.3 Add a drop of glycerine, place cover glass on material and examine under microscope.

**3.2 Identification**

Starch granules of the wrinkled-seeded types (garden peas, sweet) show up as clear cut, well defined, generally spherical particles.

Starch granules of the smooth-seeded types (round, early, Continental) show up as an amorphous mass with no well defined geometric shape.

**3. Proposed draft Codex Standard for Jams, Jellies and Marmalades (CX/PFV 06/23/9)**

Provision	Method	Principle	Note	Recommendation CCPFV to CCMAS	Type	Status
Calcium	AOAC 968.31	Complexometry Titrimetry	AOAC 968.31 is already contained in CX/STAN 234/1999 <sup>5</sup> for canned green peas (Type II). The 24 <sup>th</sup> CCMAS endorsed <sup>2</sup> AOAC 968.31 (Type II) as a general method for the determination of calcium in processed fruits and vegetables. This method replaces <sup>2</sup> CAC/RM 38-1970.		II	E <sup>2</sup>
Fill of containers	CAC/RM 46-1972 (Codex General Method for processed fruits and vegetables)	Weighing	The 21 <sup>st</sup> CCPFV retained <sup>4</sup> CAC/RM 46-1972 retained this method for the determination of fill of containers. The 24 <sup>th</sup> CCMAS retained <sup>2</sup> the method while deleting the references to “metal containers” and refer to ISO 90:1:1986 for determination of water capacity in metal containers.		I	E <sup>2</sup>
Mineral impurities	AOAC 971.33	Ashing	AOAC 971.33 is already contained in CX/STAN 234/1999 <sup>5</sup> for the determination of mineral impurities in jams, jellies, and marmalades and processed tomato concentrates (Type I and IV respectively). The 22 <sup>nd</sup> CCPFV agreed <sup>6</sup> to recommend CCMAS to replace CAC/RM 49-1972 with AOAC 971.33 for the determination of mineral impurities (sand). The 26 <sup>th</sup> CCMAS endorsed <sup>7</sup> AOAC 971.33 (Type I) as a general method for the determination of mineral impurities in jams, jellies and marmalades and processed tomato concentrates.		I	E <sup>7</sup>

Provision	Method	Principle	Note	Recommendation CCPFV to CCMAS	Type	Status
Soluble solids	AOAC 932.14C ISO 2173:1978 (Codex General Method for processed fruits and vegetables)	Refractometry	The 24 <sup>th</sup> CCMAS endorsed <sup>2</sup> AOAC 932.14C and ISO 2173:1978 (Type I) as general methods for the determination of soluble solids in processed fruits and vegetables.		I	E <sup>2</sup>

**4. Draft Codex Standard for Processed Tomato Concentrates (ALINORM 05/28/27-App. II)**

Provision	Method	Principle	Note	Recommendation CCPFV to CCMAS	Type	Status
Mineral impurities (sand)	AOAC 971.33	Gravimetry	AOAC 971.33 is already contained in CX/STAN 234/1999 <sup>5</sup> for the determination of mineral impurities in jams, jellies, and marmalades and processed tomato concentrates (Type I and IV respectively).  The 22 <sup>nd</sup> CC PFV agreed <sup>6</sup> to recommend CCMAS to replace CAC/RM 49-1972 with AOAC 971.33 for the determination of mineral impurities (sand).  The 26 <sup>th</sup> CCMAS endorsed <sup>7</sup> AOAC 971.33 (Type I) as a general method for the determination of mineral impurities in jams, jellies and marmalades and processed tomato concentrates.		II	E <sup>7</sup>

**5. Processed Fruits and Vegetables (except canned bamboo shoots, pH determined by AOAC 981.12)**

Provision	Method	Principle	Note	Recommendation CCPFV to CCMAS	Type	Status
pH	ISO 1842:1991	Potentiometry	See para. 13		IV	TE <sup>7</sup>

**4. Sampling - Draft Codex Standard for Pickled Fruits and Vegetables, proposed draft Codex Standards for Certain Canned Vegetables and Jams, Jellies and Marmalades**

**SAMPLING PLAN 1**

**(Inspection Level I, AQL = 6.5)**

<b>NET WEIGHT IS EQUAL TO OR LESS THAN 1 KG (2.2 LB)</b>		
<b>Lot Size (N)</b>	<b>Sample Size (n)</b>	<b>Acceptance Number (c)</b>
4,800 or less	6	1
4,801 - 24,000	13	2
24,001 - 48,000	21	3
48,001 - 84,000	29	4
84,001 - 144,000	38	5
144,001 - 240,000	48	6
more than 240,000	60	7
<b>NET WEIGHT IS GREATER THAN 1 KG (2.2 LB) BUT NOT MORE THAN 4.5 KG (10 LB)</b>		
<b>Lot Size (N)</b>	<b>Sample Size (n)</b>	<b>Acceptance Number (c)</b>
2,400 or less	6	1
2,401 - 15,000	13	2
15,001 - 24,000	21	3
24,001 - 42,000	29	4
42,001 - 72,000	38	5
72,001 - 120,000	48	6
more than 120,000	60	7
<b>NET WEIGHT GREATER THAN 4.5 KG (10 LB)</b>		
<b>Lot Size (N)</b>	<b>Sample Size (n)</b>	<b>Acceptance Number (c)</b>
600 or less	6	1
601 - 2,000	13	2
2,001 - 7,200	21	3
7,201 - 15,000	29	4
15,001 - 24,000	38	5
24,001 - 42,000	48	6
more than 42,000	60	7



**SAMPLING PLAN 2****(Inspection Level II, AQL = 6.5)**

<b>NET WEIGHT IS EQUAL TO OR LESS THAN 1 KG (2.2 LB)</b>		
<b>Lot Size (N)</b>	<b>Sample Size (n)</b>	<b>Acceptance Number (c)</b>
4,800 or less	13	2
4,801 - 24,000	21	3
24,001 - 48,000	29	4
48,001 - 84,000	38	5
84,001 - 144,000	48	6
144,001 - 240,000	60	7
more than 240,000	72	8
<b>NET WEIGHT IS GREATER THAN 1 KG (2.2 LB) BUT NOT MORE THAN 4.5 KG (10 LB)</b>		
<b>Lot Size (N)</b>	<b>Sample Size (n)</b>	<b>Acceptance Number (c)</b>
2,400 or less	13	2
2,401 - 15,000	21	3
15,001 - 24,000	29	4
24,001 - 42,000	38	5
42,001 - 72,000	48	6
72,001 - 120,000	60	7
more than 120,000	72	8
<b>NET WEIGHT GREATER THAN 4.5 KG (10 LB)</b>		
<b>Lot Size (N)</b>	<b>Sample Size (n)</b>	<b>Acceptance Number (c)</b>
600 or less	13	2
601 - 2,000	21	3
2,001 - 7,200	29	4
7,201 - 15,000	38	5
15,001 - 24,000	48	6
24,001 - 42,000	60	7
more than 42,000	72	8

**APPENDIX II**

This Appendix contains methods of analysis and sampling including Codex recommended methods of analysis and sampling (CAC/RMs) currently in force for selected processed fruits and vegetables. As CODEX/STAN 234-1999 (List of Methods of Analysis and Sampling in force in Codex Standards) does not contain all the methods of analysis for processed fruits and vegetables that have been endorsed by the Codex Committee on Methods of Analysis and Sampling, the document is presented as follows:

**Methods of analysis and sampling endorsed by the Codex Committee on Methods of Analysis and Sampling  
for inclusion in CX/STAN 234-1999 and in the individual standards for processed fruits and vegetables.**

1) **General Methods of Analysis for Processed Fruits and Vegetables**

Commodity	Provision	Method	Principle	Type	Status	Note
Processed fruits and vegetables	Calcium	AOAC 968.31	Titrimetry	II	E <sup>1</sup>	Replaces CAC/RM 38-1970
Processed fruits and vegetables	Drained weight	AOAC 968.30 (Codex General Method for Processed Fruits and Vegetables)	Sieving Gravimetry	I	E <sup>2</sup>	Replaces CAC/RM 36/1970
Processed fruits and vegetables (except pickled cucumbers)	Fill of containers	CAC/RM 46-1972	Weighing	I	E <sup>1</sup>	Retain the current method Delete references to “metal containers” and refer to ISO 90.1:1986 for determination of water capacity in metal containers
Processed fruits and vegetables	Mineral impurities (sand)	AOAC 971.33	Gravimetry	I	E <sup>2</sup>	

<sup>1</sup> 24<sup>th</sup> CCMAS, November 2002, ALINORM 03/23, App. VI/H.1 & 2.

<sup>2</sup> 26<sup>th</sup> CCMAS, April 2005, ALINORM 05/28/23, para. 58 & App. III/B

Commodity	Provision	Method	Principle	Type	Status	Note
Processed fruits and vegetables	Packing medium ≥ 10°Brix Canned berry fruits (raspberry, strawberry)	AOAC 932.12 ISO 2173:1978	Refractometry	I	E <sup>1</sup>	
Processed fruits and vegetables (except canned bamboo shoots, pH determined by AOAC 981.12)	pH	NMKL 179:2005	Potentiometry	II	E <sup>2</sup>	
Processed fruits and vegetables	Sodium chloride	ISO 3634:1979	Potentiometry	III	E <sup>1</sup>	Provision should read: “chloride expressed as sodium chloride”
Processed fruits and vegetables	Sulphites	EN 1988-1:1998-02 AOAC 990.28	Optimized Monier-Williams method	III	E <sup>1</sup>	General method for sulphites as endorsed for food additives <sup>3</sup>
Processed fruits and vegetables	Total solids	AOAC 920.151	Gravimetry	I	E <sup>1</sup>	

<sup>3</sup> 24<sup>th</sup> CCMAS, November 2002, ALINORM 03/13, App. VI/G.1.

2) **Methods of Analysis for specific commodities falling within this category**

Commodity	Provision	Method	Principle	Type	Status	Note
Canned Bamboo Shoots	Drained weight and Net weight	AOAC 968.30	Gravimetry	I	E <sup>4</sup>	General method for processed fruits and vegetables
Canned Bamboo Shoots	pH	AOAC 981.12	Potentiometry	I	E <sup>4</sup>	
Canned Stone Fruits	Drained weight	AOAC 968.30 ISO 2173:1978	Gravimetry	I	E <sup>1</sup>	General method for processed fruits and vegetables
Canned Stone Fruits	Soluble solids	AOAC 932.14C	Refractometry	I	E <sup>1</sup>	General method for processed fruits and vegetables
Kimchi	Drained weight	AOAC 968.30	Gravimetry	I	E <sup>5</sup>	General method for processed fruits and vegetables
Kimchi	Mineral impurities	AOAC 971.33	Ashing	I	E <sup>5</sup>	
Kimchi	Salt (sodium chloride)	AOAC 971.27 (Codex General Method)	Potentiometry (Determination of chloride, expressed as sodium chloride)	II	E <sup>5</sup>	
Kimchi	Total acidity	AOAC 942.15	Titrimetry	I	E <sup>5</sup>	

<sup>4</sup> 21<sup>st</sup> CCMAS, March 1997, ALINORM 97/23A, App. V-Part 2/D.

<sup>5</sup> 22<sup>nd</sup> CCMAS, November 1998, ALINORM 99/23, App. III, Part 1/B.