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CODEX/SUGARS/REPORT IV

JOINT FAO/WHO CODEX ALIMENTARIUS COMMISSION
Rome, 19 February - 1 March 1968
CODEX COMMITTEE ON SUGARS

REPORT OF 4th SESSION 18TH - 21ST APRIL, 1967

1. The Codex Committee on Sugars held its fourth session from 18th - 21st April, 1967 in London under the chairmanship of Mr. J. H. V. Davies of the United Kingdom. The meeting was attended by 55 delegates and observers from 19 Governments and 6 International Organisations. A list of those participating is attached at Appendix I. (omitted)

Soft and Brown Sugars (Step 7 of the Procedure)

2. The Committee had before it Codex/Sugars/25, Codex/Sugars/30 and Codex/Sugars/33. After some discussion, the Committee agreed that there should be one standard for all soft sugars and that there was no need to develop a standard for large-grain brown or yellow sugars (such as Demerara sugar). The following points were made in discussion:

(a) Definition

The Committee agreed that the definition should be amended as follows:

"Soft sugars are fine-grain moist sugars obtained from partially purified sugar syrups but do not include large-grain brown or yellow sugars such as Demerara sugar".

(b) Individual Criteria

The Committee agreed that the basic specifications should cover all soft sugars.

(i) Colour

It was agreed that the following additional specification should be added:

Colour: White to Dark Brown.

(ii) Invert Sugar

The Committee agreed that provision should be made for both a minimum and maximum limit. The minimum limit was agreed at 0.3% and the maximum at 12.0%. The United States delegation considered that a maximum of 12.0% might be too low to cover all types of soft sugars.

(iii) Extraneous Insoluble Matter

It was noted that ICUMSA had been unable to suggest an internationally agreed method of the determination of extraneous insoluble matter. The Committee agreed to delete the figure for this value and to include in the standard a note to the effect that a value was required but could not be included pending the development of a satisfactory method of analysis. The Committee agreed that this decision should apply to all the standards under consideration.

(iv) Sulphur Dioxide

The Committee agreed to maintain the figure of 40 mg/kg. The Australian delegation pointed out that the use of sulphur dioxide was prohibited in Australia. The delegation of the Federal Republic of Germany was doubtful about the technological need for sulphur dioxide. The Japanese delegate thought that the figure should be reduced to 30 mg/kg.

(v) Heavy Metals

The Committee noted that the Codex Committee on Food Additives proposed to lay down maximum tolerances for heavy metals in food. It was agreed that, pending a decision of the Commission on how provisions for heavy metals were to be included in commodity standards, these values should be maintained temporarily in the standard. The Committee agreed that this decision should apply to all the standards under consideration. The delegate of the Federal Republic of Germany was of the opinion that these criteria should not be included in sugar standards.

(vi) Additional Criteria

It was agreed that the standard should contain a provision for Loss on Drying. This should be 4.5% maximum (3 hours at 105°C). It was suggested that some criteria should be added to define more exactly what was meant by fine-grain.

(vii) Special Labelling Provision for Soft White Sugars

It was agreed that a product designated "Soft White Sugar" should comply with the specification and also with the following criteria

Total Sugar (saccharose) + invert sugar expressed as saccharose	97% min.
Conductivity Ash	0.2% max.
Colour (ICUMSA units)	60 max.

The standard as agreed is at Appendix II.

3. The Committee agreed that this standard should be held at Step 7 of the Codex Procedure for the Elaboration of World-Wide Standards and that it should be sent to governments for further comments.

Glucose Syrup (Step 7 of the Procedure)

4. The Committee considered the standard and made the following amendments:

(a) Definition. It was agreed that the definition should read as follows:

"Glucose Syrup is a purified concentrated aqueous solution of nutritive saccharides obtained from starch".

(b) Dextrose Equivalent. The dextrose equivalent was reduced from 25% to 20%.

(c) Sulphur Dioxide. The Committee agreed that the most important matter was the level of sulphur dioxide in the final product. It further agreed to restrict the provision for 400 mg/kg SO₂ to glucose syrup used for the manufacture of sugar confectionery only.

The revised standard is at Appendix III.

Dried Glucose Syrup (Step 7 of the Procedure)

5. The Committee considered the standard and made the following amendments:

(a) Dextrose Equivalent. The dextrose equivalent was reduced from 25% to 20%.

(b) Sulphur Dioxide. It was decided, on the basis of United Kingdom experiments, that the maximum sulphur dioxide content of dried glucose syrup used for the manufacture of sugar confectionery only, should be reduced from 400 mg/kg to 150 mg/kg.

The revised standard is at Appendix IV.

Dextrose Monohydrate (Step 7 of the Procedure)

6. The Committee considered the standard and amended the Definition to read as follows:

"Dextrose monohydrate is purified and crystallised D-glucose containing one molecule of water of crystallisation".

The revised standard is at Appendix V.

Dextrose Anhydrous (Step 7 of the Procedure)

7. The Committee considered the standard and amended the definition to read as follows:

"Dextrose anhydrous is purified and crystallised D-glucose without water of crystallisation".

The revised standard is at Appendix VI.

Lactose (Step 7 of the Procedure)

8. The Committee had before it Codex/Sugars/28 and Codex/Sugars/36. The Committee considered the standard and made the following amendments:

(a) Definition. The definition was amended to read:

"Lactose is the carbohydrate normally obtained from whey. It may be anhydrous or contain one molecule of water of crystallisation or be a mixture of both forms".

(b) Lactose Monohydrate. It was agreed that this should be changed to "Lactose anhydrous" and the value should be 99% min. (on a dry basis).

(c) Sulphated Ash. It was decided that this value should be raised to 0.3% (on a dry basis).

(d) Free Moisture. It was decided not to include this criterion but to prescribe instead a figure of 6.0% for Loss on Drying.

(e) pH Value. The Committee decided to widen the range to 4.5 to 7.0. The delegate of the Netherlands considered it would be better to use a value for Acidity based on titration.

(f) Sulphur Dioxide. It was agreed to delete the reference to sulphur dioxide. In removing the reference the Committee emphasised that no sulphur dioxide should be present in lactose.

9. The Committee agreed to refer to the Codex Committee on Food Hygiene the question whether lactose, being of animal origin, was more liable to bacteriological contamination than other sugars and whether any particular provisions were required. The reference should include the figures suggested by the Polish delegation which were as follows:

Standard plate count:	10 thousand per gram (max).
Coliform count :	Negative in 10 mg.
Yeast and mould :	100 per gram (max).

The revised standard is at Appendix VII.

Submission of Standards to Codex Alimentarius Commission

10. The Commission agreed that the standards at Appendices III to VII of this Report should be transmitted to the Secretariat of the Codex Alimentarius Commission with a view to adoption as provisional standards at the next Session of the Commission (Step 8 of the Procedure for the Elaboration of World-Wide Standards). The delegation of Denmark considered, however, that the standards should be retained at Step 7 until the Committee had been able to review the decisions of the Codex Committee on Methods of Analysis and Sampling on the methods of analysis and sampling set out at appendix X.

White Sugar (Step 4 of the Procedure)

11. The Committee had before it Codex/Sugars/22, Codex/Sugars/23, Codex/Sugars/26, Codex/Sugars/27, Codex/Sugars/31, Codex/Sugars/32, Codex/Sugars/34, Codex/Sugars/35 and Codex/Sugars 37 (Conference Room Document).

12. Some delegations considered that the realities of the sugar situation could only be met by having at least three standards. This number was necessary to prevent deception of the consumer, to ensure fair practice in the food trade and to facilitate international trade. They considered that it would be wrong not to make provision in the standards for sugars such as plantation-whites. Other delegations were of the opinion that one standard, set at a moderately high level, would be quite sufficient to safeguard the interests of consumers.

13. After a full discussion, the Committee decided to accept a single White Sugar standard with an exception, subject to suitable labelling requirements, for lower-grade sugars such as plantation-whites, mill-whites and turbinados. The Committee agreed to seek the views of member governments on whether the word 'white' should be permitted to be used for these sugars if always qualified by specific words such as 'plantation' or 'mill' and also to ask whether any other names should be allowed as synonyms for these types of sugar.

14. The Committee agreed to the standard which is at Appendix VIII. It was emphasised that the standard would prohibit the use of ultramarine and other blueing agents in sugar.

15. During the course of discussion, the following points were made:

(a) Sulphated Ash

It was decided that Sulphated Ash should be replaced by Conductivity ash.

(b) Loss on Drying

The Committee agreed that this value should not apply to sugar in lump or cube form. Some delegations considered that the figure of 0.1% for white sugar was too high since it might result in sugars that would deteriorate during storage.

(c) Sulphur Dioxide

The delegations of the Republic of Ireland and of the Netherlands drew attention to the use of sulphur dioxide in the production of beet sugar in many countries. It was not always possible for these sugars to comply with a sulphur dioxide limit of 10 mg/kg. Some delegations considered that a figure of 10 mg/kg should be laid down. The Committee agreed to a figure of 20 mg/kg; the delegation of the Federal Republic of Germany asked for its opposition to this figure to be recorded. The Committee also decided that a maximum figure of

70 mg/kg could be accepted for plantation-whites etc. many of which were produced by the sulphitation process. It was agreed that the attention of the Codex Committee on Food Additives should be drawn to the technological reasons for the figures included in the standard.

(d) Additional Criteria

The Committee agreed that a value for turbidity and for insoluble matter should be included in the standard, when there is agreement on satisfactory methods of determination.

16. The Committee discussed the Braunschweig Points system and agreed that, since they were recommending a single minimum standard for white sugar, it would not be necessary at this time to consider it further since it was mainly designed for the quality determination of different grades of white sugars.

Powdered Sugar (Icing Sugar) (Step 4 of the Procedure)

17. The Committee considered the standard (Appendix V) of Codex/Sugars/26 and the following points arose:

(a) Anti-caking Agents

The Committee agreed to ask member governments to consider the proposed list of anti-caking agents, to give their views on the technological need for these substances and the minimum levels of use of the substances which they considered to be necessary to achieve the desired effect.

(b) Particle Size Test

It was decided that a particle size test should be introduced into the standard, and that member governments should be asked to supply information on such a test (including the aperture size if a screen test is suggested).

The revised standard is at Appendix IX.

Submission to the Codex Alimentarius Commission

18. The Committee agreed that the standards at Appendices VIII and IX of this Report should be transmitted to the Secretariat of the Codex Alimentarius Commission with a view to adoption as draft provisional standards at the next Session of the Commission (Step 5 of the Procedure for the Elaboration of World-Wide Standards).

Methods of Sampling and Analysis

19. The Committee had before it Codex/Sugars/13 and Codex/Sugars/29. The representative of ICUMSA drew attention to certain inaccuracies in Codex/Sugars/29 and proposed the following amendments:

(a) Sulphur dioxide The range and accuracy of this test depend on the concentration of the test solution, namely:

- 1 to 7 mg/kg, test solution of 40 g/100 ml \pm 0.3 mg/kg
- 2 to 15 mg/kg, test solution of 20g/100 ml \pm 0.5 mg/kg
- 5 to 30 mg/kg, test solution of 10g/100 ml \pm 1.0 mg/kg
- 10 to 60 mg/kg, test solution of 5g/100 ml \pm 2.0 mg/kg.

(b) Number of Packages to be Sampled The formula $3\sqrt{r}$ should apply to all sizes of packages, provided that a minimum of 3 packages should be sampled.

20. The Committee agreed to accept the methods of sampling and analysis proposed by ICUMSA in Codex/Sugars/29 as amended.

21. The Committee considered Codex/Sugars/13, as amended by paragraph 14 of the Report of the Committee's Third Session. The following points arose during the discussion:

(a) Paragraph 15 (Codex/Sugars/13) the following amendment was agreed:-

Total Solids - Reference C.I.R.F. Method E-42 Vacuum oven method instead of Refractive Index.

(b) Paragraph 17 (Codex/Sugars/13) the following amendments were agreed:

Free Moisture - The reference should be to:

Loss on Drying and either of the following methods should be permitted:

U.S.P. 1965, Pg. 336 or

Karl Fischer.

Sulphated Ash - Reference I.C.M. p.100
Single sulphation.

22. The Committee agreed that the proposed methods of analysis and sampling should be sent to the Codex Committee on Methods of Analysis and Sampling for endorsement. The delegation of the United States said that they were of the opinion that two methods of analysis for sulphur dioxide in starch conversion products were not necessary. The United States considered that the method described on page 116 of I.C.M. should be used. The representative of ICUMSA said that in their experience this method of analysis was not sufficiently sensitive to detect sulphur dioxide at levels below 20 mg/kg.

The agreed methods of Sampling and Analysis are at Appendix X.

23. The Committee agreed that it would not be practicable for the Codex Committee on Sugars to meet until at least five months after the next session of the Commission. This would not take place until early 1968. The most suitable month in all respects for the next session of the Committee would be September 1968. It was agreed that these points should be drawn to the attention of the Commission.

SOFT SUGARS
(Step 7 of the Procedure)

Definition

Soft Sugars are fine-grain moist sugars obtained from partially purified sugar syrups, but do not include large-grain brown or yellow sugars, such as Demarara sugar.

Specification

(a)	Colour	White to Dark Brown
	Sucrose (saccharose) + invert sugar expressed as saccharose	88.0% min.
	Invert Sugar	(0.3% min. 12.0% max.
	Sulphated ash	3.5% max.
	Loss on Drying (3 hours at 105°C)	4.5% max.
	Sulphur dioxide	40 mg/kg max.
	Arsenic (As)	1 mg/kg max.
	Lead (Pb)	2 mg/kg max.
	Copper (Cu)	5 mg/kg max.
(b)	<u>Soft White Sugar</u>	
	(a) Sucrose (saccharose) + invert sugar expressed as saccharose	97% min.
	(b) Conductivity Ash	0.2% max.
	(c) Colour (ICUMSA units)	60 max.

Labelling

1. The provisions of this paragraph are subject to endorsement by the Codex Committee on Food Labelling and to any general provisions laid down by the Committee and subsequently approved by the Commission.
2. All products designated as 'soft sugar' must conform to this standard.
3. The name of a product conforming to the definition shall be such as to give a true indication of the nature of the sugar.
4. All products designated as 'soft white sugar' must conform to this standard and to the additional criteria listed under (b) of the specification.

Notes

- (1) A value for extraneous insoluble matter should be included when there is agreement on a satisfactory method of determination.
- (2) The question of the inclusion of provisions in respect of heavy metals in this standard and the values, if any, to be included are subject to decisions by the Codex Committee on Food Additives and the Commission.
- (3) The provision in respect of sulphur dioxide is subject to endorsement by the Codex Committee on Food Additives.
- (4) All percentages are by weight.

GLUCOSE SYRUP
(Step 8 of the Procedure)

Definition

Glucose Syrup is a purified concentrated aqueous solution of nutritive saccharides obtained from starch.

Specification

Total solids	70% min.
Dextrose Equivalent (reducing sugars expressed as D-glucose)	20% min. (on dry basis)
Sulphated ash	1.0% max. (on dry basis)
Sulphur dioxide	40 mg/kg max.
Sulphur dioxide (for manufacture of sugar confectionery only)	400 mg/kg max.
Arsenic (As)	1 mg/kg max.
Lead (Pb)	2 mg/kg max.
Copper (Cu)	5 mg/kg max.

Labelling

1. The provisions of this paragraph are subject to endorsement by the Codex Committee on Food Labelling and to any general provisions laid down by the Committee and subsequently approved by the Commission.
2. All products designated as 'Glucose Syrup' must conform to the standard.

Notes

- (1) A value for extraneous insoluble matter should be included when there is agreement on a satisfactory method of determination.
- (2) The question of the inclusion of provisions in respect of heavy metals in this standard and the values, if any, to be included are subject to decisions by the Codex Committee on Food Additives and the Commission.
- (3) The provisions in respect of sulphur dioxide are subject to endorsement by the Codex Committee on Food Additives.
- (4) All percentages are by weight.

DRIED GLUCOSE SYRUP
(Step 8 of the Procedure)

Definition

Dried glucose is glucose syrup from which the water has been partially removed.

Specification

Total solids	93% min.
Dextrose Equivalent (reducing sugars expressed as D-glucose)	20% min. (on dry basis)
Sulphated ash	1.0% max. (on dry basis)
Sulphur dioxide	40 mg/kg max.
Sulphur dioxide (for manufacture of sugar confectionery only)	150 mg/kg max.
Arsenic (As)	1 mg/kg max.
Lead (Pb)	2 mg/kg max.
Copper (Cu)	5 mg/kg max.

Labelling

1. The provisions of this paragraph are subject to endorsement by the Codex Committee on Food Labelling and to any general provisions laid down by the Committee and subsequently approved by the Commission.
2. All products designated as 'Dried Glucose Syrup' must conform to the Standard.

Notes.

- (1) A value for extraneous insoluble matter should be included when there is agreement on a satisfactory method of determination.
- (2) The question of the inclusion of provisions in respect of heavy metals in this standard and the values, if any, to be included are subject to decisions by the Codex Committee on Food Additives and the Commission.
- (3) The provisions in respect of sulphur dioxide are subject to endorsement by the Codex Committee on Food Additives.
- (4) All percentages are by weight.

DEXTROSE MONOHYDRATE
(Step 8 of the Procedure)

Definition

Dextrose monohydrate is purified and crystallised D-glucose containing one molecule of water of crystallisation.

Specification

Dextrose (expressed as D-glucose)	99.5% min. (on dry basis)
Total solids	90.0% min.
Sulphated ash	0.25% max. (on dry basis)
Sulphur dioxide	20 mg/kg max.
Arsenic (As)	1 mg/kg max.
Lead (Pb)	2 mg/kg max.
Copper (Cu)	2 mg/kg max.

Labelling

1. The provisions of this paragraph are subject to endorsement by the Codex Committee on Food Labelling and to any general provisions laid down by the Committee and subsequently approved by the Commission.
2. All products designated as 'Dextrose Monohydrate' must conform to the standard.

Notes

- (1) A value for extraneous insoluble matter should be included when there is agreement on a satisfactory method of determination.
- (2) The question of the inclusion of provisions in respect of heavy metals in this standard and the values, if any, to be included are subject to decisions by the Codex Committee on Food Additives and the Commission.
- (3) The provision in respect of sulphur dioxide is subject to endorsement by the Codex Committee on Food Additives.
- (4) All percentages are by weight.

DEXTROSE ANHYDROUS

(Step 8 of the Procedure)

Definition

Dextrose anhydrous is purified and crystallised D-glucose without water of crystallisation.

Specification

Dextrose (expressed as D-glucose)	99.5% min. (on dry basis)
Total solids	98.0% min.
Sulphated ash	0.25% max. (on dry basis)
Sulphur dioxide	20 mg/kg max.
Arsenic (As)	1 mg/kg max.
Lead (Pb)	2 mg/kg max.
Copper (Cu)	2 mg/kg max.

Labelling

1. The provisions of this paragraph are subject to endorsement by the Codex Committee on Food Labelling and to any general provisions laid down by the Committee and subsequently approved by the Commission.
2. All products designated as 'Dextrose Anhydrous' must conform to the standard.

Notes

- (1) A value for extraneous insoluble matter should be included when there is agreement on a satisfactory method of determination.
- (2) The question of the inclusion of provisions in respect of heavy metals in this standard and the values, if any, to be included are subject to decisions by the Codex Committee on Food Additives and the Commission.
- (3) The provision in respect of sulphur dioxide is subject to endorsement by the Codex Committee on Food Additives.
- (4) All percentages are by weight.

LACTOSE
(Step 8 of the Procedure)

Definition

Lactose is the carbohydrate normally obtained from whey. It may be anhydrous or contain one molecule of water of crystallisation or be a mixture of both forms.

Specification

Lactose anhydrous	99.0% min. (on dry basis)
Sulphated ash	0.3% max. (on dry basis)
Loss on Drying (16 hours at 120°C)	6.0% max.
pH (10% solution)	4.5 to 7.0
Arsenic (As)	1 mg/kg max.
Lead (Pb)	2 mg/kg max.
Copper (Cu)	2 mg/kg max.

Labelling

1. The provisions of this paragraph are subject to endorsement by the Codex Committee on Food Labelling and to any general provisions laid down by the Committee and subsequently approved by the Commission.
2. All products designated as 'Lactose' must conform to the standard.

Notes

- (1) A value for extraneous insoluble matter should be included when there is agreement on a satisfactory method of determination.
- (2) The question of the inclusion of provisions in respect of heavy metals in this standard and the values, if any, to be included are subject to decisions by the Codex Committee on Food Additives and the Commission.
- (3) All percentages are by weight.

WHITE SUGAR
(Step 5 of the Procedure)

Definition

White Sugar is purified and crystallised sucrose (saccharose).

Specification

(a) Polarisation	99.7° min.
Invert Sugar	0.04% max.
Conductivity Ash	0.04% max.
Loss on Drying (3 hours at 105°C)	0.1% max.

(This value does not apply to white sugar in lump or cube form)

Colour (ICUMSA units)	60 max.
Sulphur Dioxide	20 mg/kg max.

(b) Polarisation	99.5° min.
Invert Sugar	0.1% max.
Conductivity Ash	0.1% max.
Loss on Drying (3 hours at 105°C)	0.1% max.
Colour (ICUMSA units)	150 max.
Sulphur Dioxide	70 mg/kg max.

(c) Arsenic (As)	1 mg/kg max.
Lead (Pb)	2 mg/kg max.
Copper (Cu)	2 mg/kg max.

Labelling

1. The provisions of this paragraph are subject to endorsement by the Codex Committee on Food Labelling and to any general provisions laid down by the Committee and subsequently approved by the Commission.

2. All products designated as 'White Sugar' must conform to the specifications at (a) and (c) and products not conforming may not be so designated.

3. Products which comply with the specifications at (b) and (c) but not at (a) must be designated as 'plantation', 'mill' or 'turbinado'.

4. All products designated as 'plantation', 'mill' or 'turbinado' must conform to the specifications under (b) and (c).

Notes

- (1) Value for insoluble matter and for turbidity should be included when there is agreement on satisfactory methods of determination.
- (2) The question of the inclusion of provisions in respect of heavy metals in this standard and the values, if any, to be included are subject to decisions by the Codex Committee on Food Additives and the Commission.
- (3) The provisions in respect of sulphur dioxide are subject to endorsement by the Codex Committee on Food Additives.
- (4) All percentages are by weight.

POWDERED SUGAR (ICING SUGAR)
(Step 5 of the Procedure)

Definition

Powdered Sugar (Icing Sugar) is finely pulverised white sugar with or without the addition of an anti-caking agent.

Specification

1. That part of powdered sugar other than the anti-caking agent shall conform in every respect to the specifications at (a) and (c) of the standard for white sugar.
2. Powdered sugar may contain starch, in amounts not exceeding 2% by weight, provided that no other anti-caking agent is present.
3. Powdered sugar, when starch is not present, may contain one or more inorganic anti-caking agents. The total content of inorganic anti-caking agents shall not exceed 1.5% by weight.
4. The following inorganic anti-caking agents shall be permitted:

Tri-calcium phosphate
 Magnesium carbonate
 Magnesium tri-silicate
 Sodium-calcium-aluminium silicate
 Calcium silicate
 Dehydrated silica gel

This provision is subject to endorsement by the Codex Committee on Food Additives except that that Committee has already endorsed the use of magnesium carbonate up to 1.5% by weight.

5. Particle size test [to be developed].

Labelling

1. The provisions of this paragraph are subject to endorsement by the Codex Committee on Food Labelling and to any general provisions laid down by the Committee and subsequently approved by the Commission.
2. All products designated as 'powdered sugar' or 'icing sugar' must conform to this standard.
3. The presence of anti-caking agents shall be declared on the label or containers of powdered sugar.

I Methods of Analysis1. WHITE SUGAR

Analytical Criterion	Method	Accuracy	Reference
Polarisation expressed as sucrose	ICUMSA method for raw sugars (without lead). Lead defecation only if necessary; no correction for 'lead effect'	$\pm 0.1^{\circ}$	Ic.R1950p.84
Invert Sugar	KNIGHT & ALLEN method for contents below 0.02%	$\pm 0.005\%$	Ic.M. p. 29
	BERLIN INSTITUTE method for contents between 0.02% and 0.10%	$\pm 0.005\%$	Ic.M. p. 25
	LANE & EYNON method for contents above 0.1%	$\pm 0.01\%$	Ic.M. p. 13
Conductivity Ash	ICUMSA method for conductivity ash using 5g/100ml or 28g/100g solutions; with 5g/100ml, the conductivity expressed in micromhos/cm should be multiplied by the standard C-ratio factor of 18×10^{-4}	$\pm 0.001\%$	Ic.R1962 p.12
Loss on Drying	ICUMSA method using a minimum sample size of 20g (without grinding)	$\pm 0.005\%$	Ic.M. p. 44
Colour(ICUMSA units)	Measurement by ICUMSA method 4 on a solution of 50g/100g after filtration through a membrane filter of pore size 0.4μ to 0.6μ . Results to be expressed as 'ICUMSA units' as defined in Ic.M.p.58	not yet established	IcM.pp 57 & 58 IcR 1958 p.52
Sulphur Dioxide	CARRUTHERS, HEANEY & OLDFIELD method. The range and accuracy depend on the concentration of the test solution 1 - 7 mg/kg, test solution of 40g/100ml 2 - 10 mg/kg, test solution of 20g/100 ml	$\pm 0.3\text{mg/kg}$ $\pm 0.5\text{mg/kg}$	

1. WHITE SUGAR (Contd.)

Analytical Criterion	Method	Accuracy	Reference
Sulphur Dioxide (cont.)	5 -30mg/kg, test solution of 10g/100 ml 10 -60mg/kg, test solution of 5g/100 ml	± 1.0mg/kg ± 2.0mg/kg	I.S.J.1965 p 364
Arsenic (As) ϕ	Diethyldithiocarbamate method using wet ashing and colorimetric measurement with silver diethyldithiocarbamate		AOAC, 1965 24.011
Lead (Pb) ϕ	ICUMSA method with wet ashing, satisfactory below a level of 0.5mg/kg	± 0.1mg/kg	IC.M. p.48(c)
Copper (Cu) ϕ	ICUMSA method with wet ashing, for levels referred to in Codex standards	± 0.5mg/kg	IC.M.p.106

ϕ Subject to any recommendation by the Codex Committee
on Food Additives

2. SOFT SUGARS

(a) White to Dark Brown

Analytical Criterion	Method	Accuracy	Reference
Sucrose (saccharose) + invert sugar expressed as sucrose	TATE & LYLE Invertase Modification of LANE & EYNON method		Ic.M.p.71
Invert Sugar	LANE & EYNON method (without inversion)		Ic.M.p.71
Sulphated Ash	Gravimetric double sulphation method		Ic.M.p.36
Loss on drying	ICUMSA method using 10g		Ic.M.p.44
Sulphur dioxide	CARRUTHERS, HEANEY & OLDFIELD method The range and accuracy depend on the concentration of the test solution. 1-7mg/kg, test solution of 40g/100ml 2-15mg/kg, test solution of 20g/100ml 5-30mg/kg, test solution of 10g/100ml 10-60mg/kg, test solution of 5g/100ml	± 0.3mg/kg ± 0.5mg/kg ± 1.0mg/kg ± 2.0mg/kg	I.S.J. 1965 p.364
Arsenic (As) ϕ	Diethyldithiocarbamate method using wet ashing and colorimetric measurement with silver diethyldithiocarbamate		AOAC, 1965 24.011
Lead (Pb) ϕ	ICUMSA method with wet ashing, satisfactory below a level of 0.5mg/kg	± 0.1mg/kg	Ic.M. p.48(c)
Copper (Cu) ϕ	ICUMSA method with wet ashing for levels referred to in Codex standards	± 0.5mg/kg	Ic.M. p.106

ϕ Subject to any recommendation by the Codex Committee on Food Additives '79.

(b) Soft White Sugar

Artificial Criterion	Method	Accuracy	Reference
Sucrose(saccharose) + invert sugar expressed as sucrose	TATE & LYLE Invertase modification of LANE & EYNON method		Ic.M.p.71
Conductivity Ash	ICUMSA method for conductiv- ity ash using 5g/100ml or 28g/100g solutions; with 5g/100ml the conductivity expressed in micromhos/cm should be multiplied by the standard C-ratio factor of 18×10^{-4}		Ic.R.1962p.12
Colour(ICUMSA units)	Measurement by ICUMSA method 4 on a solution of 50g/100g after filtration through a membrane filter of pore size 0.4μ to 0.6μ		Ic.M.pp.57 & 58 Ic.R.1958 p.52

3. LACTOSE

Analytical Criterion	Method	Accuracy	Reference
Lactose anhydrous	LANE & FYNON method		Ic.M. p. 13
Sulphated Ash	Single sulphation		Ic.M. p.100
Loss on drying	U.S.P. method(drying 16 hours at 130°C.) or KARL FISCHER method		U.S.P. 1965 p.336 Angew.Chem. 1935, <u>48</u> , 394.
pH(10% solution)	by pH meter		Ic.M. p.44
Arsenic (As) ϕ	Diethyldithiocarbamate method using wet ashing and colorimetric measure- ment with silver diethyldi- thiocarbamate		AOAC, 1965 24.011
Lead (Pb) ϕ	ICUMSA method with wet ashing satisfactory below a level of 0.5mg/kg	\pm 0.1mg/kg	Ic.M. p.48(c)
Copper (Cu) ϕ	ICUMSA method with wet ashing for levels referred to in Codex standards	\pm 0.5mg/kg	Ic.M. p.106

ϕ Subject to any recommendation by the Codex
Committee on Food Additives

4. GLUCOSE SYRUP, DRIED GLUCOSE SYRUP

Analytical criterion	Method	Accuracy	Reference
Total Solids	Drying in vacuum oven		C.I.R.F. Method E. 42
Extrose Equivalent (reducing sugars expressed as D-glucose)	LANE & EYNON method		Ic. M p. 101
Sulphated ash	Single sulphation method		Ic. M p. 100
Sulphur dioxide	CARRUTHERS, HEANEY & OLDFIELD method. The range and accuracy depend on the concentration of the test solution, namely 1-7 mg/kg, test solution of 40g/100 ml 2-15mg/kg, test solution of 20g/100 ml 5-30mg/kg, test solution of 10g/100 ml 10-60mg/kg, test solution of 5g/100 ml	± 0.3 mg/kg ± 0.5 mg/kg ± 1.0 mg/kg ± 2.0 mg/kg	I.S.J. 1965 p.364
Arsenic (As) δ	Diethyldithiocarbamate method using wet ashing and colorimetric measurement with silver diethyldithiocarbamate		AOAC, 1965 24.011
Lead (Pb) δ	ICUMSA method with wet ashing, satisfactory below a level of 0.5 mg/kg	± 0.1 mg/kg	Ic.M p. 48 (c)
Copper (Cu) δ	ICUMSA method with wet ashing for levels referred to in Codex standards	± 0.5 mg/kg	Ic.M p. 106

δ Subject to any recommendation by the Codex Committee on Food Additives

5. DEXTROSE MONOHYDRATE & DEXTROSE ANHYDROUS

Analytical Criterion	Method	Accuracy	Reference
Dextrose (expressed as D-glucose)	LANE & EYNON method		Ic.M p.101
Total solids	Drying at 100° C for 4 hours under reduced pressure.		Ic.M p.113
Sulphated ash	Single sulphation method		Ic.M p.100
Sulphur dioxide	CARRUTHERS, HEANEY & OLDFIELD method. The range and accuracy depend on the concentration of the test solution, namely 1-7 mg/kg, test solution of 40g/100 ml 2-15mg/kg, test solution of 20g/100 ml 5-30mg/kg, test solution of 10g/100 ml 10-60mg/kg, test solution of 5g/100 ml	± 0.3 mg/kg ± 0.5 mg/kg ± 1.0 mg/kg ± 2.0 mg/kg	I.S.J.1965 p.364
Arsenic (As) ϕ	Diethyldithiocarbamate method using wet ashing and colorimetric measurement with silver diethyldi- thiocarbamate		AOAC, 1965 24.011
Lead (Pb) ϕ	ICUMSA method with wet ashing, satisfactory below a level of 0.5 mg/kg	± 0.1 mg/kg	Ic.M p.48(c)
Copper (Cu) ϕ	ICUMSA method with wet ashing for levels referred to in Codex standards	± 0.5 mg/kg	Ic.M p.106

ϕ Subject to any recommendation by the Codex
Committee on Food Additives

II METHOD OF SAMPLING
(for White and Soft Sugars)

1. Sampling from bags (Ic.M. p.86)

Preferably, samples should be taken from opened bags. When this is not possible samples should be taken by piercing the bags with a trier of the type described in Ic.M. p.80, the punctures being sealed by appropriate means, e.g. with adhesive tape for paper bags. For domestic packets up to 5 kg in weight, the entire package should be taken.

2. Number of samples to be taken

The maximum size of a lot is 500 tons. The number of packages to be sampled will be $\sqrt[3]{T}$ (where T is the tonnage of the lot) with a minimum of 3 packages. In all cases, the gross sample set apart will be at least 2 kg; more than one insertion of the trier being made when necessary.

3. Preparation of the sample for analysis (Ic.M. p.83)

From the gross sample collected as described above and mixed, 4 sub-samples each of at least 500 g should be prepared by the ICUMSA method for raw sugars and sealed in moisture-proof containers.

III ABBREVIATIONS USED IN THE APPENDIX

Ic.M.	=	ICUMSA Methods of Sugar Analysis (1964).
Ic.R.	=	ICUMSA Report (Report of the Proceedings of the . . . Session).
I.S.J.	=	International Sugar Journal.
C.I.R.F.	=	Corn Industries Research Foundation.
A.O.A.C.	=	Association of Official Analytical Chemists.