

# THE QUALITY OF IMPORTED RAW SUGARS

by R. P. JENNINGS and RITA VAN KEPPEL

## Introduction

During the 1965/66 season the Refinery has processed more than 117,500 tons of imported raw sugars. Of this total 38.7 per cent came from Mauritius, 28.7 per cent from Brazil, 18.9 per cent from San Domingo and 13.7 per cent from Thailand. The analyses of these sugars is the subject of this paper.

## Sugars Imported in Previous Seasons

10,600 tons of raw sugar from Cuba was processed at the Refinery in 1961. No imported sugars were refined during the 1962/63 and 1963/64 seasons but in 1964/65 a total of 49,350 tons was imported from Taiwan, Indonesia and San Domingo.

## Analysis of Imported Sugars

Table I compares the analysis of Cuban imported sugars with the average analysis of Natal raw sugar for the 1961/62 season.

Table I

	Cuban Raws	Natal Raws
<i>Raw Sugar</i>		
Pol. °	96.86	98.57
Reducing sugars. %	0.95	0.25
Sulphated Ash. %	0.43	0.38
RS/Ash Ratio.	2.21	0.66
Moisture. %	0.96	0.36
Safety Factor.	0.31	0.25
Insolubles. %	0.05	0.04
<i>ICUMSA Washed Sugar</i>		
Reducing sugars. %	0.04	0.05
Sulphated Ash. %	0.06	0.15
Starch. p.p.m.	64	560
S.G.S. mm	0.59	0.59

No figures are available for the filterability of Cuban raws, but it was the experience of the Refinery that Cuban sugars were far easier to process than their Natal counterparts.

The comparative analyses of imported sugars and Natal sugars for the 1964/65 season are shown in Table II.

Table II

	Taiwan	Indonesia	San Domingo	Natal
<i>Raw Sugar</i>				
Pol. °	97.58	96.66	97.30	98.60
Reducing Sugars. %	0.65	1.12	0.87	0.27
Sulphated Ash. %	0.63	0.65	0.39	0.34
RS/Ash Ratio.	1.03	1.72	2.23	0.79
Moisture. %	0.56	0.70	0.64	0.37
Safety Factor	0.23	0.21	0.24	0.26
Insolubles. %	0.03	0.045	0.04	0.03
Gums. %	0.19	0.14	0.20	0.22
<i>Washed Sugar</i>				
Reducing Sugar. %	0.01	0.02	0.07	0.03
Sulphated Ash. %	0.14	0.07	0.11	0.11
Starch. p.p.m.	400	13	140	520
S.G.S. mm	0.65	0.66	0.50	0.58
Filterability. %	65	51	32	36
Tons processed	14,945	10,459	23,948	418,747

While the analyses of the two consignments from San Domingo were very similar in most respects, the larger, 12,860 tons, possessed a 24 per cent filterability compared with 41 per cent for the smaller consignment of 11,090 tons.

Table III summarises the analyses of sugars imported during 1965. The average of Natal raws up to the end of November is given for comparative purposes:

Table III

	Mauritius	Brazil	San Domingo	Thailand	Natal
<i>Raw Sugar</i>					
Pol. °	98.69	97.51	97.39	97.04	98.57
Reducing Sugars. %	0.20	0.95	0.79	0.91	0.24
Sulphated Ash. %	0.30	0.31	0.46	0.49	0.35
RS/Ash Ratio.	0.67	3.07	1.72	1.86	0.69
Moisture. %	0.33	0.63	0.64	0.75	0.45
Safety Factor	0.25	0.25	0.25	0.25	0.31
Insolubles. %	0.04	0.03	0.03	0.05	0.07
Gums. %	0.19	0.17	0.13	0.16	0.23
Starch. p.p.m.	410	130	80	190	630
<i>Washed Sugar</i>					
Sulphated Ash. %	0.12	0.05	0.13	0.08	0.11
Gums. %	0.15	0.13	0.08	0.14	0.18
Starch. p.p.m.	320	90	40	150	510
Silica. p.p.m.	100	30	80	25	100
Total P <sub>2</sub> O <sub>5</sub> . p.p.m.	30	20	5	5	30
Wax. p.p.m.	230	120	100	70	130
S.G.S. mm	0.67	0.48	0.45	0.69	0.59
Filterability. %	26	59	54	56	34
Tons Processed	45,450	33,792	22,268	16,069	253,400

The 33,792 tons of sugar imported from Brazil included 11,193 tons of white sugar, extremely high in moisture and reducing sugars either as a result of deterioration or "doctoring" with an invert solution to reduce the polarisation. The average pol of the sugar was 98.55°.

#### Comparison of Imported and Local Raw Sugars

It is apparent that there are considerable differences between Natal raws and those produced in Brazil, Thailand, Taiwan, San Domingo, Indonesia and Cuba. Sugars from these countries are characterised by:

1. Low polarisation.
2. High invert/ash ratio.
3. Low starch — exception Taiwan.
4. Good filterability.

While it may appear from analytical differences that sugars imported from these countries are more desirable, from the refiners point of view, than local sugars — two points should be noted. Firstly, many of the imported sugars are difficult to handle because of stickiness, this was especially noticeable with Indonesian and Thailand sugars. Secondly, difficulties are encountered in handling large quantities of low pol sugar in a refinery geared for higher polarising Natal raws. The excess load placed on the Recovery House was, at times, critical.

Sugar produced in Natal and in Mauritius are similar in many respects. Polarisation and reducing/sugar ash ratio are practically the same, while both filter less satisfactorily than other imported sugars. The concentration of silica, phosphate, wax, gums and starch in the crystal of Mauritian and Natal sugars is above the average.

The quality of Mauritian sugar varied considerably among the nine consignments received. Filterability ranged from 37 per cent for a consignment received in May to 11 per cent for sugars processed in August.

While these differences may parallel the variations in quality of raw sugars produced by different Natal mills, it is pertinent to mention that the grain size of every consignment from Mauritius fell within the range 0.62 mm to 0.74 mm.

#### Analytical Methods

Analysis were carried out on composites representing the sugar processed from each source over periods of ten days. Pol, reducing sugars, moisture and ash in raw sugar were determined daily.

Insolubles were determined by centrifuging in graduated tubes. (3).

Gums in both raw sugar and crystal were precipitated from solutions by acidified alcohol. (6).

Starch was determined spectrophotometrically by the iodide complex method. (1).

Filterability determinations were made using the Colonial Sugar Refining Company method at 20° C. (5).

Phosphate (2) and silica (2, 4) were determined colorimetrically.

Wax was extracted by the method suggested by Alexander (2).

The methods recommended by the South African Sugar Technologists Association (7) were followed for all other analyses.

#### Summary

Analytical data are given for imported sugars processed at Hulett's Refinery during 1965. Reference is made to sugars imported in previous years. Essential differences between imported sugars and Natal sugars are noted.

#### Acknowledgments

The authors express their thanks to the staffs of the laboratories of Hulett's S.A. Refineries and to the Directors for permission to publish the results used in this paper.

**References:**

1. Alexander, J. B. Some Notes on Starch in the Sugar Industry. Proc. S.A.S.T.A. 28, 1954, p. 100.
2. Alexander, J. B. Some Observations on the Filterability of Natal Raw Sugars. Proc. S.A.S.T.A. 31, 1957, p. 70, 71.
3. Alexander, J. B., and Douwes-Dekker, K. The Presence and Determination of Insoluble Impurities in Raw Sugar. Quart. Bul. S.M.R.I. July, 1959, p. 20
4. Alexander, J. B. and Parrish, J. R. Silica in Raw and Clarified Cane Juices. S.A. Sugar Journal, 37, September, 1953, p. 573.
5. I.C.U.M.S.A. Proceedings 12th Session (Subject 10) Washington, 1958.
6. Jennings, R. P. Some Notes on the Determination of Gums in Sugar Products with Special Reference to their Distribution in Hulsar Process. Proc. S.A.S.T.A. Vol. 38, 1964, p. 87.
7. South African Sugar Technologists Association Laboratory Manual for South African Sugar Factories, fifth edition, 1962.

*For discussion see page 204*