

COMMITTEE ON STANDARDIZATION OF CHEMICAL CONTROL.

ANNUAL REPORT FOR SEASON 1934-35.

Three meetings of the Committee were held during the year on May 8th, 1934, November 1st, 1934, and March 7th, 1935, respectively. There is not very much progress to report, the abnormal conditions of the past milling season not being very favourable to the further development of standard methods or to opportunity of studying and collating them.

STANDARD CLERGET METHOD FOR SUCROSE DETERMINATION.

Thus the recommendation of this committee that the double polarization method No. 4 of Jackson & Gillis as published in Scientific Paper No. 375 of the U.S. Bureau of Standards be adopted has not yet been officially put into practice.

It was formally accepted and approved at last year's general conference and its advantages in scientific soundness and lesser liability to errors of manipulation or errors arising out of changes in the composition of the products under test, over the previous official method have been generally recognised by those concerned.

Nevertheless, it was referred back to the Committee for the consideration of certain details of procedure, which entailed the postponement of its official adoption until the following season. It was decided to make deleading optional, calling attention to the fact that if considerable excess of the lead acetate reagent were avoided deleading would be unnecessary. If the very small interval of time spent on deleading were avoided, the amended method need not take appreciably longer time than the older method, while offering the advantages mentioned.

PUBLICATION OF REVISED OFFICIAL METHODS.

One consequence of the above delay was that, even if it had been possible to make time for the editing of our official methods to include the amendments of recent years, it could not be done until this matter of inversion practice had been finally settled. This work therefore still remains to be done.

FOUR-HOURLY VERSUS EIGHT-HOURLY TESTS FOR MIXED JUICE FOR SUCROSE DETERMINATION.

Some misunderstanding appeared to exist in this matter. Although the last official ruling in the proceedings of the Association, in the 1931 record,

pages 10 and 36 states that a four-hourly system of tests had been adopted as the result of a ballot among factory chemists, a subsequent circular sent out by the Association dated 20th April, 1931, specified an eight-hourly sample. Since the latter had been adopted by most factories and found satisfactory, it was now confirmed by the committee.

REFRACTOMETRIC METHODS.

During the year a Bachler Immersion Refractometer with Goldbach flow-through tube has been received at the Experiment Station. It is found excellent for the examination of clear solutions, being more sensitive and more finely graduated than the ordinary prism refractometer.

It can not be applied directly, however, to turbid solutions. Mr. Bachler, in a letter to the convener, states that only a simple filtration of the small quantity necessary for the test is required, after the addition of a little filter-aid and clarifying agent such as some form of diatomaceous earth or activated carbon. This was said to have no appreciable effect on the total solids in solution as measured by refractometric or other means.

This instrument appears to mark a real step forward in refractometric methods of analysis, and probably brings nearer that looked-for time when this convenient principle will be generally used for the measurement of total solids in sugar juices and products.

EXAMINATION OF RAW SUGARS.

The filtering and refining qualities of our raw sugars, a matter of the most vital importance to the industry, since it affects our markets, has had further study at the Experiment Station during the year, Mr. Hayes having spent much time on this work.

In accordance with the recommendation of the committee last year, factories were requested to send every month during the manufacturing season two composite samples of their raw sugars, one to be examined forthwith and the other to be tested in six months' time, to determine the changes on storage. Most factories complied with this request, with a few important exceptions, due to misunderstanding of what was really required.

A report on these sugars is to be submitted, from which it will appear that the general improvement in quality of raw sugars over the past few years has been maintained.

TEST FOR ARSENIC CONTENT OF SUGAR.

In view of the extensive use of arsenical poisons for locusts in cane fields, details of a modified Gutzeit method for arsenic determination were circulated to all factories with the recommendation that periodical tests should be made. The result was that only the most minute traces of arsenic, if any, were found, scarcely more than in normal seasons, and in all cases well within the very small limits laid down officially for sugar and similar food-stuffs.

SUCROSE DETERMINATION IN CANE.

Mr. Moberly called the attention of the committee to the differences between direct polarization and Clerget in crusher juice that had been noted in locust-damaged and other abnormal cane during the season. Under the Fahey conference agreement we were bound to use the direct polarization, which entailed the rejection of much cane that would not have been rejected on an actual sucrose test by double polarization.

SOIL ANALYSIS.

The convener (Mr. Beater) of the sub-committee appointed to consider this subject, had submitted a detailed specification of the methods for soil analysis that had been adopted at the Experiment Station as most suitable for our conditions after trial of various alternative methods. These methods were largely based on official methods of the International Society of Soil Science and those of the Union Department of Agriculture.

This specification has been formally approved by the Experiment Station Committee and it is recommended that it be published as Bulletin 2 of the Technologists' Association for general reference of members. The specification is much more detailed than the abridged outline of methods published last year.

INTERNATIONAL COMMISSION FOR UNIFORM METHODS OF SUGAR ANALYSIS.

The convener reports having received certain memoranda from this organization, from which it appears that South Africa has now been invited to take part as a separate country and to form a National Committee, having official voting representation on the International Commission on a basis proportional to quantity of sugar manufactured and consumed. The next meeting of the International Commission is to be held in London in 1936.

ADDITIONAL BASES OF COMPARISON OF MILLING AND GENERAL FACTORY PERFORMANCE.

The Chairman of the Special Committee on Uniformity in Reporting Factory Data, of the Inter-

national Society of Sugar Cane Technologists, Dr. F. W. Zerban, in his report for the forthcoming Queensland Congress, calls attention to certain proposals of Noel Deerr made to the Puerto Rico Congress and published in the International Sugar Journal, Volume 35 (1933), p. 214.

These proposals are to eliminate the effect of variation in fibre content of cane and purity of juice on milling and factory performance. He introduces the term "Reduced Extraction" in which the extraction is reduced from the actual fibre content to a standard assumed fibre content of 12.5 per cent; also the term "Reduced Boiling House Recovery" in which the boiling house recovery (recovery on mixed juice) is reduced from the actual purity of mixed juice to a standard assumed purity of 85; and a "Reduced Overall Recovery" based on the Reduced Extraction and the Reduced Boiling House Recovery.

While these figures of course serve the valuable purpose of eliminating the effect of different fibre contents and juice purities, they naturally cannot take into account differences in the nature of the fibre and of the non-sugars in the juice in their effects on recovery. Consequently they can hardly be expected to give very accurate bases for comparison between Uba and certain other variety canes, for example; but where the same variety is concerned, or varieties of the same general type and properties, these new data for comparing different results may be very valuable. At all events, they have been introduced by way of trial into the annual summary of chemical laboratory reports for the past season.

These proposals of Noel Deerr for comparing factory performance are much simpler than others that have been suggested in recent years, and are at first sight at least very promising.

The calculation of the Reduced Extraction involves the calculation of the "lost primary juice," i.e. $(1-e)(1-f) \div f$ where e is the extraction and f the fibre. This value is therefore also tentatively introduced into our annual summary, as suggested by W. Buchanan at our conference two years ago.

Another interesting calculation involved in the Reduced Boiling House Recovery is the "virtual gravity purity" of the molasses, that is, the purity of the molasses recalculated indirectly from the observed purity (j) of the mixed juice and the actual recovery on mixed juice (boiling house recovery) (e) by the formula

$$\frac{j(1-e)}{j(1-e)+(1-j)}$$

It is of interest to compare the purity of the molasses so calculated with that recorded by the factory.

Experiment Station,
South African Sugar Association,
Mount Edgecombe,
Natal.
March, 1935.

COMMITTEE ON STANDARDIZATION OF CHEMICAL CONTROL:

R. M. Bechard
L. Blacklock
B. Campbell
W. O. Christianson
G. C. Dymond
P. L. Draeger
W. H. Foster
F. W. Hayes
E. P. Hedley
G. S. Moberly
B. E. D. Pearce
J. Rault
M. Viger
H. H. Dodds (Convener)



Mr. MOBERLY: I should like to draw particular attention to this question of abnormal purity differences between crusher juice and 1st mill juice. We had some very marked cases at Felixton in which the mixed juice purity was actually higher than that of the crusher juice. Clerget tests of crusher juice revealed that this was due to the apparent purity of the crusher juice being much below the true purity. As a result several hundred tons of cane were rejected that would not have been rejected, but for this error in the apparent purity.

Unfortunately, since it is impracticable to do Clerget tests on all crusher juices, it is difficult to suggest a means of overcoming this difficulty. Perhaps it might be possible to establish a factor to correct for the difference between true purity and apparent purity, but then the difficulty is to know to which consignment it should be applied as the trouble is not regular, and does not occur every day nor to all the samples in any one day. Any suggestions that anyone here could give us to the best method of overcoming this trouble would be welcomed, as it is a matter which seriously affects those who make their living by growing cane.

Mr. L. BLACKLOCK: Mr. Dodds has referred in his report to the examination of raw sugars. Of course this is a thing in which I am particularly interested and I should like to corroborate his assertion here that the improvement in the filtering and refining qualities of raw sugars has been fully maintained during the past season.

We have done numerous filtrability tests on raw

sugars received during the season. This is also made as a routine test, weekly, on composite samples of raw sugar entering process and washed raw sugar result from it.

During the first three months of the season, June, July and August, the sugars received showed a very low filtrability test. This was confirmed by the weekly test on the average melt sample, and also by the results on the average washed sugar samples of that period.

The figure of 1,200 to 1,300 may be taken to represent the raw and this was improved to 1,500 to 1,600 on the washed sugar.

The sugars received during this period were from Amatikulu, Darnall, Zululand and Tongaat. Small quantities of Felixton and Platt were received at the same time, but these showed a much higher test, in the region of 1,700.

There was a marked improvement in the sugars from September onwards, when the test figure rose to 1,600/1,700 and the washed sugar round about 2,000. A slight improvement in the practical working in the refinery was also noticeable at this time, although at no time during the run has the filtrability, as reflected by the refinery working, been other than good. Taking the season through, the sugars in this respect have maintained the steady yearly improvement shown of late years.

A review of tests shows the sugars to range in order of merit as follows:—Delville Estates, Felixton, Armstrong Central, C. Platt, Umzimkulu, Amatikulu, Tongaat, New Guelderland, Darnall, Zululand Sugar Milling Co., Chaka's Kraal.

Unfortunately, as many of you know, the supplies of standard filter cloth ran short before the end of the season. Large supplies are already on the water, and there should be no trouble on this account during the coming year. Any mills requiring cloth may obtain it from the refinery.

No doubt the steady improvement in filtrability is due to improving methods and control of clarification and therefore a more complete removal of colloidal matter. The low available P_2O_5 in the soils and the low phosphate content of the juice are no doubt difficulties in this connection. I am of the opinion that filtration subsequent to clarification would be a long stride in the right direction. We look forward to a future when all syrups coming from the evaporators will pass through some form of mechanical filter and filter-aid before going to the pans.

Mr. RAULT: I should like to ask my colleagues what difference they find between pol and sucrose per cent as determined after double polarisation, with special reference to the past season. In some years past this difference fluctuated from +1.5% to a -0.3% of the sugar in the juice. During the past season we have consistently recorded a + in the nature of 1.2% of the sucrose in mixed juice.

It stands to reason that if some factory through being understaffed does not carry out the double

polarisation—as may happen in small factories—the recovery figure is fictitiously favourably influenced and the mill extraction lowered. The chemical control sheet should specify the name of such factories, as their results are not comparable with the rest who carry out the official methods.

Mr. DODDS: It is presumed for these returns that all factories having complete chemical control follow the official methods, which entail doing sucrose determinations by double polarisation in the mixed juice. As far as I know all the factory reports are based on that test.

Mr. HAYES: It was very interesting to hear Mr. Blacklock's remarks on the filtering and refining qualities of raw sugars. Evidently the work he has done very largely bears out the results obtained at the Experiment Station, with this important difference—he was able to take the samples himself; we had to wait for samples to be sent to us. In this connection I should like to endorse the remarks made by Mr. Dymond yesterday regarding an early meeting of all Committees formed, with the idea of definitely formulating a plan of campaign for the coming season. I have recommended to both the Clarification and the Chemical Control Committees that the General Committee should if possible urge the various sub-committees to see that this is done. Where any recommendations for certain work to be carried on during the season are made, they should be backed up by definite working schemes, and not just vague suggestions that information should be obtained on sugars, or work done on clarification. In the case of the sugars there was no definite decision as to the type or amount of work to be done. It was more or less left to the Experiment Station to decide, and in our opinion the important line of work lay in connection with keeping qualities. Numerous factories have asked for full reports on their sugars, without taking into consideration the fact that before one can determine the keeping qualities of a sugar it is necessary that it should be stored for a reasonable period. On the

other hand, some factories sent us bulk samples of their total output right at the end of the crop, which is not very encouraging from the point of view of doing monthly samples as originally suggested. But the samples that have come in have been tested regularly and the results are very largely parallel to those Mr. Blacklock has obtained, especially in connection with filtrability. The filtrability was very low in the early months of the year, but rose rapidly in July and August and then remained fairly steady right through to the end. In no instance was there a serious drop. This low filtrability at the start was particularly noticeable in some factories which later maintained a very high standard.

The significant part of all this work will be shown when the remaining half of the samples is analysed after being stored for six months, which is the period decided on at the Experiment Station, as being able to give fairly reasonable results as regards keeping qualities. There were two papers published in the International Society's proceedings in connection with the relation of the filtrability of sugars to pan boiling operations and the formation of the sugar crystal. The findings in neither case were really conclusive. In some instances poor keeping qualities have been accompanied by remarkably good filtrability, and in others sugars which have deteriorated very badly indeed have maintained filtrability or even increased in filtration speed.

CHAIRMAN: The work that this Committee is doing is of a very important nature to our Industry, and we are very glad to see that it is being maintained with such enthusiasm. I will now ask you to accord the usual vote of thanks to the Committee and to Mr. Dodds for reading these two papers. (Loud applause).

CHAIRMAN: I will now call upon Mr. Moberly to give us his paper upon the sampling of crusher juice.