COMMITTEE ON STANDARDIZATION OF CHEMICAL CONTROL.

ANNUAL REPORT FOR 1932-33 SEASON.

Read by Mr. DODDS.

There is comparatively little to report this year. Only three meetings have been held on January 10th, February 17th and March 8th, respectively. The personnel of the committee remains as before, except that W. H. Foster and W. O. Christianson have been added and H. M. Jacobs has retired, having left South Africa.

Standardisation of Apparatus

Measuring Flasks.—It was resolved to make specifications for 200/220 ml. flasks in addition to the 100/110 ml. size and to omit the words "at least" in the specification of the latter.

The specifications for dilution flasks now are, therefore:—

A.—The 100/110 ml. flask:—

Total length—210 mm.

Diameter of neck—17 mm.

The 110 ml. mark shall be 70 mm. from the top of the flask.

The 100 ml. mark shall be 10 mm. above the conical portion of the flask.

B.—The 200/220 ml. flask:—

Total length—240 mm.

Diameter of neck—21 mm.

The 220 ml. mark shall be 75 mm. from the top of the flask.

The 200 ml. mark shall be 10 mm. above the conical portion of the flask.

The form of the flasks is as shown in figure "A" of the 1931 report.

The tolerances from the above dimensions are to be those customary for whatever grade of volumetric glassware may be selected.

Brix Hydrometers.—The following range is standardised:—

0° — 5°
5° — 15°
15° — 25°
10° — 20°

These shall be 54 cm. in total length and shall have a range of not more than 10° Brix, graduated in 0.1°. There shall be 22 mm. between each unit on the scale, excepting the 0° — 5° range which is required to have a scale of the same length as the others and to have 44mm. between each unit on the scale. Hydrometers shall be standardised at 20°/4° C.

The limit of tolerance of the Brix scale shall be ±0.05°.

Round stems are to be used and the units shall be so marked as to be clearly distinguishable from the fractions where the figures are not visible.

A thermometer shall be included within the hydrometer.

Filtration Jars.—The use of beaker flasks made in heavy glass is recommended for this purpose in preference to straight-sided beakers.

Routine Testing of Mixed Juice

It is recommended that the substitution of four-hourly for hourly polarisation of mixed juice be made optional, subject to the following conditions.

The sample for four-hourly polarisation shall be composited from hourly samples preserved with basic lead acetate solution, as used for clarification, added with each successive sample of juice to the composite.

Hourly polarisation tests shall be done from time to time by planters' chemists and averaged every four hours proportionately to juice weighed each hour. The daily average of these tests shall be compared with the daily average of the four-hourly tests made by the factory staff.

When the average of the hourly tests exceeds the average of the four-hourly tests by more than 0.1° Ventzke for two successive days, the planters' chemist may demand that the factory shall revert to hourly polarisation tests and continue to use such tests until the discrepancy between the two daily averages has been less than 0.1° Ventzke for two successive days.

Determination of Sucrose

The baryta method is now being critically examined at the experiment station with a view to its adoption if found suitable in lieu of inversion methods; so far it appears to be very promising.

The present method of determination of sucrose content of bagasse is also being investigated at the experiment station.

Determination of Sulphur Dioxide in Syrups

The sample shall be treated as specified for sugar, that is to say, 20 ml. of 5 per cent. caustic soda shall be added to 150 ml. of the syrup, then the solution neutralised by 30 per cent. sulphuric acid and 10 ml. excess acid added, and an excess of N/32 iodine solution run in, the excess being titrated back after 15 minutes standing by N/32 sodium thiosulphate.

Filtrability of Raw Sugars

A Sub-Committee was appointed to draw up a scheme of research into this matter, comprising the following members:—Blacklock, Dodds, Draeger, Dymond, Hedley, Pearce and Rault.

This Committee was also delegated to inquire into the sulphur dioxide content of raw sugar.

A report has been made to the Natal Sugar Millers' Association.

Standard Laboratory Report Form

This has been revised and brought up to date to correspond with present practice.

International Society of Sugar Technologists

The report of Dr. F. W. Zerban, as Chairman of the Committee, on Uniformity in Reporting Factory Data, was submitted at the Fourth Congress, held in Puerto Rico, last March.

Since the meeting of the above named Committee was not fully representative, however, it was decided not to take final action on the report, although it was very fully discussed by those members present, including Messrs. Dodds and Dymond, representing this country.

This report has not yet been circulated, so that there is no further progress to record.

A questionnaire has been received from Dr. Zerban with a view to obtaining concerted action on the testing of raw sugars for filtrability, and our reply thereto has been sent.

Members of the Committe:—

R. M. BECHARD.
L. BLACKLOCK.
W. O. CHRISTIANSON.
P. L. DRAEGER.
G. C. DYMOND.
W. H. FOSTER.
E. P. HEDLEY.
G. S. MOBERLY.
B. E. D. PEARCE.
J. RAULT.
M. VIGER.
H. H. DODDS, Convenor.

Dr. HEDLEY: Uninteresting as these figures on the size of the flasks may look, the necessity for laying down these standards has been very evident in the deliveries of the standard laboratory apparatus during the past year, and we were approached by different members of the factories with complaints about the tallness of the flask, the squatness of the flask, and so on. Although we laid down standards two or three years ago, the manufacturers have not adhered to them and one of the reasons is, that in spite of laying down those standards, those responsible for making up the orders have not adhered to them themselves, consequently there has been confusion in the minds of those with whom the orders have been placed. We laid down these standards this year, and hope that you will carry on with it and adopt these standards for your future orders. It means that you will get your deliveries quicker and may rely upon the apparatus being standard. It is not an academic point, it really does refer to your work. We had complaints about the difficulty of cleaning the beaker flask, and the flask we have chosen is shown in this case (indicating in showcase). If you adopt that, you will probably have less breakages in the hands of your assistants. It is also very much cheaper than the straight, square-sided one.

Mr. DODDS: I see there is one recommendation to be made regarding Brix hydrometers, that was omitted from this report. In fact, it was only decided upon at the last meeting of the Committee; it is with regard to the use of the 10° to 20° range. You will notice we have adopted an overlapping range between 10 and 20, and the Committee recommend that where juice is being tested round about 15° instead of using the 5 to 15° or 15 to 25°, that the 10 to 20° instrument should be used.

CHAIRMAN: There is an important statement in this report on the filtrability of raw sugars, and it is right that you should know what the recommendations of the Sub-Committee were. I will ask Mr. Dodds to read the report which has been sent to the Millers.

Mr. Dodds then read the report referred to.

Mr. MOBERLY: I would like to draw your attention to the fact that the recommendations will eventually require a vote from the members present, that is in connection with routine testing of mixed juice.* Owing to shortness of time, I think that discussion will have to take place later, but I draw attention to it now so that members will be able to prepare their views on the subject. I would say in reference to it, that the suggestions contained in the last paragraph under the section "Routine Testing of Mixed Juice," that is a tentative suggestion which we hope will meet the case, but other expressions of opinion will be welcomed. This is a very important thing, as it bears directly on the testing of cane and sucrose payments, so that proper consideration of it and a vote one way or another from the members of the Association is very desirable.

Mr. DODDS: I must say at first sight, that it would appear that the tolerance of only one-tenth of a degree Ventzke is a very small one, but when you realise that this is the average of a large number of readings it is a difference that appears to be

* This Discussion is given over the page.

reasonably wide, and it seems quite practicable that if there is no deterioration of the four-hourly sample compared with the hourly sample, one can easily keep within the limit of 0.1° Ventzke between the average of the two.

Mr. BECHARD: On that same point, I quite agree that we want a very close margin of difference between the two figures, but on the other hand I consider that two days is rather a short period to establish anything. On the other hand, on the question of practicability, we generally arrange our weekly programme of work some time the previous week, and it is rather difficult in the middle of the week to revert back to another method. I would suggest that instead of two days period, the week period would meet the case very well.

Mr. MOBERLY: The reason for that two days period was that due to some climatic changes it is sometimes necesary to take prompt action in this respect. It is admitted that there is normally no significant difference between hourly and four-hourly tests. The procedure has been adopted so that when the change in climatic conditions occurs, prompt steps may be taken to initiate the more accurate method. We had a case last year, where there occurred a very severe period of heat following on wet weather, which had a most marked effect on the cane, more than usual, especially in the southern part of the belt, and it is those sudden changes of temperature which we want to be ready to deal with.

Discussion on Question of Hourly versus Four-Hourly Testing.

Mr. MOBERLY: This is a very important thing which is going to affect everybody concerned in the matter of testing next year, and is a point that should be settled clearly. I wish to refresh your minds on this point. that previously the official methods laid down that the testing of mill juices should be done every four hours. Then a year ago a certain amount of doubt was expressed as to whether that was arequate and whether there was not a falling off in juice during that period, so last year is was proposed that for this past year we should try out hourly tests. From the experience of the year figures have been brought forward from certain quaters, which lead to the proposal that the four-hourly method should be reverted to. I myself felt doubtful, not about the accuracy but the adequacy of these figures, and although in recent years, and at certain factories, four-hourly tests may have been shown to be perfectly adequate. I was doubtful whether they were necessarily universally so, and the Committee went into this very thoroughly, and realised that there should be a safeguard against possible deterioration of juice, especially during hot periods of the year, and it was decided that reversion to four-hourly pol be allowed, but that the Planters' staff should have the option of demanding a return to the hourly test whenever they could show that it was necessary. It was proposed that the Planters' chemists should do these hourly tests, and when they found a significant difference occurring they could then go to the Mill Chemist and propose the reversion to the hourly test. A tentative scheme has been put forward here in which it is proposed that wherever the Planters' chemist doing these hourly tests finds that there is a difference of 0.1 Ventske on two successive days equivalent to 0.03 in sucrose that they should revert to the hourly pol, until the figure is less than that on two successive days.

CHAIRMAN: Before you express your opinion on this matter I would like to say the reason for this alteration is not that we want to do away with the hourly pol; we are quite willing to do it as far as that goes, but we want time. We have proved that it is unnecessary to do this work where you have efficient control. We have shown two seasons figures in which the difference is negligible. Now we want the time usually occupied in doing this hourly test for other work. There is a tremendous lot of other work we want to do in this Industry. We are establishing lines of research in various directions. The Chemists in the past have had their programmes filled up so that there is no time for such work. That is one of the few things we want to cut down to enable us to devote time to really more important subjects, because we can prove the four-hourly tests to be equally as accurate as the hourly test. That is the reason why I brought this subject up, and I ask for your opinion, and to pass this as the method for next year.

Mr. BECHARD: This matter has been fully discussed in Committee that I do not see that any good purpose would be gained by discussing it further. 0.1 Ventske difference is a very small one. As a matter of fact it is smaller than the experimental error permissible so that when you come down to 0.1 Ventske you cannot get any greater accuracy than that. Therefore, I propose that this report of the Committee be adopted.

Mr. HAYES: Although 0.1 degree may be a small experimental error on one sample it is certainly not on an average of two days. Regarding the time saved, you would still have to do the compositing of the hourly samples. The only thing that is omitted is one filtration. You are doing

a dozen at the same time and the time saved would be absolutely negligible. You would still have to take a proportionate sample.

CHAIRMAN: In reply to that I agree with Mr. Hayes up to a point. This is only one of the things,—I am speaking for Huletts now,—that we have cut out one polarisation means one filtration and so many minutes. So many minutes each hour in a day mount up to an appreciable quantity of time. There are other things we are leaving out as well wherever we can and the omission of the small things we are enabled to build up an extra hour or two of the assistants' time so that other work can be done. I admit one polarisation is nothing, but taken with other pols it makes quite a lot in the day's work.

Mr. VIGER: It is not only one pol. but with that pol there is some calculation and weighing of juice. For that hour the results are determined as well. As regards four-hourly and hourly pols, these have both been used for two years now and we have figures for two years which lead us to conclude that the hourly pol is unnecessary.

Mr. BECHARD: In any case they have the safeguard in reverting to the hourly pol if there is a specified difference. It is a saving which mounts up. Quite apart from that it interferes with routine work.

Mr. HAYES: I still maintain the loss of time is negligible. The loss of time is not cumulative. If you save half a minute what is the chemist going to do. It is really not half a minute but a split second. That does not accumulate during the day.

Mr. FOSTER: I think last year I pointed out that I found the hourly pol exceedingly tedious in our ordinary routine work, so much so that it is almost impossible to introduce any outside work at all into the ordinary routine work. However, I do think we are taking a step in the right direction in omitting the hourly pol and bringing it down to four-hourly. We require a lot more time at out disposal to get on with other work. There is no doubt about it the hourly pol although it means little when you say it, when you come to do two or three pols together with one or two other little jobs it does take up a considerable amount of time.

Mr. MOBERLY: I see that no criticism has been brought forward about the proposed tolerance, and it has been proposed that the report be adopted. I will second that and point out that on these figures they are significant in another way that that difference of 0.1 Ventske is equivalent so far as I can calculate it to about £2 sterling in the payment for cane for every 1,000 tons of juice. Although not a fortune it is still significant and I second the proposal.

On being put to the meeting the proposal was agreed to unanimously.