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REPORT ON METHODS FOR
MAPLE PRODUCTS

BY

C. O. WILLITS

true in the case of the determination of the degrees Brix, since such values are used to convert measurements made on sirups of different solids content to a comparable basis.

The 1955 studies were therefore limited to investigations of the methods for making measurements of degrees Brix and conductivity.

SAMPLES

Three pure maple sirups, designated A, B, and C, were packaged in sealed tin cans and sent to the collaborators. Sample A was U. S. Grade AA; sample B, U. S. Grade B; and sample C, U. S. unclassified. The three grades were chosen to provide samples with a wide range of conductivity values, and the densities were so adjusted as to yield sirup with Brix values both above and below that for sirups of standard density, 67.5° Brix.

The collaborators were requested to describe the instruments used in making the two measurements and to give the temperatures at which the measurements were made. They were also asked to give the resistance or cell constant of the conductivity cell. While no specific directions were given for making the measurements, approximate Brix and conductivity values for one of the samples were given to the collaborators to serve as guides.

RESULTS

Ten collaborators participated. Statistical summaries of the values are given in Tables 1 and 2, in which n is the number of values reported by a collaborator; \bar{x} is the mean of his values; s is the standard deviation; \bar{x} is

TABLE 1.—*Collaborative values for degrees Brix*

COLLABORATOR NO.	SAMPLE A			SAMPLE B			SAMPLE C		
	n	\bar{x}	s	n	\bar{x}	s	n	\bar{x}	s
1	4	64.9	0.05	4	63.3	0.24	4	67.4	0.13
2	4	65.7	0.06	4	63.5	0.06	4	67.8	0.05
3	4	65.5	0.06	4	63.3	0.05	4	67.1	0.05
5	4	65.5	0	4	63.3	0	4	67.1	0
7	4	65.4	0.24	4	63.1	0.13	4	66.9	0.06
8	4	65.4	0.06	4	63.3	0.09	4	67.0	0
9	4	66.3	0.10	4	63.9	0.05	4	68.0	0.06
10	4	65.5	0	4	63.2	0	3	67.0	0
11	1	65.6	—	1	64.2	—	1	68.1	—
12	2	65.9	0.21	2	63.7	0.14	2	67.9	0.21
\bar{x}	35	65.6		35	63.5		34	67.4	
s_m		0.3			0.3			0.4	
Range		1.4			1.1			1.2	

and 1.2 for C. The improvement in the standard deviation of the collaborators' means over that obtained for the 1954 studies was no doubt caused by the collaborators' checking the scale of their refractometers, and either adjusting or making the necessary temperature corrections.

Since U. S. standards for maple sirup specify a minimum Brix, a method for measuring the degrees Brix of maple sirup should be written, and these studies have provided sufficient data for the writing of this method.

Conductivity Value.—The eight collaborators submitted 28 values for each of the three samples. The statistical summary of these data is given in Table 2. The low standard deviations of 0.03 to 1.6 for the within-laboratory values show that a high precision can be attained, as would be expected, since there are only a few manipulations involved and the measurements can be made with an accuracy of about 4 parts in 1000.

When all of the interlaboratory data are considered, the standard deviation (s_m) of the collaborators' means (\bar{x}) becomes very large; values range from 7.9 to 10.1, which could be due to a systematic error. This large s_m is of the same order as that obtained in the 1954 studies. In these 1955 data the collaborators' means (\bar{x}) by visual inspection fall into two distinctly different populations. The one with the lower population values has a range of 9 units while the one with the higher values has a range of 5 units. When these populations are grouped into two sets of data, the standard deviations of the collaborators' means become 2.4 to 3.7 for the lower values and 1.0 to 1.4 for the higher values. These smaller s_m values are comparable with the s values of each collaborator's data. These values indicate that the ratios between the mean values, \bar{x} 's, of the two populations for the 3 samples is a constant of 1.14 and this shows that some bias is occurring in one set of population data but not in the other.

From the information supplied by the collaborators it was impossible to correlate any one set of conditions such as instrument used, cell constant, temperature of the conductance measurement, or the sample size, to one of the sets of data. Since this situation did not become apparent until the collaborators' data were analyzed, there was not enough time to consult the collaborators on all experimental details before writing this report, but this information will be included in the 1956 studies.

RECOMMENDATIONS

It is recommended*—

- (1) That a method for the determination of the degrees Brix of maple sirup, based upon these studies, be prepared for inclusion in Chapter 29, "Sugar and Sugar Products," of *Official Methods of Analysis*.
- (2) That work be continued to establish a satisfactory method for the determination of conductivity value.

* For report of Subcommittee C and action of the Association, see *This Journal*, 39, 80, 81 (1956).