

In his opinion the resinous substance obtained was a more advanced condensation product. He did not think the formation of the substance was so simple as Dr. Stiasny suggested. It was more probable that polymerisation did not take place at all, but that higher condensation products were formed. He thought *o*-hydroxybenzyl alcohols were first produced, and that these then condensed with another molecule, and afterwards the process was repeated. The proposed methane compound seemed too simple and a compound of such constitution would probably only have weak tanning properties.

Prof. H. R. PROCTER thought this was one of the most important discoveries ever made in the chemistry of tanning. It might be of far-reaching importance, not only scientifically, but also commercially. It was possible that it might compete with sumach, but a still more striking possibility was its use in modifying natural tans. Sulphite cellulose or wood pulp liquors were waste products for which chemists had long been anxious to find a use. Used in combination with syntan they gave leather of satisfactory commercial value and excellent appearance. It was difficult to say what the full commercial importance of the discovery might be. It might cause the leather trade to change to different localities. He pointed out the importance of theory to the practical side of leather manufacture. Progress was due to the gradual development of theoretical considerations. This discovery might throw an important light on the theory of the tanning process. Dealing with the extent to which chemical reactions and physical reactions took part in this process, he was in a position to prove that the action of the acids and salts in these reactions were purely chemical and absolutely subject to the same laws as any other ionic reactions.

Prof. J. W. COBB referred to the action of certain substances in increasing the plasticity of clays. This was noticeable in the difference between secondary clays rich in organic matter which were plastic, and pure primary clays (kaolins) which lacked the property of plasticity. Had the power of the syntan in increasing plasticity been subjected to trial as it might be of industrial importance?

Mr. L. A. INGLE asked to what extent leather produced with syntan would resist water. It seemed to him that as both tans and non-tans are necessary to make commercial leather, that the synthesis of the latter was a future problem.

Prof. STIASNY, in reply, said that the breaking strain of leathers tanned with syntans was found to be superior to that of leathers tanned with vegetable tannins, the toughness of the fibre being one of the valuable features of this new tannage. It was the free sulphonic acid which had the specific tanning effect, and by neutralising one diminished gradually the astringency and the tanning capacity of a syntan solution. In that respect syntans behaved analogously to vegetable tannins, but syntan leathers were more sensitive to alkalis than were vegetable tanned leathers. He agreed with Prof. Green that Neradol D was in some respects similar to colourless dyestuffs, and that many tar dyestuffs possessed some tanning capacity, although the leather produced by such materials was rather poor and not of a commercial quality. As regards the formula suggested by Prof. Green for Neradol D, he thought that the formation of phenol-alcohols was only proved when working in alkaline solutions. The ratio of formaldehyde to phenol as taken for the production of syntans is distinctly in favour of the author's conception of the condensation process, while Prof. Green's view would demand a very different ratio. The free acids of syntans gave a precipitate with basic aniline dyes, but they seemed to have no affinity for cotton. The suggestion of Prof. Cobb re plasticity of clay seemed to be a very valuable one, and experiments would be carried out in this direction.

Prof. GREEN asked if syntans had been tried in indigo vats in order to cause the artificial indigo blue to develop in a suitable colloidal form.

Prof. STIASNY said that he had not tried syntans in this direction.

Communications.

AN EXTENSION OF VIETH'S TABLE FOR CORRECTING THE SPECIFIC GRAVITIES OF MILK.

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Vieth's table for finding the specific gravity of a milk at 60° F. from the specific gravity at some other temperature is largely used when calculating the total solids of a milk from the percentage of fat and the specific gravity. It has, however, the great disadvantage that the temperatures only extend from 40 to 75° F.; it is thus useless in a climate like that of Trinidad, where the temperature during the day is between 75 and 88° F., and milks brought in for analysis are at a temperature between these limits.

To make Vieth's table of use to analysts in the tropics I have extended it by extrapolation. The numbers in each horizontal column of Vieth's table (as given in Wynter Blyth's "Foods," 5th Edition, 1903, p. 216) were plotted on the same sheet of squared paper with degrees of lactometer as ordinates and temperatures as abscissae; in each case a smooth curve was drawn through the maximum number of points, and continued as far as 89° F. It will be noticed in Vieth's table that the difference between successive numbers in each horizontal column increase with rise in temperature; hence the curves get steeper as the temperature increases. Again, in each vertical column the differences between successive numbers increase as the degrees of lactometer increase; hence the curves when plotted on the same sheet of paper are further apart as the specific gravity increases. By reading the points where the curves intersect the ordinates at each degree from 76 to 89° F. the figures in Table I. were obtained. As the temperatures of milks in many laboratories are taken with a centigrade thermometer I give in Table II. the corresponding figures for finding the specific gravity of a milk at 15.6° C. (=60° F.) from the specific gravity determined at a temperature between 24 and 31° C.; they were obtained by converting these temperatures into their equivalents on the Fahrenheit scale, and then drawing perpendiculars at the temperatures so found, and reading the points at which these perpendiculars intersect the curves. This table is used in the same way as Vieth's; if, for example, the specific gravity of a milk is 1.028 at 28° C., its specific gravity at 15.6° C. is 1.0311.

Table II. has been tested in the case of 36 milks by comparing the total solids obtained by weighing with the total solids calculated from Hehner and Richmond's formula—

$$T.S. = 0.25 G + 1.2 F + 0.14,$$

In each case the total solids were determined by evaporating 5 grms. of milk to dryness in a platinum dish; the fat was determined by the Leffmann-Beam method and the specific gravity with a lactometer. The milks were not in any way selected—they were the last 36 milks in which I determined the total solids, fat, and specific gravity as explained above. They were a very varied collection; some were known to be genuine; others were obviously watered; the percentage of fat varied from 5.2 to 1.95 per cent.; the observed specific gravity ranged from 1.032 to 1.019 and the temperatures at which these were taken varied from 26° to 29° C. In 21 cases the calculated total solids are greater than the total solids found by weighing, the mean difference being 0.22; in 15 cases the calculated total solids are less than the total solids found by weighing, the average difference being 0.18. Hence the total solids calculated from the formula differ from the total solids found by weighing on the average by ± 0.2 .

This is the error one would expect. According to S. H. Collins (*Proceedings of the Univ. of Durham Philosophical Society*, 1909–10, 3, [4] 191) the probable error of a single determination of fat by the Gerber method is ± 0.036 ; the probable error of a single determination of

specific gravity using a lactometer in which $1^\circ = 1$ mm. is ± 2 degrees, and using a lactometer in which $1^\circ = 3$ mms. it is ± 0.55 degree.

In calculating from the formula

$$T.S. = 0.25 G + 1.2 F + 0.14$$

(error of T.S.)² = (error of $0.25 G$)² + (error of $1.2 F$)².

Therefore using a lactometer in which $1^\circ = 1$ mm. and determining fat by the Gerber process the error of T.S. =

$$\pm \sqrt{(0.25 \times 2)^2 + (1.2 \times 0.036)^2} = \pm 0.5$$

Similarly, using a lactometer in which $1^\circ = 3$ mm. the error of T.S. =

$$\pm \sqrt{(0.2 \times 0.55)^2 + (1.2 \times 0.036)^2} = \pm 0.14$$

Assuming that the error of the Leffmann-Beam process is the same as that of the Gerber process, the above results show that the differences between the calculated total solids and those found by weighing—on the average ± 0.2 —are not due to defects in Table II., but are the results of experimental error in finding the specific gravity of milk, and to a less extent in determining the fat.

supplies of seeds from Madagascar have appeared on the oil-seed market in Marseilles (Der Pflanzer, 1909, 5, 140). The fruit pulp of species of *Adansonia* has been stated to contain tartaric acid and tartrates, and it was considered advisable therefore to investigate fruits and seeds of the baobab tree forwarded from British East Africa to the Imperial Institute, in order to ascertain whether these were likely to be of any commercial value.

The fruits consisted of a hard, brittle woody shell, about 11 inches in length and 4 inches in diameter, and bluntly pointed at the ends; each fruit weighed about 1 lb. The interior was divided into nine compartments by fibrous septa; each compartment contained a mass of dry, buff-coloured, friable pulp surrounding and adhering to the numerous small kidney-shaped seeds.

The fruits were composed of: outer shell, 41—48 per cent.; pulp, 14—17 per cent.; seeds, 36—42.

The outer woody shell yielded 2.4 per cent. of ash containing: silica, 2.8 per cent.; potash, 47.0 per cent.; soda, 1.5 per cent.; phosphoric acid, 0.3 per cent.

TABLE I.

Degrees of Lactometer.	Temperature in degrees Fahrenheit.													
	76	77	78	79	80	81	82	83	84	85	86	87	88	89
20	21.8	21.0	22.0	22.2	22.3	22.4	22.6	22.7	22.8	23.0	23.1	23.2	23.4	23.5
21	22.8	23.0	23.1	23.2	23.4	23.5	23.6	23.8	24.0	24.1	24.2	24.4	24.5	24.7
22	23.8	23.0	24.1	24.2	24.4	24.5	24.6	24.8	25.0	25.1	25.2	25.4	25.5	25.7
23	24.8	24.0	25.1	25.2	25.3	25.5	25.6	25.8	25.9	26.1	26.2	26.4	26.5	26.7
24	25.8	26.0	26.1	26.2	26.4	26.5	26.7	26.8	27.0	27.2	27.3	27.4	27.6	27.8
25	26.0	27.0	27.2	27.3	27.4	27.6	27.7	27.9	28.0	28.2	28.3	28.5	28.6	28.8
26	27.0	28.1	28.2	28.4	28.5	28.7	28.8	29.0	29.2	29.3	29.5	29.6	29.8	30.0
27	28.0	29.2	29.3	29.4	29.6	29.8	29.9	30.1	30.2	30.4	30.5	30.7	30.9	31.1
28	30.1	30.2	30.4	30.5	30.7	30.8	31.0	31.2	31.4	31.5	31.7	31.8	32.0	32.2
29	31.1	31.3	31.4	31.6	31.8	31.9	32.1	32.3	32.4	32.6	32.8	32.9	33.1	33.3
30	32.2	32.4	32.5	32.7	32.9	33.0	33.2	33.4	33.6	33.7	33.9	34.1	34.2	34.4
31	33.3	33.4	33.6	33.7	33.9	34.1	34.3	34.5	34.7	34.8	35.0	35.2	35.4	35.6
32	34.4	34.6	34.8	35.0	35.1	35.3	35.5	35.7	35.8	36.0	36.2	36.4	36.6	36.8

TABLE II.

Degrees of Lactometer.	Temperature in degrees Centigrade.							
	24	25	26	27	28	29	30	31
20	21.7	21.0	22.1	22.4	22.6	22.8	23.1	23.3
21	22.7	23.0	23.2	23.4	23.7	24.0	24.2	24.5
22	23.7	23.0	24.2	24.4	24.7	25.0	25.2	25.5
23	24.7	24.0	25.2	25.4	25.7	26.0	26.2	26.5
24	25.7	26.0	26.2	26.5	26.8	27.0	27.3	27.6
25	26.8	27.0	27.3	27.5	27.8	28.1	28.3	28.6
26	27.8	28.1	28.4	28.6	28.9	29.2	29.5	29.8
27	28.0	29.2	29.4	29.7	30.0	30.3	30.5	30.8
28	30.0	30.2	30.5	30.8	31.1	31.4	31.7	32.0
29	31.0	31.3	31.6	31.9	32.2	32.5	32.8	33.1
30	32.1	32.4	32.7	33.0	33.3	33.6	33.9	34.2
31	33.1	33.4	33.7	34.0	34.3	34.7	35.0	35.4
32	34.3	34.6	34.9	35.2	35.6	35.9	36.2	36.6

COMPOSITION OF THE FRUIT AND SEEDS OF *ADANSONIA DIGITATA*.

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The baobab tree (*Adansonia digitata*, Linn., N.O. Malvaceæ) is a large tree common in many parts of Africa and also growing in India and other tropical countries. The seeds of *Adansonia madagascariensis* and *A. Grandidieri* have been found to contain respectively about 34 and 42 per cent. of oil (see Lewkowitsch, "Chemistry and Technology of Oils, Fats and Waxes" (4th ed.) ii., 424), and

The seeds were composed of a very tough husk enclosing a soft oily kernel, devoid of starch. They were examined with the following results:—*

	Per cent.
Moisture	12.1
Ash	3.5
Oil	11.6
Protein (Total N x 6.25)	11.2
Fibre	22.5
Carbohydrates (by difference)	39.1

The ash of the kernels contained: potash, 31.0 per cent.; soda, 7.2 per cent.; phosphoric acid, 34.2 per cent.

* Owing to the tough nature of the husk it was extremely difficult to grind the seeds and mix the material thoroughly; the analytical results are therefore only approximately accurate.