

or steam-bath until the sugar is liquefied. Add to this heavy syrup five cc of ten per cent. ammonium sulphate solution and three cc of a dilute hydrochloric acid made by mixing one volume of 6-normal acid with sixteen volumes of water. Place a one-liter pyrex or Jena flask in an oil-bath and heat to 200°. While retaining this temperature add the glucose syrup and heat for eighteen minutes. Remove the flasks from the bath and add, as soon as sufficiently cool, sufficient water to dissolve the caramel. Allow to stand until solution is complete and remove the char by filtration.

SUMMARY.

1. A satisfactory caramel can be prepared by heating commercial crystallized glucose in the presence of small amounts of ammonium sulphate and hydrochloric acid.

2. The ammonium sulphate and acid do not seem to enter into the composition of the caramel, but apparently act by facilitating the dehydration of the sugar molecule.

3. Dialysis of the caramel so prepared through a collodion membrane against water shows the absence of unchanged sugar.

4. The authors would suggest that the acid-fastness of a caramel depends upon the complete conversion of the sugar, the decolorization on heating with acid being initiated by the action of the acid upon the unchanged sugar.

URBANA, ILLINOIS,
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PHYTOCHEMICAL NOTES.*

No. 92. Constants of Cassia Leaf and Twig Oils.¹

BY I. NISHMURA.

The oils, the distillation of which is reported in the previous note,² were not examined at once owing to unavoidable delay. Their constants were determined a year later and are herewith reported. As an indication of the changes that took place during this interval, the densities of the leaf oils as originally determined and as redetermined a year later are here recorded side by side.

	Fall 1920 d_{20}°	Fall 1921 d_{20}°
1 Oil bale No. 1, original and cohobated.....	1.049
2 Original oil bale No. 5.....	1.0525	1.045
3 Original oil bale No. 2.....	1.0523	1.059
4 Cohobated oil (first) bale No. 1.....	1.0547	...
	1.0530	...
5 Cohobated oil (first) bale No. 5.....	1.0540	1.035
6 Cohobated oil (first) bale No. 2.....	1.0535	1.037
7 Cohobated oil (second) bales Nos. 1, 5 and 2.....	1.032

The differences are not great, but, what seems surprising, is that the densities taken about a year after distillation, are, for the most part, slightly lower than those first taken. Inasmuch as this is almost uniformly the case, this difference cannot

* From the laboratory of Edward Kremers.

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² April JOURNAL A. PH. A., p. 294.

well be attributed to experimental errors. The only way to account for this difference at present is to assume that the Mohr-Westphal balances used by the two operators are to be held responsible.

So far as practicable the physical and chemical constants of these oils were determined. The results are herewith tabulated.

	d_{20}°	n_{D25}°	α_{D20}°	Aldehyde content, p. c.	Acid value.
1	1.049	1.603	$\approx 0^{\circ}$	85	15.7
2	1.045	1.5995	-16.2°	84	51.7
3	1.059	1.6020	-1.2°	86	21.4
4	1.062	1.603	-3.0°	91	49.7
5	1.035	1.606	$\approx 0^{\circ}$	90	13.0
6	1.037	1.606	$\approx 0^{\circ}$	84	8.9
7	1.032	1.606	$+4.2^{\circ}$	90	11.9

At the time of examination the original oils were still clear yellow in color, the cohobated oils were cloudy and two of them (Nos. 5 and 7) were brown in color. Those that revealed optical activity were observed in a 1:2 alcoholic (by vol.) solution either to overcome the brown color or the turbidity of the oil.

For the rest the constants are somewhat puzzling. The larger aldehyde content of three of the cohobated oils is readily understood, but that of the fourth cohobated oil is as low as that of any of the original oils. The higher acid content of two of the oils, one an original oil, the other a cohobated oil, might be attributed to the containers in which these oils were kept. However, the densities of these two oils are slightly lower than those of the other oils in each group. With one exception (?) the optical rotations are uniformly low as might be expected, but, again, within the narrow ranges, no generalization can be drawn from these physical constants of the two groups when contrasted with each other. Possibly the amount of original oil mechanically suspended in the aqueous distillate and thus carried over into the cohobated oil has something to do with these seeming irregularities.

The twig oils were examined in like manner. The two sets of specific gravity determinations are first recorded for the sake of comparison.

	d_{20}° , 1920.	d_{20}° , 1921.
Original oil, charge No. 1.....	1.0477	1.012
Original oil, charge No. 2.....	1.0477	1.013
Original oil, charge No. 3.....	1.0465	...
Oil from cohobations.....	1.0473	...

With one exception these densities are appreciably lower than those recorded by Chen.

The remaining physical constants, together with the densities determined at the same time, are herewith tabulated.

	d_{20}°	n_{D25}°	α_{D20}°	Aldehyde content, p. c.	Acid value.
Original oil, charge No. 1.....	1.012	1.603	-15.0°	86	6.5
Original oil, charge No. 2.....	1.013	1.604	-15.0°	84	6.8
Original oil, charge.....	1.017	1.603	-15.0°	82	16.9
Cohobated oil, charge No. 1.....	1.026	1.608	-15.0°	90	16.0
Cohobated oil, charge No. 2.....	1.021	1.608	-7.8°	92	13.2
Cohobated oil, charge.....	1.023	1.609	-7.8°	92	14.5
Cohobated oil.....	1.040	1.606	-7.8°	96	81.4

With one exception the oils as grouped suggest a close similarity in each group as might be expected. Thus the density of the cohobated oils is, as a group, slightly higher than that of the original oils, the last oil to be separated after cohobation having the highest density. The index of refraction of the cohobated oils is, likewise, somewhat higher than that of the original oils. With one exception the optical rotation of the cohobated oils is about one-half of that of the original oils, whereas the aldehyde content is slightly higher. Both differences are such as one might expect from the chemical constituents of the oil and their relative solubility in water. Again it may be assumed that the high angle of rotation of the first cohobated oil recorded in the table is due to original oil carried mechanically into the cohobated oil by the aqueous distillate in which the oil was suspended and from which it had not been carefully separated. The acid values show no such regularities. These differences may readily be accounted for by the differences in the containers in which the oils were kept during the long interval between distillation and examination.

As already stated, these results may be of interest since they supplement the earlier investigation of Schimmel & Company. Although their chemists examined other parts of the shrub as well, they did not examine separately the oils from the leaves and twigs. As a biochemical study their investigation is much more complete. Yet, from a practical point of view it seemed desirable to examine the leaves and twigs separately since these are the two principal elements that enter into the distillation of the commercial oil. As Schimmel & Co. themselves point out, the other parts examined by them play but a minor, if not a negative, rôle in the distillation of the commercial oil.

PHARMACOGNOSY IN THE GARDEN.*

BY E. E. STANFORD.

A botanical garden devoted mainly to medicinal and poisonous plants was established at Western Reserve University in the spring of 1921. This beginning, for reasons which will be noted later, was far from being a pretentious one, but it was a beginning, at least, with several distinct ends in view, some obvious and some less so. Without attempting to present these objects or their stages of fulfilment in any very logical order—leaving some of them, indeed, quite out of the immediate question, these random remarks on our successes and failures to date are offered with the idea that they may be of some interest and encouragement to those of our colleagues who, in somewhat similar situation, may be contemplating a similar experiment. From those of longer pharmacultural experience, who plant in acres as we in footage, we crave an indulgent smile and perhaps a word of helpful criticism.

Lack of interest in courses in pharmaceutical botany and pharmacognosy may not infrequently be traced to the static nature of the work. Under the microscope, except in an occasional elementary microchemical test, nothing happens. Cells, tissues, organs, preserved in balsam or cleared in chloral hydrate, are fragments only, they do not function. In pharmacy or chemistry a nodding head may get blown off, but even that wakening stimulus is absent here. As *digitalis* or *belladonna* develops under his hand from seed to sprout, from sprout to maturity, from ma-

* Scientific Section, A. Ph. A., Cleveland meeting. 1922.