

alkalinity is maintained, the water usually has a zero soap hardness.

Concentration

3. The concentration ratio can be determined by:

- a. Chloride ratio in feed water and boiler water.
- b. By concentration hydrometers. We have found hydrometers very

satisfactory for controlling the amount of blowdown.

The sulphate ratio as recommended by the A.S.M.E., should be strictly adhered to.

Acknowledgment

Credit is given the Navy bulletin from which most of this material was obtained.

LITERATURE REFERENCE

Staub, F. B., Univ. of Ill. Bulletin No. 216.—Embrittlement in Boilers.
 Staub, F. B., Univ. of Ill. Bulletin No. 261.—Prevention of Calcium Sulphate Scale.
 Adams, Robt. C.—Combustion Vol. 6, No. 6.—Results from the Change in the Navy's Method of Boiler Water Treatment.
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A NOTE ON THE ANALYSIS OF TUNG FRUITS

GROWN UNDER DIFFERENT CONDITIONS IN MISSISSIPPI

By R. S. MCKINNEY and G. S. JAMIESON

SIX large samples of tung fruits were sent by B. T. Abbott, colonization agent of the Illinois Central Railroad Company at Jackson, Mississippi, to Dr. C. C. Concannon of the Department of Commerce, who gave them to us for investigation. According to descriptions accompanying the samples, they had been collected as indicated in Table I.

times) until the weight of the oil obtained is negligible.

Of the various directions suggested for the determination of the iodine number by the Wijs method, it was found in the case of tung oil that more concordant results were obtained by following the method given in the 1930 Tentative Standards of the American Society for the Testing of Materials, which

found also that a Wijs solution 25 days old gave results about two units lower than a freshly prepared solution. In view of these findings, it was decided not to use a Wijs solution older than 8 days and to take portions of about 175 mg. of the oils.

All the results obtained with the tung fruits and their oils are given in Table 2.

It will be observed that the oil content of the kernels of the fruit from the cultivated trees was 64.7 and 70.1 per cent, whereas that of the other samples ranged from 53.6 to 67.6 per cent. For comparative purposes a sizable sample of tung fruits grown near Gainesville, Florida, was sent to us by B. F. Williamson. The kernels from these fruits gave 67 per cent of oil and 2.3 per cent of moisture. The extremely low moisture content of these kernels and the kernels from the Mississippi tung fruits accounts in part for the higher oil content than that reported in most instances in the literature. A portion of this difference may be due in the present case to the more complete extraction of the oil.

TABLE I

Sample	Age of Trees Years	Soil Types	Locality (Miss.)	Cultivation
1 Composite	4	Orangeburg	Yeaton	Cultivated
2 Composite	4	Orangeburg	Yeaton	Uncultivated
3 Composite	4	Ruston	Yeaton	Uncultivated
4 Composite	5	Orangeburg	Lyman	Cultivated
5 Single tree ^a	10	Loess	Natchez	Uncultivated
6 Single tree ^b	12	Loess	Port Gibson	Uncultivated

^aTotal crop was 184 pounds of fruit.
^bTotal crop was 135 pounds of fruit.

The average weight of the fruits of each sample was determined, as well as the percentages of the nuts and kernels. The moisture and oil contents of the kernels were also determined, together with the iodine number of their respective oils.

In order to get a representative sample for the determination of the oil content it was necessary to take about 60 grams of the tung nut kernels and grind them to a meal which would pass through a 6-mesh sieve. After thoroughly mixing the ground kernels, portions of about 5 grams were accurately weighed for the determination of oil by the well-known method described in the Department of Agriculture's Service and Regulatory Announcement No. 133, with the following modification: The extraction with the special petroleum ether is continued for one hour, and the meal is ground in a mortar and extracted for another hour. This treatment of grinding and extracting is repeated (usually three more

recommends that 160 to 190 mg. of the oil be allowed to react for 30 minutes with 25 cc. of the Wijs solution in a dark place at a temperature between 21° and 23° C.

After making a number of experiments according to these directions, we found that approximately 160 mg. of oil gave an iodine number more than a unit above that given by about 190 mg. It was

TABLE 2
Tung Fruits, Nuts, Kernels and Oils

Sample	Aver. Wt. Fruit Grams	Percent Nuts in Fruits	Percent Kernels in Nuts	Percent Kernels in Fruits
*1.....	27.3	53.2	63.6	37.0
2.....	25.7	52.1	67.7	32.7
3.....	22.8	50.5	58.9	29.7
*4.....	30.4	58.4	64.1	36.2
5.....	19.9	66.4	62.0	41.2
6.....	23.1	51.2	52.3	27.0

Sample	Moisture in Kernels Percent	Oil in Kernels Percent	Iodine Value of Oil (Wijs)
*1.....	2.3	70.1	164.7
2.....	2.5	67.6	164.7
3.....	2.6	67.6	166.2
*4.....	2.7	64.7	163.2
5.....	1.7	54.9	163.1
6.....	2.0	53.6	165.5

*Cultivated.