Example. Method No. 2.—Same data as before.

Molecular weight.			Molecular weight.	Amount $NaHCO_3$.
CO_2 :	per cent. CO_2 found	= $NaHCO_3$:	x.	
44 :	50.98	=	84	: 97.3255.

$97.71 - 97.3255 = 0.3845$.

$$\left(\begin{matrix}\text{Molecular weight}\\ Na_2CO_3\end{matrix}\right) - \left(\begin{matrix}\text{Molecular weight}\\ NaHCO_3\end{matrix}\right) : \left(\begin{matrix}\text{Difference}\\ \text{found}\end{matrix}\right) = \left(\begin{matrix}\text{Molecular weight}\\ Na_2CO_3\end{matrix}\right) : \left(\begin{matrix}\text{Per cent. } Na_2CO_3\\ x\end{matrix}\right)$$

$$22 : 0.3845 = 106 : 1.852.$$

$Na_2CO_3 = 1.852$ per cent.

$NaHCO_3 = 95.858$ per cent.

Proof:

$$1.852 \times 0.4150943 = 0.76875$$
$$95.858 \times 0.5238095 = 50.21133$$
$$50.98008$$

ACCURACY OF THE DYEING TEST.

BY CHARLES S. BOYER.

Received April 8, 1895.

THE accuracy and value of the laboratory dyeing test of the natural organic dyestuffs, such as logwood, etc., is a much mooted question among those engaged in the dyestuff trade. Some hold that the dyeing test is only of value where the dyestuff is to be used in exactly the same manner as the laboratory test, and since about every dyer has his own modifications of the general method of dyeing with the dyestuff the test is useless except for special cases. Still others hold that the dyeing test never gives the actual value of the dyestuff.

To ascertain the accuracy of the dyeing test the writer made a series of comparative dyeing tests, and also analyzed the dyestuffs according to the best methods of analytical chemistry now known. For these tests several samples of logwood and extract of sumac were used.

Logwood.—Fifty grams each of two different samples of thoroughly dried chipped "St. Marc" logwood were repeatedly extracted with water and the weak liquor evaporated to one

liter, care being taken to remove all insoluble matter from the solution. A number of skeins of worsted yarn, of five grams each, were mordanted in separate baths containing 0.150 gram potassium bichromate and 0.075 gram potassium tartrate in 500 cc. water. Two of these skeins were dyed respectively in baths containing thirty-five cc. of each extract, when it was found that sample No. 1 was considerably stronger than No. 2. Dyeing tests were now made, using varying amounts of No. 2 and thirty-five cc. of No. 1, with the result that thirty-five cc. of the latter were equal to forty-five cc. of No. 2, from which we find that 100 parts No. 1 equal, in tinctorial value, 128.5 parts No. 2.

One hundred cc. of each extract solution were now filtered through thoroughly washed hide powder, as described by L. Schreiner (*Chem. Ztg.*, *1890*, 961), and the filtrate evaporated to dryness and dried at 100° C. until constant weight is obtained. One hundred cc. of each of the original solutions were also evaporated to dryness and dried at 100° C., the difference in the weights being the coloring matter removed. The results were:

	No. 1. Gram.	No. 2. Gram.
Weight of residue from 100 cc. of the original solution after evaporating to dryness	0.6110	0.4714
Weight of the dry residue from 100 cc. of the original solution after being filtered through hide powder	0.0368	0.0313
Weight of coloring matter	0.5742	0.4401

from which we find that 100 parts No. 1 equal, in tinctorial value, 130.4 parts No. 2.

Another experiment was made to ascertain the accuracy of the Schreiner method, using a sample of hematein which had been made by the writer from chipped logwood.

Five grams of this pure, powdered, and dried hematein were dissolved in one liter of water and 100 cc. of the solution run through hide powder, and the filtrate evaporated to dryness. Results:

(1) Hide powder removed from 100 cc. of original solution, 0.4989 gram. Theory, 0.5000 gram.

(2) Hide powder removed from 100 cc. of original solution, 0.4991 gram. Theory, 0.5000 gram.

This shows that hide powder will remove practically all of the coloring matter of logwood.

It may be well to mention just here, that while the Schreiner method is accurate when working on pure extracts and chipped woods, it is absolutely worthless so far as giving the percentage of hematein and hematoxylon in extracts adulterated with quercitron bark, tannin-containing compounds, etc.

The hide powder treatment extracted 0.965 gram of matter from 100 cc. of a fifty per cent. hematein and fifty per cent. tannin solution, while theory required but 0.500 gram of hematein.

Trimble's volumetric method of the color reaction given by two samples, when treated with copper sulphate, gave a dilution of 100 cc. for No. 2 to 127 cc. for No. 1, which indicates that 100 parts No. 1 are equal to 127 parts No. 2.

The above results show that a dyeing test, when applied to chipped logwoods and unadulterated extracts of logwood, yield results that will compare favorably with most of the methods used in analytical chemistry.

Extract of Sumac.—A series of dyeing tests were also made upon six samples of extract of sumac which came to me in the ordinary course of business.

The dyeing tests were made as follows: one and a half grams of each extract were diluted with water to 500 cc., and then a five gram skein of "boiled out" cotton yarn was "laid down" in each bath over night. The temperature of the baths during the night was the ordinary room temperature. The next morning each skein was taken out of the bath and all wrung out as nearly alike as possible. Baths, equal in number to that of the skeins, were made containing two and one-fourth grams of ferrous sulphate to 500 cc. of water, and the skeins "entered" cold and turned for thirty minutes when the solutions were brought to a boil in a water-bath and held there one hour. The skeins are now taken out, rinsed, and dried. After several trials, varying the amount of extract in each bath, it was found that the following amounts gave shades which were of the same depth and intensity:

Sample No.	1657	2.011 grams	or	134	parts.
" "	1661	1.830 "	"	122	"
" "	1662	1.575 "	"	105	"
" "	1663	1.800 "	"	120	"
" "	1665	2.200 "	"	146.7	"
" "	1666	1.500 "	"	100	"

This shows that 100 pounds of No. 1666 will do the same work as 134 pounds of No. 1657, or 146.7 pounds of No. 1665, etc.

Now of each extract four to eight grams were weighed out and dissolved in one liter of water, and the tannin determined in them by the hide powder method as described in Allen's Commercial Organic Analysis, **3**, Part 1, 119. The results are as follows:

No.	Specific gravity.	Total solids. Per cent.	Tannin. Per cent.	Non-tannin. Per cent.	Relative value in parts.
1657	1.2445	45.91	18.50	27.41	136.1
1661	1.2741	49.51	20.99	28.52	119.9
1662	1.2849	51.32	23.48	27.84	107.2
1663	1.2648	49.11	21.03	28.08	119.7
1665	1.2738	49.14	17.30	31.84	145.5
1666	1.2438	45.27	25.18	20.09	100.0

A comparison of these results with those obtained upon the same samples by means of the dyeing test shows a very close and favorable agreement.

While the hide powder method is not all that could be desired in the line of accuracy, yet, in the present knowledge of the chemistry of the tannins, it is the best method we have for the valuation of such extracts as are used on account of their tannin contents. This method also yields results which are much nearer the practical value, and can, in all fairness, be used as the standard in the valuation of extracts by the dyeing test.

The results of the above investigation are: First, the dyeing test yields results which compare favorably in accuracy with the best methods of analytical chemistry. Second, that the results of the dyeing test have a practical value.

Another feature of the dyeing test applied to the natural organic dyestuffs is, that it will frequently show not only any admixture with other dyestuffs, but also give an indication of the method employed in their manufacture. Suppose, for example, one of the extracts of sumac had been adulterated with

extract of quercitron bark. Such an addition would have been indicated by the modification of the shade given with ferrous sulphate. Again, had the extract of logwood been oxidized with hydrogen peroxide, etc., the color would have been taken up by the wool fiber much quicker and the deep blue shade would have developed much sooner than with an extract not so oxidized.

CAMDEN, N. J., April, 6, 1895.

ABSORBENT BLOCKS.[1]

BY PETER T. AUSTEN AND W. HOMER BROADHURST.

Received April 16, 1895.

FOR drying moist precipitates unglazed plates are generally used in the laboratory, but they have the disadvantages of being rather expensive, as well as fragile, while their absorptive capacity is not great.

We have found that a mixture of equal parts of infusorial earth and plaster of Paris, when moistened, will set, forming a block that after drying has a very strong absorbent power for liquids. The plaster and infusorial earth are thoroughly mixed, then moistened with sufficient water to work easily, and placed in the molds. After setting, the blocks are placed in an air-chamber and heated for a day or two at 100°–120° to free them from hygroscopic moisture.

The molds are easily made in the following way: A sheet of glass, the larger the better, is laid on a table, and rubbed with waste oiled with a few drops of light lubricating oil. Long glass strips, an inch wide, and one-quarter of an inch or more thick, are laid on edge on the plate at a distance apart of six inches, if the block is intended to be of that size, and cross-pieces of the same kind of glass strips, but cut in suitable lengths, are placed between the long parallel strips, thus making squares. The strips should also be oiled a little. The wet mixture is poured in and the top smoothed with a straight edge of wood. After setting, the strips of glass are easily removed and the blocks come off the plate easily, and are ready to be placed in the drying oven. The surface next to the glass plate is very smooth.

[1] Read before the N. Y. Section, March 8, 1895.