Report of the Color Committee, October 1955

Revision of A.O.C.S. Method Cc 13b–45. The Color Committee, since its last meeting in New Orleans, was asked to vote on a revision of the existing A.O.C.S. Wesson procedure for color, using Lovibond glasses. At the time of this report eight affirmative and no negative votes had been received. Accordingly the Uniform Methods Committee was notified in writing of the following recommended change in A.O.C.S. Method Cc 13b–45:

B. Procedure

1. Crude, raw, or refined oil samples must be treated with 0.5 g. of official diatomaceous earth per 300 g. oil. Add the diatomaceous earth to the oil and agitate for 2½ min. at 250 r.p.m. at room temperature or at no more than 10–15°C. above the melting point of the fat, if necessary, and filter through an approved paper.

Bleached oils normally are sufficiently clear for the color determination. Suspended material, even if of colloidal size, will cause light scattering. If the sample is not absolutely clear, treat with official diatomaceous earth as outlined above and filter before proceeding with the color determination.

Item 2 under Procedure remains unchanged. Item "a," under 3 and under the subheading Crude Oils of the Coconut Oil Type, should be changed to delete the sentences "melt the oil in the water bath at a temperature not exceeding 50°C. and filter through approved filter paper at a temperature not above 35°C. If not clear, refilter once."

This change will make the method of reading colors more uniform and should reduce differences between laboratories.

Standardization of Lovibond Glasses. A request by committee members was made at the last meeting to investigate the possibility of having existing Lovibond glasses standardized and to find out if new small-size glasses now obtainable could be standardized. Accordingly to the Electrical Testing Laboratory were submitted two of the new Lovibond glasses with a request for information on standardization. The following information was obtained:

Since your letter of June 3, we have tried the Lovibond glasses that you sent in to us and find that in these holders they work quite satisfactorily in our standardization equipment. If glasses can be furnished mounted, or if all will be the same size so that we might make something in the way of a mount that would take individual glass specimens, there is no reason why we should not be able to make these standardizations for your group.

In either event, that is whether dealing with the large size of glass or these smaller glasses, the costs of standardization would be the same. These costs cover the actual determination of the value for the glass or glasses submitted and our report indicating the values assigned. Prices would be based upon the following schedule:

First sample submitted	$20.00
2nd to 5th sample submitted at one time	10.00 ea.
6th to 10th sample submitted at one time	7.50 ea.
Samples over and above 10 submitted at one time	5.00 ea.

As pointed out in our previous correspondence, we are in a position to standardize only red or pink glasses. Until suitable standards might be obtained for the yellow glasses, we are not in a position to work on these.

Spectral Transmission Curves. On June 30, 1955, four oil samples were submitted to the Color Committee members and to three additional members of the Bleaching Committee for cooperative spectral transmission work, using the method shown in the last committee report. Data were submitted on 10 instruments. These data are shown in Tables I to IV. Absorbancy values on 10-mm. columns of oil at wavelengths from 360 to 700 millimicrons are tabulated.

The results show: spreads of approximately .01 below values of 0.1; spreads of approximately .05 between 0.1 and 1.0; spreads of approximately 0.5 between 1.0 and 2.0; meaningless results above 2.0.

TABLE I

Absorbancies
Oil No. 1—10-mm. Cell
Refined Cottonseed Oil

Lab.	1	2	3	4	5	6	7	8	9	10
Wave-length										
360	1.06	.940	1.05	1.090	1.010	.970	1.050	1.05	1.09	.772
370	.91	.860	.893	.925	.880	.845	.881	.92	.928	.676
380	.80	.800	.815	.835	.800	.775	.797	.825	.842	.606
390	.75	.760	.750	.773	.740	.735	.754	.775	.783	.552
400	.75	.810	.785	.784	.775	.765	.767	.778	.810	.596
410	.77	.820	.815	.825	.790	.800	.815	.810	.838	.612
420	.78	.850	.829	.840	.810	.820	.818	.817	.855	.652
430	.80	.860	.879	.865	.830	.870	.885	.851	.890	.710
440	.788	.830	.826	.825	.800	.830	.845	.808	.850	.694
450	.80	.865	.886	.860	.845	.870	.890	.838	.895	.762
460	.77	.750	.827	.798	.760	.810	.844	.778	.838	.702
470	.64	.642	.664	.648	.620	.670	.673	.642	.674	.572
480	.585	.624	.662	.632	.620	.665	.670	.618	.666	.594
490	.56	.457	.622	.507	.480	.537	.536	.502	.538	.456
500	.30	.231	.300	.280	.255	.300	.300	.280	.300	.226
510	.15	.124	.142	.186	.115	.152	.139	.132	.143	.101
520	.077	.076	.072	.065	.060	.077	.069	.066	.074	.050
530	.041	.050	.046	.038	.038	.050	.044	.040	.045	.030
540	.033	.041	.034	.026	.029	.038	.031	.028	.034	.019
550	.017	.020	.024	.021	.019	.028	.021	.020	.024	.015
560	.013	.016	.018	.017	.015	.024	.017	.013	.019	.012
570	.013	.013	.016	.014	.012	.019	.014	.013	.015	.010
580	.011	.011	.013	.013	.010	.017	.011	.008	.012	.007
590	.009	.010	.012	.010	.009	.016	.010	.008	.011	.007
600	.009	.010	.011	.012	.009	.015	.010	.012	.012	.008
610	.009	.011	.013	.012	.009	.016	.010	.013	.012	.008
620	.009	.008	.010	.008	.008	.015	.009	.012	.011	.005
630	.008	.006	.008	.010	.006	.007	.007	.008	.008	.006
640	.008	.007	.009	.011	.007	.006	.007	.008	.008	.006
650	.008	.011	.011	.014	.010	.009	.011	.012	.010	.008
660	.008	.019	.019	.017	.020	.015	.020	.018	.017	.008
670	.008	.025	.027	.017	.028	.025	.028	.033	.028	.012
680	.023	.013	.017	.013	.016	.013	.010	.018	.020	.004
690	.010	.005	.006	.007	.005	.003	.003	.007	.006	.006
700	.009	.003	.004	.005	.002	.003	.002	.005	.003	.008

TABLE II

Absorbancies
Oil No. 2—10-mm. Cell
R-B Cottonseed Oil

Lab.	1	2	3	4	5	6	7	8	9	10
Wave-length										
360	1.39	1.080	1.62	1.62	1.45	1.90	1.89	1.55	1.72	1.20
370	.96	.910	1.09	1.14	1.00	1.00	1.17	1.10	1.16	.765
380	.820	.738	.796	.845	.760	.725	.855	.827	.842	.557
390	.690	.522	.572	.609	.530	.545	.620	.605	.609	.376
400	.455	.427	.422	.455	.395	.413	.505	.450	.452	.265
410	.360	.337	.330	.354	.305	.328	.360	.348	.353	.198
420	.270	.276	.259	.275	.240	.258	.286	.281	.277	.148
430	.220	.224	.208	.213	.192	.208	.227	.224	.221	.117
440	.168	.185	.168	.168	.150	.170	.184	.177	.177	.092
450	.138	.150	.137	.132	.120	.136	.147	.143	.142	.075
460	.108	.112	.109	.106	.094	.108	.116	.112	.112	.057
470	.087	.087	.086	.084	.067	.085	.088	.088	.086	.043
480	.073	.074	.065	.063	.050	.065	.066	.063	.064	.034
490	.048	.058	.048	.046	.032	.047	.048	.045	.047	.024
500	.037	.043	.032	.033	.026	.034	.034	.033	.034	.018
510	.028	.039	.026	.023	.019	.027	.025	.023	.025	.015
520	.020	.018	.018	.014	.014	.020	.019	.018	.019	.012
530	.015	.014	.014	.012	.010	.016	.015	.013	.014	.010
540	.015	.011	.012	.010	.008	.013	.012	.012	.011	.007
550	.015	.009	.009	.006	.006	.010	.009	.008	.009	.007
560	.015	.006	.008	.007	.005	.008	.007	.005	.007	.006
570	.015	.006	.008	.012	.004	.007	.006	.003	.006	.005
580	.009	.005	.008	.007	.003	.005	.005	.004	.005	.005
590	.008	.004	.004	.007	.003	.005	.005	.005	.004	.004
600	.009	.004	.004	.002	.002	.005	.004	.006	.004	.004
610	.009	.003	.004	.002	.002	.003	.004	.006	.004	.004
620	.009	.003	.002	.004	.002	.003	.003	.005	.003	.003
630	.020	.003	.002	.004	.002	.003	.003	.005	.003	.003
640	.026	.003	.002	.002	.002	.003	.003	.005	.003	.003
650	.027	.003	.002	.004	.002	.003	.004	.006	.003	.003
660	.017	.003	.002	.004	.002	.003	.004	.005	.004	.003
670	.009	.003	.002	.004	.001	.003	.003	.006	.003	.003
680	.009	.002	.001	.002	.001	.002	.002	.004	.002	.002
690	.009	.002	.001	.002	.001	.001	.002	.003	.001	.002
700	.009	.002	.001	.002	.001	.000	.002	.004	.001	.003

TABLE 3

Absorbancies
Oil No. 3—10-mm. Cell
Refined Soybean Oil

Laboratory	1	2	3	4	5	6	7	8	9	10
Wavelength										
360	1.45	1.10	1.50	1.48	1.45	∞	∞	1.49	1.57	1.33
370	1.50	1.27	1.55	1.56	1.60	∞	∞	1.61	1.65	1.46
380	1.60	1.45	1.90	1.83	1.80	∞	∞	1.90	2.0+	2.0
390	1.60	1.63	2.0+	2.0+	2.00	∞	∞	2.0+	2.0+	2.0+
400	1.80	1.75	2.0+	2.0+	2.0+	∞	∞	2.0+	2.0+	2.0+
410	1.75	1.90	2.0+	2.0+	2.0+	∞	∞	2.0+	2.0+	2.0+
420	1.70	1.90	2.0+	2.0+	2.0+	∞	∞	2.0+	2.0+	2.0+
430	1.70	1.90	2.0+	2.0+	2.0+	∞	∞	2.0+	2.0+	2.0+
440	1.70	2.00	2.0+	2.0+	2.0+	∞	∞	2.0+	2.0+	2.0+
450	1.70	2.00	2.0+	2.0+	2.0+	∞	∞	2.0+	2.0+	2.0+
460	1.70	2.0+	2.0+	2.0+	2.0+	∞	∞	1.95	2.0+	2.0+
470	1.70	2.0+	2.0+	2.0+	2.0+	∞	∞	2.00	2.0+	2.0+
480	1.60	2.0+	2.0+	2.0+	2.0+	∞	∞	2.00	2.0+	2.0+
490	1.70	2.00	2.0+	2.0+	2.0+	∞	∞	2.00	2.0+	2.0+
500	1.70	1.60	2.0+	2.0+	1.25	1.700	∞	2.00	2.0+	2.0
510	.965	.627	.958	.885	.424	.840	.798	.803	.919	.800
520	.375	.239	.234	.299	.162	.293	.283	.300	.321	.294
530	.165	.125	.154	.143	.090	.144	.137	.141	.149	.139
540	.092	.086	.090	.081	.052	.088	.076	.083	.088	.078
550	.036	.057	.055	.052	.036	.059	.048	.054	.054	.048
560	.028	.044	.040	.039	.025	.043	.034	.037	.038	.033
570	.027	.036	.028	.029	.018	.033	.025	.028	.028	.024
580	.022	.035	.022	.022	.013	.026	.019	.023	.022	.017
590	.013	.014	.017	.017	.010	.022	.014	.017	.017	.013
600	.013	.013	.014	.017	.010	.020	.013	.017	.015	.012
610	.013	.013	.014	.011	.009	.020	.013	.017	.014	.011
620	.013	.010	.012	.010	.007	.018	.008	.014	.012	.008
630	.012	.009	.009	.008	.006	.011	.008	.013	.009	.007
640	.009	.009	.010	.010	.007	.010	.008	.012	.008	.007
650	.009	.011	.010	.015	.016	.012	.010	.013	.010	.008
660	.009	.021	.018	.018	.030	.019	.020	.022	.017	.018
670	.018	.029	.031	.019	.015	.032	.031	.036	.032	.028
680	.025	.015	.018	.014	.003	.020	.011	.024	.018	.011
690	.025	.006	.005	.008	.001	.007	.004	.011	.004	.003
700	.009	.005	.004	.004	.001	.005	.002	.008	.002	.003

The results are not sufficiently concordant to be satisfactory.

Tristimulus Data on Cottonseed and Soybean Oils. Spectrophotometric curves were obtained on a cottonseed oil and a soybean oil, using a Beckman DU with a 50-mm. cell. Curves were also obtained on the same oils bleached with 1, 2, 3, 4, 5, and 6% English earth. The calculated results are given in Table V. The 10 Selected Ordinate method was used in the calculations.

Figure 1 is a chromaticity plot of the oils. Shown in the plot are five of the soybean oils measured in a 10-mm. cell. It is fairly obvious that the oils follow a fairly well defined path in the chromaticity diagram. The curve passes through the cottonseed points. Most of the soybean points lie above and to the right of the cottonseed line.

Figure 2 shows Y or the brilliance values plotted against the % earth used to bleach the original oils. One cannot help but see here the possibility of a method for evaluating the bleachability of an oil and evaluating the efficacy of bleaching earths. As a trading tool such a procedure would be highly impractical, but from a methods' developing standpoint the information may be most revealing.

It is along such lines as these that the present

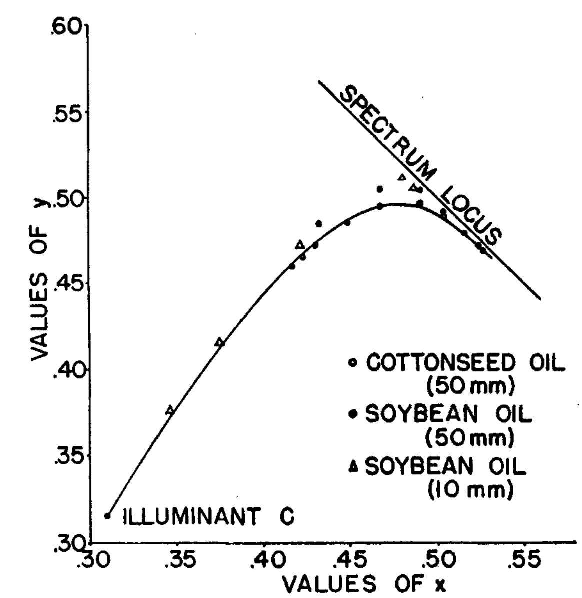

FIG. 1. Chromaticity plot of cottonseed and soybean oils bleached with English earth.

TABLE IV

Absorbancies
Oil No. 4—10-mm. Cell
R-B Soybean Oil

Lab.	1	2	3	4	5	6	7	8	9	10
Wave-length										
360	1.33	1.30	1.66	1.64	1.60	1.400	1.700	1.67	1.85	1.34
370	1.15	1.25	1.46	1.47	1.38	1.300	1.44	1.52	1.58	1.13
380	1.13	1.18	1.27	1.32	1.24	1.200	1.28	1.38	1.37	1.00
390	.98	1.03	1.09	1.11	1.04	1.00	1.08	1.12	1.15	.835
400	.96	1.00	1.01	1.07	.980	.950	1.00	1.03	1.08	.790
410	.885	.870	.920	.925	.820	.880	.920	.935	1.00	.706
420	.690	.730	.744	.762	.700	.735	.747	.762	.780	.566
430	.640	.645	.678	.659	.620	.620	.670	.670	.690	.517
440	.505	.518	.556	.542	.500	.550	.555	.552	.560	.418
450	.430	.440	.424	.450	.430	.464	.466	.462	.468	.361
460	.365	.355	.409	.366	.355	.388	.399	.388	.384	.310
470	.280	.276	.311	.276	.260	.297	.303	.295	.295	.233
480	.235	.236	.275	.236	.230	.257	.260	.248	.248	.205
490	.188	.175	.226	.170	.170	.200	.212	.197	.194	.168
500	.125	.108	.138	.114	.094	.126	.133	.124	.121	.101
510	.077	.064	.080	.074	.058	.080	.069	.074	.073	.060
520	.043	.040	.047	.037	.036	.053	.044	.049	.046	.032
530	.037	.028	.031	.026	.024	.027	.030	.032	.031	.022
540	.022	.019	.023	.016	.018	.028	.021	.023	.023	.016
550	.017	.013	.014	.014	.012	.021	.014	.017	.016	.010
560	.011	.010	.012	.007	.008	.017	.011	.013	.012	.008
570	.011	.006	.009	.003	.006	.014	.008	.008	.008	.007
580	.009	.005	.009	.003	.004	.012	.006	.008	.007	.005
590	.005	.004	.006	.003	.004	.011	.005	.006	.006	.005
600	.008	.005	.008	.004	.004	.012	.006	.007	.008	.005
610	.008	.005	.009	.002	.004	.012	.006	.008	.007	.005
620	.008	.004	.006	.003	.003	.012	.005	.006	.006	.004
630	.005	.003	.006	.003	.003	.005	.004	.006	.004	.004
640	.003	.004	.006	.006	.003	.005	.004	.006	.005	.005
650	.008	.006	.006	.006	.005	.007	.006	.007	.006	.005
660	.010	.011	.012	.004	.011	.011	.010	.014	.010	.009
670	.010	.013	.014	.004	.014	.015	.015	.018	.009	.013
680	.013	.007	.010	.004	.006	.010	.006	.012	.009	.006
690	.013	.003	.005	.005	.002	.004	.002	.006	.003	.003
700	.002	.003	.004	.005	.001	.003	.002	.006	.001	.005

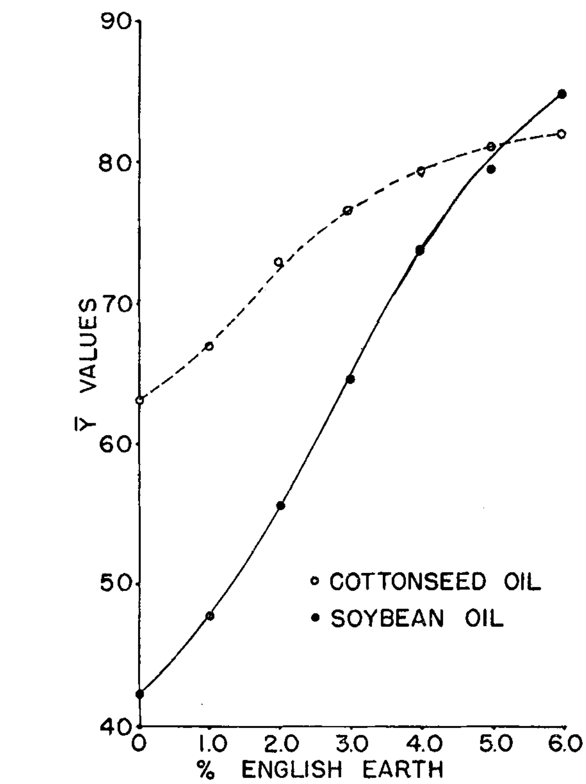

FIG. 2. Y values for bleached soybean and cottonseed oils plotted against the % of earth used.

TABLE V

Chromaticity Data

Oil	x	y	z	Y
Cottonseed Oil				
0% Bleach	.504	.490	.0066	63.12
1% Bleach	.491	497	.011	66.91
2% Bleach	.469	.493	.038	72.89
3% Bleach	.450	.485	.065	76.56
4% Bleach	.431	.471	.098	79.10
5% Bleach	.424	.465	.111	81.06
6% Bleach	.418	.460	.122	81.74
Soybean Oil				
0% Bleach	.528	.469	.0024	42.57
1% Bleach	.525	.472	.0034	47.81
2% Bleach	.517	.479	.0030	55.69
3% Bleach	.505	.492	.0030	64.42
4% Bleach	.491	.505	.0040	73.60
5% Bleach	.469	.505	.0250	79.18
6% Bleach	.433	.485	.0814	84.74

work of the Color and Bleaching Committees is directed.

General. During the past year the name of this committee has been changed from the "Oil Color Committee" to the "Color Committee." W. T. Coleman has accepted chairmanship of the subcommittee on Oil Colors and L. K. Whyte the subcommittee on Surface Colors.

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A Dye-Dilution Method for Estimating Solids Content of Plastic Fats[1]

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IN A PREVIOUS PAPER (3) we reported the separation of several plastic fats into oil and solids phases by ultracentrifugation. Extent of separation increased with the speed of centrifugation, but in no case was an oil-free solid phase obtained and ultracentrifugation alone did not permit a direct determination of the true solids content of a fat. Oil phases separated however were free from solids, and this provides an essential condition for a dye-dilution method which we have developed for estimating true solids in plastic fats. In this method a known quantity of oil-soluble dye is added to the plastic fat and thoroughly mixed to insure uniform distribution of the dye in the oil phase. A portion of the oil phase is recovered by ultracentrifugation, and the concentration of dye is determined spectrophotometrically. The quantity of oil in the sample and, by difference, the solids content can be computed from the dye concentration.

Dyes satisfactory for the dilution method should be soluble in the oil phase of the plastic fat but insoluble in the solids phase. In the present investigation a search was made for dyes suitable for use with global edible spread (6), a plastic mixture of commercial distilled monoglycerides and winterized cottonseed oil. This plastic fat was chosen for initial tests because the monoglyceride was only slightly soluble in cottonseed oil at room temperature (4); solids content of the spread thus was known from its formulation, and no independent method was required for determining solids as a check on the accuracy of the dye-dilution method.

Two dyes were found which gave satisfactory results in the determination of solids in global edible spread by the dye-dilution method. These dyes were tested further, applying the dilution method to analysis of solids content of butter, margarine, shortening, and lard. An independent estimate of the solids content for these fats was obtained by dilatometric measurements. Results presented below show the two methods to be in reasonable agreement.

Experimental

As an initial screening test for estimating the solubility of dyes in the monoglyceride comprising the solid phase of global edible spread, flakes of monoglyceride were immersed overnight in solutions of dyes in cottonseed oil. Extent of dye uptake was

[1] Presented at the meeting of the American Oil Chemists' Society, Chicago, Ill., Nov. 2–4, 1953.