1936 Report
A. O. C. S. Committee for the Study of Soap Wrappers

COLLABORATIVE work this year was confined to a continued study of three possible methods of determining the suitability of paper intended for use as soap wrappers, viz:

(a) Spot test for alkali resistance.
(b) Extraction method for alkali resistance.
(c) Soap contact tests with white soaps of three types; milled, floating, and filled laundry soap.

Samples of six unprinted papers, kindly supplied for the use of the committee by two paper mills, were sent to all members of the committee early in June, 1936.

These papers were designated as follows:

M-350, M-216, M-284B, K-P, K-30, K-30W35.

Paper designated M-284B was rated by the manufacturer as having poor resistance to alkali, and is *not intended* for use *as a soap wrapper*. This paper was, however, included expressly so that collaborators might have available for comparative purposes a paper which might be expected to show discoloration.

The other five papers are rated by the manufacturers as having good resistance to alkali. Paper K-30W35 is lightly waxed.

Collaborators were instructed to subject the six papers to the following tests:

(a) Spot Test With Alkali

Place paper to be tested on a flat clean surface and mark off five areas with a lead pencil. Make up solutions of caustic soda of 1/10, 1/4, 1/2, 1 and 2% strengths. Mark each area with the strength alkali used in testing it. Apply one drop of alkali solution with a clean glass rod or medicine dropper. Avoid moving the paper during the test and allow to dry spontaneously at room temperature.

When dry note in writing, for each strength, if the alkali has produced a harmful change.

Record as O. K. the strongest solution of alkali that does not produce a harmful change.

(b) Extraction Test

Boil 3 grams of paper in two successive portions of 50 cc distilled water for 5 minutes. Combine extracts and make up to 100 cc. Mix thoroughly. To 20 cc of extract add 5 cc normal caustic soda solution. Compare color produced with standards of equal volume containing measured amounts of a freshly prepared standard color solution containing 0.5 grams potassium bicromate and 3.5 cc of a 0.1% solution (i.e., 3.5 milligrams) of Congo Red (E.K. No. 770) per liter.

Use 50 cc Nessler tubes for the color comparison. Report number of cc standard color solution required to match the color of 20 cc of extract.

Note: Results in 1934 indicated that the amount of Congo Red then used (5 cc) should be somewhat reduced to secure a better color match. In order that there may be no discrepancies from Congo Red of different origin we are specifying this year that Congo Red, Eastman Kodak No. 770 be used. This dye is listed by Eastman at $0.45 for a 10-gram bottle and is a certified color manufactured by the pharmaceutical laboratories of National Aniline & Chemical Co.

Mr. Crossley, Chairman of the T. A. P. P. I. Committee on Soap Wrap Papers, in his January report makes this important comment on the standard color solution, viz.: "It has been found that Congo Red in potassium bichromate is thrown out of solution gradually and therefore should be added only to the amount of bichromate needed at the time. For this reason the comparates must be renewed from day to day as there is a distinct difference in shade after eighteen hours."

(c) Soap Contact Tests

It seems highly desirable to test the papers submitted, for discoloration by contact tests with three types of soap, viz.: white floating soap, white filled laundry soap, and uncolored freshly milled toilet soap.

Place the paper under test between two freshly cut surfaces of the different soaps. Subject the test samples to a weight of approximately 2 lbs. per square inch for 16 hours at room temperature. After this treatment examine papers for discoloration.

Eight laboratories responded and submitted reports covering the three tests on six papers. The results are shown in Tables 1, 2 and 3.

TABLE 1.

Spot Test With Alkali.

Laboratory	M — 350		M — 216		M — 284B	
	O. K.	Discolored	O. K.	Discolored	O. K.	Discolored
1	0.1	0.25	0.1	0.25	0.0	0.1
2	0.0	0.1	0.1	0.25	0.1	0.25
3	0.1 sl	0.25	1.0	2.0	0.1 sl	0.25
4	0.1	0.25	0.1	0.25	0.1 sl	0.25
5	0.1	0.25	0.25	0.5	0.1 sl	0.25
6	0.1	0.25	0.1	0.25	0.0	0.1
7	0.1	0.25	0.0	0.1 sl	0.0	0.1
8	0.1	0.25	0.1	0.25	0.0	0.1

Laboratory	K — P		K — 30		K — 30W35	
	O. K.	Discolored	O. K.	Discolored	O. K.	Discolored
1	0.25	0.5	0.1	0.25	0.1	0.25
2	0.1	0.25	0.25	0.5	0.0	0.1
3	1.0	2.0	0.1 sl	0.25	0.1 sl	0.25
4	0.5	1.0	0.1	0.25	0.0 sl	0.1
5	0.5	1.0	0.25	0.5	0.0	0.1
6	0.5	1.0	0.25	0.5	0.0	0.1
7	0.1	0.25	0.1	0.25	0.1 sl	0.25
8	0.25	0.5	0.25	0.5	0.0	0.1

TABLE 2—EXTRACTION TEST

cc. Standard Color Solution Required to Match Sample.

Laboratory	M-350	M-216	M-284B	K-P	K-30	K-30W35
1	1.35	0.63	0.80	0.22	0.28	0.2+
2	0.9	0.8	0.8	0.4	0.5	Very cloudy
3	0.8	0.6	0.7	0.2	0.2	0
4	1.43	0.63	0.69	0.30	0.43	0.28
5	0.95	0.60	0.90	0.25	0.35	0.25
6	1.20	0.85	0.95	0.45	0.55	0.35
7	1.03	1.00	1.05	0.30	0.33	Very milky
8	1.35	0.60	0.75	0.22	0.3	0.2
Range	0.8-1.43	0.6-1.0	0.69-1.05	0.2-0.45	0.2-0.55	0.2-0.35
Average	1.13	0.71	0.82	0.29	0.37	0.21

TABLE 3—SOAP CONTACT TEST

Degree of Discoloration

Note: The progressive degrees of discoloration are designated as follows: None, V. sl. (very slight), Slight, Discolored, Marked, Very marked.

(a) Milled Toilet Soap:

Laboratory	M-350	M-216	M-284B	K-P	K-30	K-30W35
1	Slight	V. sl.	Marked	None	Slight	V. sl.
2	None	V. sl.	V. sl.	None	None	None
3	None	V. sl.	Slight	V. sl.	Slight	V. sl.
4	Slight	V. sl.	Slight	None	None	V. sl.
5	Slight	V. sl.	Slight	None	V. sl.	V. sl.
6	Slight	V. sl.	Marked	None	V. sl.	None
7	Slight	Discolored	Marked	None	V. sl.	V. sl.
8	Slight	Slight	Marked	None	None	V. sl.

(b) White Floating Soap:

Laboratory	M-350	M-216	M-284B	K-P	K-30	K-30W35
1	Slight	None	Marked	None	V. sl.	V. sl.
2	V. sl.	V. sl.	Slight	None	V. sl.	V. sl.
3	Slight	Slight	Marked	V. sl.	Slight	Slight
4	V. sl.	V. sl.	None	None	None	V. sl.
5	Slight	Slight	Marked	None	V. sl.	None
6	Slight	Slight	Marked	V. sl.	None	V. sl.
7	Discolored	Discolored	Marked	None	V. sl.	V. sl.
8	Discolored	Discolored	Marked	None	V. sl.	V. sl.

(c) White Filled Laundry Soap:

Laboratory	M-350	M-216	M-284B	K-P	K-30	K-30W35
1	Slight	V. sl.	Marked	V. sl.	Slight	V. sl.
2	V. sl.	V. sl.	Slight	None	V. sl.	V. sl.
3	Marked	Marked	Very marked	Marked	Marked	Marked
4	Slight	Discolored	Marked	Slight	V. sl.	Slight
5	Marked	Discolored	Very marked	None	Marked	Slight
6	Marked	Marked	Very marked	Slight	Marked	Slight
7	Discolored	Discolored	Marked	None	V. sl.	V. sl.
8	Marked	Marked	Very marked	V. sl.	V. sl.	Slight

Comments by Collaborators

Laboratory No. 4 listed the papers in the order of discoloration by the spot test and the soap contact tests as follows:

	Alkali Spot Test	Filled Soap Contact Tests		
		Milled	Floating	Laundry
Least Discoloration.	K-P	K-30	K-30	K-P
	K-30	K-P	M-284B	K-30
	M-216	M-216	K-P	M-216
	M-350	K-30W35	K-30W35	K-30W35
	K-30W35	M-284B	M-216	M-350
Most Discoloration.	M-284B	M-350	M-350	M-284B

Laboratory No. 7 commented extensively as follows:

"A. Spotting Test"

"The spotting test apparently gives very uniform results. In all cases the intensity of the discoloration is definitely proportional to the strength of the alkali."

"B. Extraction Test"

"Some difficulty was encountered with this method since the water extracts of some papers are rather milky and cannot be matched with the standard color solution."

"The balance between the red and yellow color is not the same in the water extract of all paper, some may contain a large amount of yellow to a small amount of red while in others the red may predominate. For this reason it seems rather dubious for comparable results to be obtained using a standard color solution, which varies only in the total amount of red and yellow color, with no variation in the ratio of red to yellow shade."

"C. Contact Test"

"This method seems to be the most satisfactory for testing wrappers. Laboratories which have available a supply of fresh toilet and laundry bars should find this test the easiest to use. The results should be more accurate as the test more nearly duplicates actual usage than do the spot test and extraction test."

"In making these tests we found that on some papers, such as parchment, little or no discoloration is noted at the time the wrapper is removed from the soap. However, on aging for several days at room temperature, that part of the wrapper which was in direct contact with the soap, develops a pronounced yellowish discoloration not in evidence when the wrapper is first examined at the end of the contact period. In our opinion, this is an important observation, since a wrapper of this kind may discolor on aging when in contact with soap. Due to the limited quantity of samples only a few tests could be made to determine if this discoloration could be accelerated by placing the wrapper in a warm oven immediately after contact with soap. The indications are that heat will hasten discoloration on the wrapper."

"Conclusions:

"1—Comparison of the spotting tests with the soap contact tests indicates that satisfactory paper should show no trace of discoloration to 1/10 per cent NaOH. Paper M-350 was not quite in agreement as it showed no discoloration with 1/10 NaOH and still did not test very satisfactory with the contact tests.

"2—Comparison of the extraction tests with the soap contact test indicate that a paper requiring not over 0.4 cc. of standard color solution reacts favorably toward the contact test. Judging from the few tests run we would suggest 0.5 cc. standard color solution as the upper limit on a paper satisfactory for soap wrapping."

"Recommendations:

"1—We would recommend that more samples of paper be tested before attempting to set any standard limits on either the spotting test or the extraction test.

"2—The color standard for the extraction method does not seem to fit all cases. For this reason it seems advisable that some change be made in the standards so as to enable a better matching of the red and yellow color present in the extract.

"3—We suggest further cooperative tests be made to study the contact test with special reference in improving the interpretation of results.

"4—The samples of paper are not large enough and in future cooperative work we believe that at least 20 sheets 8½-in. by 11-in. be furnished of each different kind of paper."

Discussion of Results:

Careful examination of the tabulated results from eight laboratories shows:

(1) Very good agreement among

the eight laboratories in the spot test with alkali. In the case of 4 out of the 6 papers tested, viz.: M-350, M-284B, K-30 and K-30W35, the agreement among laboratories is rather striking.

(2) Poor correlation between

(a) Alkali spot test and soap contact tests in some cases. Paper K-30W35 showed relatively poor resistance to the alkali spot test, yet showed very little discoloration in the soap contact tests even with filled laundry soap.

(b) Extraction test and either alkali spot test or soap contact test. Paper M-350 shows by far the highest color in the extraction test yet is much superior to M-284B in the soap contact test.

Conclusion:

The compiled results clearly indicate that considerably more comparative tests on more samples of paper should be carried out before this committee is in a position to recommend even a tentative method of evaluating paper for use as a soap wrapper.

L. F. HOYT, Chairman.

MEMBERSHIP OF 1936 A. O. C. S. COMMITTEE FOR THE STUDY OF SOAP WRAPPERS

Allen Abrams, Tech. Div., Marathon Paper Mills Co., Rothschild, Wis.
H. C. Bennett, Los Angeles Soap Co., Los Angeles, Calif.
W. H. Burkhart, Mgr., Gold Dust Corp., 5300 Holabird Ave., Baltimore, Md.
T. Linsley Crossley, 388 University Ave., Toronto, Ontario.
J. E. Doherty, Lever Bros. Co., Cambridge, Mass.
W. H. Braebner, Marathon Paper Mills Co., Menasha, Wis.
N. H. Ittner, Colgate Palmolive Peet Co., 105 Hudson St., Jersey City, N. J.
Frank Libby, Kalamazoo Vegetable Parchment Co., Parchment, Mich.
M. J. Neubauer, Industrial Chemical Sales Co., Mechanicsville, N. Y.
A. S. Richardson, Chemical Division, The Procter & Gamble Co., Ivorydale, Ohio.
H. L. Roschen, care Chemical Laboratory, Swift & Co., Union Stock Yards, Chicago, Ill.
M. L. Sheely, Armour Soap Works, 1355 West 31st St., Chicago, Ill.
L. F. Hoyt, Larkin Co., Inc., Buffalo, N. Y.

ABSTRACTS

Oils and Fats

Edited by
W. F. BOLLENS and M. M. PISKUR

The origin of fathardening. W. Normann. *Chem-Ztg.* **61**, 20-22 (1937). The early history is given.

Notes on the hydrogenation of tea-seed oil. Hung-Yuan Chan and Shün-Hsü Wang. *J. Chem. Eng. China* **1**, 136-7 (1934). Tea-seed oil, purified and treated with Cu hydrate, is readily hydrogenated in the presence of a Ni catalyst contg. Ni 75 and Cu 25%. The catalyst is prepd. by pptg. a mixt. of the nitrates of these 2 metals on fuller's earth by means of Na_2CO_3 and heating the dried carbonate mixt. in H_2 at 350-360° for 1 hr. Five % by wt. of the catalyst is used for the hydrogenation, for which the best temp. is 180-190°. The solid product thus obtained is a hard mass with a solidification point of about 44.5°; it possesses excellent odor. (*Chem. Abs.*)

Studies on the chemistry of the fat acids. II. The preparation of pure oleic acid by a simplified method. J. B. Brown and C. Y. Shinowara. *J. Am. Chem. Soc.* **59**, 6-7 (1936). The method pertains to fractional crystalization of olive oil fat acids from acetone soln. followed by vacuum distn.

The condensation of maleic anhydride with tung oil: A new "constant" for oils. B. A. Ellis and R. A. Jones. *Analyst* **61**, 812-6 (1936). A new procedure for detg. the "diene value" of fats was developed. It is proposed that "maleic acid value" (M.A.V.) be used as it indicates the method used and because it makes no assumption as to the mechanism of the reaction. Procedure: 3 g. sample of oil is placed in 250 cc. flask with ground glass neck. Add 25 cc. 6% maleic anhydride in toluene and a pinch of fine pumice to prevent bumping. The flask is connected to a reflux condenser through means of ground glass joint lubricated with fine graphite powder. Boil for 3 hrs. Wash down condenser with 5 cc. ether and 20 cc. H_2O. Pour into separatory funnel and wash flask with 20 cc. ether and 25 cc. H_2O. The funnel is shaken, allowed to stand and the water layer separated. The residual liquid is further extd. with H_2O. The aqueous mixt. is titrated with 1-*n* NaOH.

$$\text{"M.A.V." in term of I} = \frac{12.892 \times \text{cc. N Na OH used}}{\text{Wt. of sample in g.}}$$

"M.A.V." of several oils was detd. Experimental error is probably ± 0.3.

Rancidity as a problem in oils and fats. E. E. Russell. *Can. Chem. Met.* **20**, 346-8 (1936). Rancidity is caused by the presence in the fat of the aldehydes corresponding to enanthylic, pelargonic, butyric, caprylic and capric acids. It is upon these oxidizable aldehydes that the chem. tests for rancidity depend. The stages of decompn. are indicated and the effects of color, of enzymes and of light rays in producing randicity discussed. The Kreis and other colorimetric tests are outlined. The O taken up by the oil or fat attacks the double bonds of the unsatd. acids as the glycerol acids. The glycerides are probably attacked as well as the fatty acid mols. Early quant. methods for detection of peroxides or active O in oils are outlined and a method is described that eliminates personal factors. (*Chem. Abs.*)

Irradiation of fats. II. Some observations on methods of analysis of oxidized fats and on the interrelation of the results obtained. L. H. Lampitt and N. D. Sylvester. *Biochem. J.* **30**, 2237-2249 (1936). Summary: Modifications of methods for Kreis test, detn. of Issoglio value and detn. of peroxides according to Lea are presented. Figures are given for detns.