

TABLE III
Percentages of Acids and Glycerides in
Ouricury Oil.

	Acids	As Glycerides
Caproic	1.66	1.8
Caprylic	9.10	9.9
Capric	7.64	8.2
Lauric	42.70	45.3
Myristic	8.43	8.9
Palmitic	7.15	7.5
Stearic	2.15	2.3
Arachidic .....	.096	.1
Oleic	12.18	12.7
Linoleic	2.04	2.1

previously made from the mean molecular weights of the saturated acids.

The distillation data for the fractionation of the esters, and the results of their analysis, are given in Table II. Table III contains the percentages in the oil of the saturated and unsaturated acids and their glycerides.

New Applications for Referee Certificates

Robert H. Acock, of The Oil Mill Laboratory, Austin, Texas, has

applied for appointment as Referee Chemist of the American Oil Chemists' Society on cottonseed cake, meal, oil and soap stock. John T. Boyd, Jr., of Barrow-Agee Laboratories, Inc., Cairo, Illinois, has applied for appointment as Referee Chemist on cottonseed, cake, and meal. Information concerning the qualifications of either of these applicants will be gladly received by the Referee Board from any member of the society. Address A. S. Richardson, Ivorydale, Ohio.

REPORT OF 1937-38 ACTIVITIES—REFINING COMMITTEE—AMERICAN OIL CHEMISTS' SOCIETY

THE activities of the Refining Committee for the past year have been characterized by the same very excellent cooperative spirit which has prevailed for many years past in this very important work. As chairman of this year's committee, I wish to thank every member for the prompt attention given to the cooperative samples and also for the many helpful suggestions made. Much credit is again due Mr. H. L. Kevern of the Swift & Company Laboratory for his work leading to what appears to be a satisfactory method for handling Extracted Soybean Oil.

The program carried out this year and the recommendations resulting from the several studies were as follows:

Crude Soybean Tentative Refining Method—A.O.C.S. Methods—Pages 16D-16E

The tentative methods adopted last year for Expeller and Hydraulic Soybean Oils have been used rather extensively in many laboratories of the committee members. No serious difficulties have been reported.

Two cooperative samples (Numbers 1 and 3), both of the Expeller type, were sent out to committee members. The tabulations of results on both samples are attached.

The oil selected for the first cooperative study contained a rather large amount of extraneous material. This selection was made deliberately in order to develop possible improvements in the method. It will be noted that the results reported on this sample were quite widely variant. Two possible causes for the discrepancies were suggested by our own experience and con-

firmed by a number of the committee members:

(1) Oils of this type must be heated in the original container before mixing. The lecithin, together with other extraneous material, settles to the bottom of the container and cannot be thoroughly mixed with the same treatment that is satisfactory in the handling of cottonseed oil samples. It will be necessary to incorporate in the method a provision that any sample which has been allowed to settle should be heated to 30° C. before mixing. This applies particularly to expeller and hydraulic oils. Care must be exercised that the settlings be thoroughly incorporated with the rest of the sample.

(2) Some difficulty with soft foots was encountered in the regular refinings in the Swift Laboratory, using the tentative methods for Expeller and Hydraulic oils. A number of committee members also had similar trouble. A rather extensive study of the oil used for cooperative sample No. 1 indicated that the sloppy condition of the foots very probably influenced the results reported. Chilling to a temperature of 12-15° C. was found to eliminate this difficulty.

Another sample of Expeller Oil was sent out for cooperative study, which was designated as Cooperative Sample No. 3, 1937-38. The method suggested for handling this sample called for heating the sample to 30°C. followed by sufficient mixing to thoroughly incorporate the settlings with the rest of the sample. Another change in the tentative method provided for the cooling of the oil-foots mixture after the one-hour settling period at 65° at the end of the slow agitation

period for an additional hour at 12-15° C. The mixture was again chilled to 12-15° C. for 30 minutes after standing overnight, unless this temperature had been maintained within that range. The soap stock was hardened by chilling in water at 12-15° C. to permit satisfactory draining of the oil.

The results reported by the committee on the second sample of Expeller Oil using the modified tentative method were satisfactory and led to the suggested recommendation for changes in the tentative methods adopted last year, as given at the end of this report.

Extracted Soybean Oil

The refining method development work in the Swift Laboratory this year has been pointed toward the development of a satisfactory method for extracted oil. Some work was also carried out on clarified extracted oil. Detailed tabulations covering these studies, as well as summaries of these tabulations, were submitted to the committee as a matter of record and these are attached to this report. A satisfactory method for the extracted oil was indicated by this work, and a cooperative sample (No. 2) was submitted to the committee to be handled in accordance with the proposed procedure. The results on this sample were reported to the committee and are given in the attached tabulation. These results, together with the development work carried on in Swift's Laboratory on a number of samples of this type of oil, indicate to your chairman that the proposed method used is satisfactory for recommendation for adoption as an addition to the present tentative methods for soybean oil.

Recommendations:

The Refining Committee recommends that the tentative soybean procedure as given on pages 16D-16E of the A.O.C.S. methods be continued as tentative but changed and augmented as follows:

Insert new section after first paragraph to cover mixing:

"Heat the sample in original container in hot water to a temperature which must not exceed 50° C. and *mix well*. Settlings must be thoroughly incorporated with the rest of the sample. The bottom of the container should be examined to make certain that no settlings remain."

Change the last two paragraphs to read as follows:

"At the end of the slow agitation period of refining, the oil shall be allowed to settle in the 65° bath for one hour. Cool by settling in a cold water bath at 12-15°C. for

one hour. The oil shall then be allowed to set overnight before pouring off. After settling overnight, the oil should again be chilled in a bath at 12-15° C. for 30 minutes before pouring off unless the temperature has been maintained within this range.

"The soap stock must be hardened by chilling in water at a temperature of 12-15° C. or lower to permit satisfactory draining of the oil."

The committee further recommends that the method developed this year for Extracted Soybean Oil be adopted as tentative and included in the method following the paragraph covering Hydraulic Soybean Oil, with proper mention of caustic strength and amount in the first paragraph. Additions to be made are as follows:

Paragraph No. 1:

"Strength of lye shall be 14 Bé

for Extracted Oil. Two tests shall be made on each oil using 7/8 and 2/3, respectively, of the maximum of sodium hydroxide as calculated

$$\text{from the formula } \frac{\text{F.F.A.}}{5.2} + .54''$$

To follow paragraph covering handling of Hydraulic Oil:

"Extracted Soybean Oil shall be agitated at 20-24° C. for 90 minutes from the time the sodium hydroxide solution is added with the agitator running 250 R.P.M. ± 10. It shall then be immediately transferred to the 65° C. bath and stirred at 70 ± 5 R.P.M. for exactly 20 minutes. Temperature of oil must then be 60-65° C., adjusting the temperature of the water bath if necessary within the limits specified to obtain this final oil temperature."

H. S. MITCHELL, Chairman.

A. O. C. S. REFINING COMMITTEE COOPERATIVE TESTS—1937-38—SOYA BEAN OIL—EXPELLER TYPE— SAMPLE NO. 1— SENT 10/28/37

Committee Member	Free Fat Maximum Acids as 12 Beaumé			Color of Refined Oil		Color of Bleached Oil		% Maximum 12 Beaumé			Color of Refined Oil		Color of Bleached Oil	
	Oleic	Lye	Loss	Yel.	Red	Yel.	Red	Lye	Loss	Yel.	Red	Yel.	Red	
C. B. Cluff.....	0.90	8.90	7.4	..	7.8	..	2.9	5.9	5.9	..	8.2	..	3.0	
R. H. Fash.....	1.10	9.40	6.2	70	7.9	20	2.4	6.3	7.0	70	8.5	20	2.7	
E. R. Barrow.....	1.00	9.15	7.1	70	8.3	27	2.7	6.1	5.9	70	8.6	28	2.8	
A. R. Gudheim.....	1.00	9.2	7.5	..	7.4	35	4.2	6.1	6.0	..	7.4	..	..
W. D. Hutchins.....	1.00	..	6.4	70	8.0	20	2.7	..	5.9	70	8.4	20	2.9	
A. D. Rich.....	1.10	9.3	5.6	70	7.5	..	..	6.2	6.2	70	8.0	10	3.0
C. A. Coffey.....	0.90	8.9	5.5	70	9.8	35	2.7	5.9	5.7	70	9.9	35	3.0	
T. C. Law.....	1.00	9.1	6.5	70	7.8	35	3.5	2.2	..	..	..	..	..
L. A. Spielman.....	0.98	9.0	5.7	45	7.5	..	..	6.0	5.2	..	7.4	..	2.5
M. M. Durkee.....	0.87	8.8	6.5	70	8.4	20	2.4	5.9	6.3	70	9.0	20	2.8	
N. F. True.....	1.20	9.6	9.2	..	..	..	..	6.4	7.2	..	..	..	..
H. E. Moore.....	1.00	..	6.7	70	7.5	20	1.7	..	6.2	70	7.9	20	1.7	
Lamar Kishlar.....	1.07	9.4	9.1	70	8.2	20	2.2	6.3	6.4	70	8.3	20	2.4	
W. L. Taylor.....	0.95	9.0	6.4	70	8.3	20	2.4	6.0	5.6	70	9.3	20	2.6	
H. S. Mitchell.....	1.00	9.2	6.3	70	7.9	25	2.5	6.1	5.9	70	8.3	25	2.4	
Average.....	1.00	..	6.8	..	7.9	..	2.7	..	6.1	..	8.4	..	2.7	
High.....	1.20	..	9.2	..	9.2	..	4.2	..	7.2	..	9.9	..	3.0	
Low.....	0.87	..	5.5	..	7.4	..	1.7	..	5.2	..	7.4	..	1.7	
Results on average.....	..	..	..	..	2	..	3	..	..	..	1	..	1
Results within 0.1 of average.....	..	..	1	..	3	..	..	..	3	..	3	..	3
Results within 0.2 of average.....	..	..	..	..	..	..	2	..	5	..	2	..	2
Results within 0.3 of average.....	..	..	3	..	1	..	3	..	1	..	..	..	5
Results within 0.4 of average.....	..	..	2	..	5	..	..	..	1	..	1	..	..
Results within 0.5 of average.....	..	..	1	..	2	..	2	..	1	..	..	..	..
Results more than 0.5 of average.....	..	..	8	..	1	..	3	..	3	..	5	..	1

A.O.C.S. REFINING COMMITTEE COOPERATIVE TESTS—1937-38—SAMPLE NO. 2—SOYA BEAN OIL (EXTRACTED) (Sample Sent 2/14/38)

Committee Member	Free Fat Acids as Oleic	% Max. Lye	Loss	Color Refined Oil		Color Bleached Oil		% Max. 14 Bé.		Color Refined Oil		Color Bleached Oil		Remarks
				Yel.	Red	Yel.	Red	Lye	Loss	Yel.	Red	Yel.	Red	
C. B. Cluff.....	0.80	..	5.6	70	8.5	22	2.2	..	4.0	70	8.7	22	2.2	** (See below)
R. H. Fash.....	0.90	6.6	5.2	70	8.9	..	..	5.0	4.5	70	9.1	..	..	..
E. R. Barrow.....	0.90	6.6	5.4	70	8.6	16	1.6	5.0	4.2	70	9.0	17	1.7	..
A. R. Gudheim.....	0.80	6.4	5.1	..	8.9	20	2.0	4.8	4.1	..	9.1	20	2.0	..
W. D. Hutchins.....	0.80	6.4	5.7	70	8.5	20	2.0	4.8	4.4	70	8.5	20	1.8	..
A. D. Rich.....	0.80	6.3	4.9	70	10.0	..	..	4.8	4.0	70	10.0	15	2.0	..
C. A. Coffey.....	0.70	6.2	4.9	40	8.8	30	2.1	4.7	4.6	40	9.0	35	2.1	Foots were harder than with soya bean oil refining.
T. C. Law.....	0.90	6.5	5.6	70	7.8	20	2.6	5.0	4.0	70	8.3	20	2.8	Suggests oil-foot's be allowed to stand in cold water overnight.
L. A. Spielman...	0.84	6.6	4.9	{ 70 20	{ 8.6 8.4 }	15	1.3	5.0	4.0	{ 70 20	{ 8.5 8.5 }	15	1.3	Suggests lower yellow reading.
M. M. Durkee....	0.75	6.2	5.1	{ 15 70	{ 8.3 8.5 }	15	1.8	4.7	4.1	{ 15 70	{ 8.3 8.4 }	15	1.8	Both amts. of caustic gave good break and solid soap stock. Could not match color with 70 yellow.
N. F. True.....	0.84	6.4	3.7*	..	..	..	..	4.9	2.8*	..	..	..	..	..
H. E. Moore.....	0.85	..	5.2	70	9.3	20	1.4	..	4.4	70	9.2	20	1.4	Chilling foot's to 12-15° C. constitutes an improvement.
Lamar Kishlar...	0.80	6.5	4.8	35	8.4	20	1.2	5.0	4.0	35	8.4	20	1.1	..

(Continued on page 176)

A.O.C.S. REFINING COMMITTEE COOPERATIVE TESTS—1937-38—SAMPLE NO. 2—SOYA BEAN OIL (EXTRACTED)
Sample Sent 2/14/38)

(Continued from page 175)

W. L. Taylor....	0.80	6.4	5.4	70	8.9	20	1.5	4.9	4.3	70	9.6	20	1.6	Procedure worked very well.
H. S. Mitchell...	0.80	6.4	5.4	70	8.9	20	2.0	4.9	4.1	70	8.9	20	1.5	
Average	0.82	..	5.2	..	8.7	..	1.8	..	4.2	..	8.9	..	1.8	
High	0.90	..	5.7	..	10.0	..	2.6	..	4.6	..	10.0	..	2.8	
Low	0.70	..	4.8	..	7.8	..	1.2	..	4.0	..	8.3	..	1.1	
Results of avg...	..	..	2	..	..	..	1	..	1	..	1	..	2
Results within	..	..	..	..	..	..	..	..	..	..	..	..	..
0.1 of average..	14	..	2	..	2	..	..	..	4	..	2	..	1
Results within	..	..	..	..	..	..	..	..	..	..	..	..	..
0.2 of average..	1	..	3	..	7	..	4	..	7	..	3	..	3	
Results within	..	..	..	..	..	..	..	..	..	..	..	..	..
0.3 of average..	..	..	3	..	2	..	2	..	1	..	1	..	2
Results within	..	..	..	..	..	..	..	..	..	..	..	..	..
0.4 of average..	..	..	3	..	..	..	2	..	1	..	2	..	2
Results within	..	..	..	..	..	..	..	..	..	..	..	..	..
0.5 of average..	..	..	1	..	..	..	1	..	..	..	2	..	1
Results more than 0.5 of avg.	..	..	..	..	3	..	2	..	..	..	3	..	2

*Not included.
**% maximum was too much lye. Loss recorded is average of 5.0 and 6.2 losses. Mixing sample at standard temperature desirable improvement. Agrees with suggestion that soap stock be cooled to 12-15° C. and suggests further that this chilling be continued until soap stock is solid.

A.O.C.S. REFINING COMMITTEE COOPERATIVE TESTS — SAMPLE NO. 3 — 1937-38 — SOYA BEAN EXPELLER TYPE

Committee Member	Free Fat as Oleic	Maxi-mum 12 Bé. Lye	Loss	Color Refined Oil		Color Bleached Oil		% Max. 12 Bé. Lye	Loss	Color Refined Oil		Color Bleached Oil		Remarks
				Yel.	Red	Yel.	Red			Yel.	Red	Yel.	Red	
C. B. Cluff	0.50	8.00	3.9	70	6.5	22	2.2	5.30	4.9	70	7.2	25	2.5	*** (See below)
R. H. Fash*	0.60	4.6 of 14 Bé.	7.3	70	8.1	20	2.0	3.4 of 14 Bé.	5.2	70	8.3	20	2.0	
E. R. Barrow....	0.50	8.00	4.1	70	7.1	20	2.0	5.3	4.5	70	8.1	22	2.2	
A. R. Gudheim...	0.50	8.00	4.3	70	6.3	25	2.3	5.4	5.0	70	7.1	25	2.3	
W. D. Hutchins...	0.50	8.00	4.7	70	6.6	20	2.0	5.4	4.6	70	7.1	20	2.1	
A. D. Rich	0.70	8.50	4.3	70	7.5	..	..	5.7	4.6	70	7.5	10	2.1
C. A. Coffey	0.38	7.61	5.1	70	8.2	30	2.5	5.07	5.4	70	8.5	30	2.5	
T. C. Law	0.60	8.25	4.0	70	7.1	20	1.7	5.50	4.3	70	7.2	20	1.7	
L. A. Spielman...	0.50	8.0	3.8	70	6.5	20	1.9	5.3	4.0	70	6.9	20	1.9	
M. M. Durkee...	0.43	7.60	4.0	35	7.7	20	2.0	5.06	4.8	35	8.4	20	2.1	
N. F. True*	0.58	% Max.	5.8	..	..	..	..	1/2 Max.	4.0	..	..	..	..
H. E. Moore....	0.40	..	4.2	50	8.3	30	2.0	..	5.0	50	8.5	30	2.0	
Lamar Kishlar ..	0.44	7.80	4.6	35	7.3	20	1.9	5.30	4.51	35	8.0	20	2.0	
W. L. Taylor ..	0.50	7.95	4.0	70	7.9	20	2.0	5.30	4.6	70	8.7	20	2.3	
H. S. Mitchell ...	0.50	8.00	4.3	70	7.7	30	2.0	5.30	4.5	70	8.3	30	2.0	
Average	0.50	..	4.3	..	7.3	..	2.0	..	4.7	..	7.8	..	2.1	
High	0.70	..	5.1	..	8.3	..	2.5	..	5.4	..	8.7	..	2.5	
Low	0.36	..	3.8	..	6.3	..	1.7	..	4.0	..	6.9	..	1.7	
Results on avg...	7	..	3	..	1	..	6	..	..	..	..	..	3
Results within	..	..	..	..	..	..	..	..	..	..	..	..	..
0.1 of avg....	5	..	1	..	..	..	2	..	4	..	..	..	4
Results within	..	..	..	..	..	..	..	..	..	..	..	..	..
0.2 of avg....	1	..	1	..	3	..	1	..	4	..	1	..	3	
Results within	..	..	..	..	..	..	..	..	..	..	..	..	..
0.3 of avg....	..	..	4	..	..	..	2	..	2	..	3	..	..
Results within	..	..	..	..	..	..	..	..	..	..	..	..	..
0.4 of avg....	..	..	2	..	4	..	..	..	1	..	..	..	3
Results within	..	..	..	..	..	..	..	..	..	..	..	..	..
0.5 of avg....	..	..	1	..	..	..	1	..	..	..	1	..	..
Results more than 0.5 of avg....	..	..	1	..	7	..	..	..	2	..	8	..	..

*Not included in averages.
**Color match with 70 yel. was very poor. Actual color should be read at 35 yel. for refined oil and at 20 yel. for the bleached. We feel a perfect match should be obtained rather than set the yellow.
***Maximum NaOH gives smooth, firm soap. % max. NaOH gives grainy, firm soap. No oil recovered from either test. Tests run in duplicate and uniform results obtained.

A.O.C.S. Refining Committee Tests—Extracted Soybean Oil—Development Work in Swift Laboratories

Extracted oil produced during the 1936-37 season was used at the start of these tests. The free fatty acid content of this oil was 0.5%. The equipment used was the official type as described in Rule No. 273. The maximum lye used was calculated from the formula for hydraulic pressed cottonseed oil:

$$FFA + .54 = \text{Maximum NaOH.}$$

The bath temperatures during refining follow Rule No. 273, section C. In

the first of this work the oil was cooled during settling to 20-24° C. in accordance with the regular method. Later, however, the cooling temperature was changed to 12-15° C. and this temperature range was also used after melting the foots for further draining.

Test Series No. 1
Oil from 1936-37 Season—F.F.A. 0.50%
Fast agitation 90 minutes—20-24° C.
Slow agitation 15 minutes—65° C.
Bé. Lye Used Amounts
12° Maximum
14 % Maximum
16
18

A good break was obtained along

with rapid settling foots at the end of the 15 minute agitation period. However, the foots were soft and tended to hold the oil. The 12° and 14° lyes gave the best results.

Test Series No. 2
Fast agitation 90 minutes—20-24° C.
Slow agitation 20 minutes—65° C.
Bé. Lye Used Amounts
12° Maximum
14 % Maximum
16
18

The slow agitation time was extended to 20 minutes in this series. The results were more favorable than those in Series No. 1. The

foots were more easily drained and the losses were lower in some cases.

The 14° lye gave the best results.

Test Series No. 3	90 minutes—20-24° C.
Fast agitation	25 minutes—65° C.
Slow agitation	Amounts
Bé. Lye Used	Maximum
12°	1/2 Maximum
14	
16	
18	

The more favorable results obtained in test series No. 2 indicated that the increase in the slow agitation time was helpful. A further increase to 25 minutes was, therefore, made. The results obtained with this further increase were similar to those of test series No. 1 and did not compare favorably with the findings using the 20 minute period. The foots resulting from the 25 minute period were soft and difficult to handle.

Test Series No. 4	1937-38—F.F.A. 0.30%
Oil from Season	90 minutes—20-24° C.
Fast agitation	15 minutes—65° C.
Slow agitation	Amounts
Bé. Lye Used	Maximum
12°	1/2 Maximum
14	
16	
18	

This test was the first to be run on this season's oil. The test using the 12° lye was unsatisfactory. The oil did not react with all of the lye, leaving an excess under the layer of foots that drained off with the re-

fined oil. Although a good break was obtained, the foots were soft. The 14° lye gave the best results.

Test Series No. 5	90 minutes—20-24° C.
Fast agitation	20 minutes—65° C.
Slow agitation	Amounts
Bé. Lye Used	Maximum
12°	1/2 Maximum
14	
16	
18	

Even though the results obtained from 12° lye in series No. 4 were unsatisfactory, it was thought advisable to try it with longer agitation periods at 65° C. The results were unsatisfactory in this series also. The 14, 16, and 18° lye showed a general improvement over series No. 4, although in some cases the loss was slightly higher. The foots were hard. The number of re-melts were less with the 16 and 18° lyes.

Test Series No. 6	90 minutes—20-24° C.
Fast agitation	25 minutes—65° C.
Slow agitation	Amounts
Bé. Lye Used	Maximum
12°	1/2 Maximum
14	
16	
18	

The results obtained with the 12° lye in this series were the same as in series No. 4 and No. 5, that is, unsatisfactory. The results were better on the 16, 18, and maximum 14° lyes. However, the 1/2 maximum 14° lye showed a higher loss than either series No. 4 or No. 5.

The 14° lye has given the best results with both the 1936-37 and 1937-38 seasons' oils. The 20 minute slow agitation time also gave better results in general than either the 15 or 25 minute periods.

Test Series No. 7	F.F.A. 0.50%
Fast agitation	90 minutes—20-24° C.
Slow agitation	20 minutes—65° C.
Bé. Lye Used	Amounts
14°	Maximum
16	1/2 Maximum
16	1/2 Maximum
18	

In this series the temperature of the bath for chilling the tests, before decanting the oil, and after each remelting of the foots was kept at 12-15° C. The results obtained were quite satisfactory. The foots set up hard, lessening the difficulty in decanting the oil. Additional test work was carried on between series No. 6 and No. 7 to determine the possibility of using 2/3 maximum. The results of 2/3 maximum were satisfactory, giving good foots with a lower loss than either maximum or 1/2 maximum.

The test work as described above, together with other experimental data obtained from the handling of routine refining tests, indicate that the following method will work satisfactorily on extracted soybean oil:

Tentative Method—Crude Soybean Refining—Extracted Type

I. *Apparatus.* The apparatus and general procedure shall be the same as prescribed for hydraulic pressed crude cottonseed oil, with the following exceptions:

II. *Sodium Hydroxide Solutions.* Strength of lye shall be 14° Bé for extracted oil. Two tests shall be made on each oil using the 1/8 of the maximum of sodium hydroxide as F.F.A.

calculated from the formula $\frac{5.2}{\text{F.F.A.}} + .54$ and 2/3 of the maximum quantity of sodium hydroxide.

III. *Extracted Soybean Oil.* Extracted soybean oil shall be agitated at 20-24° C. for 90 minutes from the time the sodium hydroxide solution is added with the agitator running 250 R.P.M. ± 10 . It shall then be immediately transferred to the 65° C. bath and stirred at 70 \pm 5 R.P.M. for exactly 20 minutes. Temperature of oil must then be 60-65° C., adjusting the temperature of the water bath if necessary within the limits specified to obtain this final oil temperature.

IV. *Settling.* At the end of the

slow agitation period of refining the extracted oil shall be allowed to settle in the 65° bath for one hour. Cool by settling in a cold water bath at 12-15° C. for one hour. The oil shall then be allowed to set overnight before pouring off. After settling overnight the oil should again be chilled in a bath at 12-15° C. for 30 minutes unless the temperature has been maintained within this range.

The soap stock should be hardened by chilling in water at a temperature of 12-15° C. to permit satisfactory draining of the oil.

Extracted Clarified Oil

Test series No. 8 to No. 13 cover the work done on this type of oil. A 20 minute slow agitation period with 14, 16, and 18° Bé lyes gave promising results with last season's

oil but did not do well with this year's oil. It would appear that the stronger lyes must be used with this class of specially treated oils and that 20 to 25 minutes slow agitation

would be desirable.

The work done on extracted clarified oil did not result in a method which could be recommended as a tentative procedure.

SOYA BEAN OIL REFINING—EXTRACTED OIL—SERIES NO. 1—SEASON 1936-37
(90 min. fast agitation, 20-24° C. 15 min. slow agitation, 65° C.)

	—12 Beaumé—		—14 Beaumé—		—16 Beaumé—		—18 Beaumé—	
	Max. Amt. Lye Used for C.S. Oil	% Max. Amt. Lye Used for C.S. Oil	Max. Amt. Lye Used for C.S. Oil	% Max. Amt. Lye Used for C.S. Oil	Max. Amt. Lye Used for C.S. Oil	% Max. Amt. Lye Used for C.S. Oil	Max. Amt. Lye Used for C.S. Oil	% Max. Amt. Lye Used for C.S. Oil
Per cent lye used	8.0	7.0	6.7	5.9	5.8	5.1	5.0	4.3
Grams lye used	40.0	35.0	33.5	29.5	29.0	25.5	25.0	21.5
Grams dry NaOH used for 500 grams oil	3.200	2.800	3.180	2.800	3.210	2.820	3.170	2.730
Grams H ₂ O used for 500 grams oil	36.800	32.200	30.320	26.700	25.790	22.680	21.830	18.770
Grams oil first pour off	463.7	465.7	456.2	463.9	458.0	459.5	456.5	453.7
Grams oil recovered by remelting foots.	0.9	1.1	3.1	2.9	1.0	2.7	0.4	10.2
Total grams oil	464.6	466.8	459.3	466.8	459.0	462.2	456.9	463.9
Number times foots were remelted	one	one	two	two	one	two	one	two
Loss (per cent)	7.1	6.6	8.1	6.6	8.2	7.6	8.6	7.2
Color of oil (red)	9.7	9.2	9.3	9.2	9.0	9.0	8.8	8.9
Condition of foots.	soft	soft	soft	soft	soft	soft	soft	soft
Break at end of fast agitation	slight	slight	slight	slight	slight	slight	slight	slight
Break at end of slow agitation	good	good	good	good	good	good	good	good
Color taken on by oil upon addition of lye	creamy	creamy	creamy	creamy	creamy	creamy	creamy	creamy
Oil set overnight before pouring off.								
F.F.A. 0.5								

SOYA BEAN OIL REFINING—EXTRACTED OIL—SEASON 1936-37—SERIES NO. 2
(90 min. fast agitation temp. 20-24° C. 20 min. slow agitation temp. 65° C.)

	—12° Beaumé—		—14° Beaumé—		—16° Beaumé—		—18° Beaumé—	
	Max. Amt. Lye Used for C.S. Oil	% Max. Amt. Lye Used for C.S. Oil	Max. Amt. Lye Used for C.S. Oil	% Max. Amt. Lye Used for C.S. Oil	Max. Amt. Lye Used for C.S. Oil	% Max. Amt. Lye Used for C.S. Oil	Max. Amt. Lye Used for C.S. Oil	% Max. Amt. Lye Used for C.S. Oil
Per cent lye used	8.0	7.0	6.7	5.9	5.8	5.1	5.0	4.3
Grams lye used	40.0	35.0	33.5	29.5	29.0	25.5	25.0	21.5
Grams dry NaOH used for 500 grams oil	3.200	2.800	3.180	2.800	3.210	2.820	3.170	2.730
Grams H ₂ O used for 500 grams oil	36.800	32.200	30.320	26.700	25.790	22.680	21.830	18.770
Grams oil first pour off	461.5	462.5	459.2	467.5	456.0	460.4	456.5	461.2
Grams oil recovered by remelting foots.	1.2	2.3	0.8	0.1	0.5	1.8	3.9	2.4
Total grams oil	462.7	464.8	460.0	467.6	456.5	462.2	460.4	463.6
Number times foots were remelted	one	two	one	one	one	two	two	two
Loss (per cent)	7.5	7.0	8.0	6.5	8.7	7.6	7.9	7.3
Color of oil (red)	9.7	9.2	9.3	9.2	9.0	9.0	8.8	8.9
Condition of foots.	soft	soft	soft	soft	soft	soft	soft	soft
Break at end of fast agitation	slight	slight	slight	slight	slight	slight	slight	slight
Break at end of slow agitation	good	good	good	good	good	good	good	good
Color taken on by oil upon addition of lye	creamy	creamy	creamy	creamy	creamy	creamy	creamy	creamy
Oil set overnight before pouring off.								
F.F.A. 0.5								

SOYA BEAN OIL REFINING—EXTRACTED OIL—SERIES NO. 3—SEASON 1936-37
(90 minutes fast agitation 20-24° C. 25 minutes slow agitation 65° C.)

	—12 Beaumé—		—14 Beaumé—		—16 Beaumé—		—18 Beaumé—	
	Max. Amt. Lye Used for C.S. Oil	% Max. Amt. Lye Used for C.S. Oil	Max. Amt. Lye Used for C.S. Oil	% Max. Amt. Lye Used for C.S. Oil	Max. Amt. Lye Used for C.S. Oil	% Max. Amt. Lye Used for C.S. Oil	Max. Amt. Lye Used for C.S. Oil	% Max. Amt. Lye Used for C.S. Oil
Per cent lye used	8.0	7.0	6.7	5.9	5.8	5.1	5.0	4.3
Grams lye used	40.0	35.0	33.5	29.5	29.0	25.5	25.0	21.5
Grams dry NaOH used for 500 grams oil	3.200	2.800	3.180	2.800	3.210	2.820	3.170	2.730
Grams H ₂ O used for 500 grams oil	36.800	32.200	30.320	26.700	25.790	22.680	21.830	18.770
Grams oil first pour off	463.0	466.0	459.5	464.5	456.7	459.5	456.0	392.7
Grams oil recovered by remelting foots.	0.6	0.0	0.4	0.3	0.5	1.2	2.4	68.8
Total grams oil	463.6	466.0	459.9	464.8	457.2	460.7	458.4	461.5
Number times foots were remelted	one	one	one	one	one	one	two	three
Loss (per cent)	7.3	6.8	8.0	7.0	8.6	7.9	8.3	7.7
Color of oil (red)	9.7	9.4	9.3	9.2	9.0	9.0	8.9	9.0
Condition of foots.	soft	soft	soft	soft	soft	soft	soft	soft
Break at end of fast agitation	slight	slight	slight	slight	slight	slight	slight	slight
Break at end of slow agitation	good	good	good	good	good	good	good	good
Color taken on by oil upon addition of lye	creamy	creamy	creamy	creamy	creamy	creamy	creamy	creamy
Oil set overnight before pouring off.								
F.F.A. 0.5%								

EXTRACTED SOYA BEAN OIL REFINING—SERIES NO. 4—SEASON 1937-38
(90 min. fast agitation 20-24° C. 15 min. slow agitation 65° C.)

	—12 Beaumé—		—14 Beaumé—		—16 Beaumé—		—18 Beaumé—	
	Max. Amt. Lye Used for C.S. Oil	% Max. Amt. Lye Used for C.S. Oil	Max. Amt. Lye Used for C.S. Oil	% Max. Amt. Lye Used for C.S. Oil	Max. Amt. Lye Used for C.S. Oil	% Max. Amt. Lye Used for C.S. Oil	Max. Amt. Lye Used for C.S. Oil	% Max. Amt. Lye Used for C.S. Oil
Per cent lye used	7.5	6.6	6.3	5.5	5.4	4.7	4.7	4.1
Grams lye used	37.5	33.0	31.5	27.5	27.0	23.5	23.5	20.5
Grams dry NaOH used for 500 grams oil	3.000	2.640	2.992	2.613	2.986	2.599	2.980	2.599
Grams H ₂ O used for 500 grams oil	34.500	30.360	28.508	24.887	24.014	20.901	20.520	17.901
Grams oil first pour off		Excess of lye drained	469.5	474.4	456.2	450.4	452.9	455.7
Grams oil recovered by remelting foots.			0.4	0.2	4.7	12.9	9.3	11.8
Total grams oil			469.9	474.6	460.9	463.3	462.2	467.5
Number times foots were remelted			one	one	two	three	three	three
Loss (per cent)			6.0	5.1	7.8	7.3	7.6	6.5
Color of oil (red)		with the oil	16.5	10.3	10.6	10.8	10.0	10.5
Condition of foots.			soft	soft	soft	soft	soft	soft
Break at end of fast agitation			slight	slight	slight	slight	slight	slight
Break at end of slow agitation			good	good	good	good	good	good
Color taken on by oil upon addition of lye			creamy	creamy	creamy	creamy	creamy	creamy
Oil set overnight before pouring off.								
F.F.A. 0.3%								

EXTRACTED SOYA BEAN OIL REFINING—SERIES NO. 5—SEASON 1937-38
(90 min. fast agitation 20-24° C. 20 min. slow agitation 65° C.)

	—12 Beaumé—		—14 Beaumé—		—16 Beaumé—		—18 Beaumé—	
	Max. Amt. Lye Used for C.S. Oil	% Max. Amt. Lye Used for C.S. Oil	Max. Amt. Lye Used for C.S. Oil	% Max. Amt. Lye Used for C.S. Oil	Max. Amt. Lye Used for C.S. Oil	% Max. Amt. Lye Used for C.S. Oil	Max. Amt. Lye Used for C.S. Oil	% Max. Amt. Lye Used for C.S. Oil
Per cent lye used	7.5	6.6	6.3	5.5	5.4	4.7	4.7	4.1
Grams lye used	37.5	33.0	31.5	27.5	27.0	23.5	23.5	20.5
Grams dry NaOH used for 500 grams oil	3.000	2.640	2.992	2.613	2.986	2.599	2.980	2.599
Grams H ₂ O used for 500 grams oil	34.500	30.360	28.508	24.887	24.014	20.901	20.520	17.901
Grams of oil first pour off		Excess	467.7	474.4	459.7	463.2	460.7	464.7
Grams oil recovered by remelting foots.		of	0.2	0.2	1.6	3.2	3.1	3.0
Total grams of oil		lye	467.9	474.6	461.3	466.4	463.8	467.7
Number times foots were remelted		drained	one	one	two	two	two	two
Loss (per cent)		off	6.4	5.1	7.7	6.7	7.2	6.5
Color of oil (red)		with	10.8	11.2	10.5	10.6	10.1	10.4
Condition of foots		the	hard	hard	hard	hard	hard	hard
Break at end of fast agitation		oil	slight	slight	slight	slight	slight	slight
Break at end of slow agitation			good	good	good	good	good	good
Color taken on by oil upon addition of lye			creamy	creamy	creamy	creamy	creamy	creamy
Oil set overnight before pouring off								
F.F.A. 0.3%								

EXTRACTED SOYA BEAN OIL REFINING—SERIES NO. 6—SEASON 1937-38
(90 min. fast agitation 20-24° C. 25 min. slow agitation 65° C.)

	—12 Beaumé—		—14 Beaumé—		—16 Beaumé—		—18 Beaumé—	
	Max. Amt. Lye Used for C.S. Oil	% Max. Amt. Lye Used for C.S. Oil	Max. Amt. Lye Used for C.S. Oil	% Max. Amt. Lye Used for C.S. Oil	Max. Amt. Lye Used for C.S. Oil	% Max. Amt. Lye Used for C.S. Oil	Max. Amt. Lye Used for C.S. Oil	% Max. Amt. Lye Used for C.S. Oil
Per cent lye used	7.5	6.6	6.3	5.5	5.4	4.7	4.7	4.1
Grams lye used	37.5	33.0	31.5	27.5	27.0	23.5	23.5	20.5
Grams dry NaOH used for 500 grams oil	3.000	2.640	2.992	2.613	2.986	2.599	2.980	2.599
Grams H ₂ O used for 500 grams oil	34.500	30.360	28.508	24.887	24.014	20.901	20.520	17.901
Grams of oil first pour off		The oil did not take	468.9	472.2	462.9	467.9	466.4	469.4
Grams oil recovered by remelting foots.		up all of the lye	0.2	0.3	0.3	0.2	0.3	0.4
Total grams of oil		during the process	469.1	472.5	463.2	468.1	466.7	469.8
Number times foots were remelted		of refining. When	one	one	one	one	one	one
Loss (per cent)		the refined oil was	6.2	5.5	7.4	6.4	6.7	6.0
Color of oil (red)		poured off and the	10.7	11.4	10.6	10.7	10.6	10.8
Condition of foots		cup tipped up	hard	hard	soft	soft	soft	soft
Break at end of fast agitation		about 20 grams of	slight	slight	slight	slight	slight	slight
Break at end of slow agitation		lye came out with	good	good	good	good	good	good
Color taken on by oil upon addition of lye		the oil	creamy	creamy	creamy	creamy	creamy	creamy
Oil set overnight before pouring off								
F.F.A. 6.3%								

SOYA BEAN OIL REFINING—EXTRACTED—SERIES NO. 7—SEASON 1937-38
(90 min. fast agitation 20-24° C. 20 min. slow agitation 65° C.)

	—14 Beaumé—			—16 Beaumé—			—18 Beaumé—		
	Max. Amt. Lye Used for C.S. Oil	% Max. Amt. Lye Used for C.S. Oil	% Max. Amt. Lye Used for C.S. Oil	Max. Amt. Lye Used for C.S. Oil	% Max. Amt. Lye Used for C.S. Oil	% Max. Amt. Lye Used for C.S. Oil	Max. Amt. Lye Used for C.S. Oil	% Max. Amt. Lye Used for C.S. Oil	% Max. Amt. Lye Used for C.S. Oil
Per cent lye used	6.7	5.9	4.4	5.8	5.1	3.8	5.0	4.3	3.3
Grams lye used	33.5	29.5	22.0	29.0	25.5	19.0	25.0	21.5	16.5
Grams dry NaOH used for 500 grams oil	3.180	2.800	2.090	3.210	2.820	2.100	3.170	2.730	2.092
Grams H ₂ O used for 500 grams oil	30.320	26.700	19.910	25.790	22.680	16.900	21.830	18.770	14.408
Grams of oil first pour off	470.0	473.0	481.0	467.0	471.2	478.2	469.5	473.0	476.5
Grams oil recovered by remelting foots.	0.3	0.3	0.1	0.3	0.2	0.4	0.2	0.3	1.8
Total grams of oil	470.3	473.3	481.1	467.3	471.4	478.6	469.7	473.3	478.3
Number times foots were remelted	one	one	one	one	one	one	one	one	two
Loss (per cent)	5.9	5.3	3.8	6.5	5.7	4.3	6.1	5.3	4.3
Color of oil (red)	10.7	11.3	11.3	10.6	10.7	10.8	10.6	10.8	10.8
Condition of foots	hard	hard	hard	hard	hard	hard	hard	hard	hard
Break at end of fast agitation	slight	slight	slight	slight	slight	slight	slight	slight	slight
Break at end of slow agitation	good	good	good	good	good	good	good	good	good
Color taken on by oil upon addition of lye	creamy	creamy	creamy	creamy	creamy	creamy	creamy	creamy	creamy
Oil set overnight before pouring off									
F.F.A. 0.5									

The oil was chilled to 15° C. before making the first pour off. The foots were chilled to 15° C. after each remelting.

SOYA BEAN OIL REFINING—EXTRACTED CLARIFIED OIL—SERIES NO. 8—SEASON 1936-37
(90 min. fast agitation 20-24° C. 15 min. slow agitation 65° C.)

	—12 Beaumé—		—14 Beaumé—		—16 Beaumé—		—18 Beaumé—	
	Max. Amt. Lye Used for C.S. Oil	% Max. Amt. Lye Used for C.S. Oil	Max. Amt. Lye Used for C.S. Oil	% Max. Amt. Lye Used for C.S. Oil	Max. Amt. Lye Used for C.S. Oil	% Max. Amt. Lye Used for C.S. Oil	Max. Amt. Lye Used for C.S. Oil	% Max. Amt. Lye Used for C.S. Oil
Per cent lye used	8.0	7.0	6.7	5.9	5.8	5.1	5.0	4.3
Grams lye used	40.0	35.0	33.5	29.5	29.0	25.5	25.0	21.5
Grams dry NaOH used for 500 grams oil	3.200	2.800	3.180	2.800	3.210	2.800	3.170	2.730
Grams H ₂ O used for 500 grams oil	36.800	32.200	30.320	26.700	25.790	22.700	21.830	18.770
Grams of oil first pour off	439.0	440.7	459.5	461.4	452.9	455.7	452.0	386.0
Grams oil recovered by remelting foots.	19.4	18.9	0.8	2.8	5.5	2.8	6.4	79.0
Total grams of oil	458.4	459.6	460.3	464.2	458.4	458.5	458.4	465.0
Number times foots were remelted	three	four	one	two	three	two	three	four
Loss (per cent)	8.3	8.1	7.9	7.2	8.3	8.3	8.3	7.0
Color of oil (red)	10.0	10.3	9.6	10.1	9.6	10.0	9.6	9.9
Condition of foots	soft	soft	hard	hard	hard	hard	soft	sloppy
Break at end of fast agitation	slight	slight	slight	slight	slight	slight	slight	slight
Break at end of slow agitation	good	good	good	good	good	good	good	good
Color taken on by oil upon addition of lye	creamy	creamy	creamy	creamy	creamy	creamy	creamy	creamy
Oil set overnight before pouring off								
F.F.A. 0.5								

SOYA BEAN OIL REFINING—EXTRACTED CLARIFIED OIL—SERIES NO. 9—SEASON 1936-37
(90 min. fast agitation 20-24° C. 20 min. slow agitation 65° C.)

	—12 Beaumé—		—14 Beaumé—		—16 Beaumé—		—18 Beaumé—	
	Max. Amt. Lye Used for C.S. Oil	% Max. Amt. Lye Used for C.S. Oil	Max. Amt. Lye Used for C.S. Oil	% Max. Amt. Lye Used for C.S. Oil	Max. Amt. Lye Used for C.S. Oil	% Max. Amt. Lye Used for C.S. Oil	Max. Amt. Lye Used for C.S. Oil	% Max. Amt. Lye Used for C.S. Oil
Per cent lye used	8.0	7.0	6.7	5.9	5.8	5.1	5.0	4.3
Grams lye used	40.0	35.0	33.5	29.5	29.0	25.5	25.0	21.5
Grams dry NaOH used for 500 grams oil	3.200	2.800	3.180	2.800	3.210	2.800	3.170	2.730
Grams H ₂ O used for 500 grams oil	36.800	32.200	30.320	26.700	25.790	22.700	21.830	18.770
Grams oil first pour off	465.4	468.0	461.2	468.0	455.7	461.2	457.7	445.0
Grams oil recovered by remelting foots	0.0	0.2	0.0	0.3	1.1	0.3	1.3	18.9
Total grams oil	465.4	468.2	461.2	468.3	456.8	461.5	459.0	463.9
Number times foots were remelted	one	one	one	one	one	one	one	three
Loss (per cent)	6.9	6.4	7.8	6.3	8.6	7.7	8.2	7.2
Color of oil (red)	9.7	9.9	9.3	9.6	9.3	9.6	9.0	9.1
Condition of foots	hard	hard	hard	hard	hard	hard	soft	sloppy
Break at end of fast agitation	slight	slight	slight	slight	slight	slight	slight	slight
Break at end of slow agitation	good	good	good	good	good	good	good	good
Color taken on by oil upon addition of lye	creamy	creamy	creamy	creamy	creamy	creamy	creamy	creamy
Oil set overnight before pouring off.								
F.F.A. 0.5.								

SOYA BEAN OIL REFINING—EXTRACTED CLARIFIED OIL—SERIES NO. 10—SEASON 1936-37
(90 min. fast agitation 20-24° C. 25 min. slow agitation 65° C.)

	—12 Beaumé—		—14 Beaumé—		—16 Beaumé—		—18 Beaumé—	
	Max. Amt. Lye Used for C.S. Oil	% Max. Amt. Lye Used for C.S. Oil	Max. Amt. Lye Used for C.S. Oil	% Max. Amt. Lye Used for C.S. Oil	Max. Amt. Lye Used for C.S. Oil	% Max. Amt. Lye Used for C.S. Oil	Max. Amt. Lye Used for C.S. Oil	% Max. Amt. Lye Used for C.S. Oil
Per cent lye used	8.0	7.0	6.7	5.9	5.8	5.1	5.0	4.3
Grams lye used	40.0	35.0	33.5	29.5	29.0	25.5	25.0	21.5
Grams dry NaOH used for 500 grams oil	3.200	2.800	3.180	2.800	3.210	2.800	3.170	2.730
Grams H ₂ O used for 500 grams oil	36.800	32.200	30.320	26.700	25.790	22.700	21.830	18.770
Grams of oil first pour off	460.2	469.0	460.9	467.4	456.5	462.0	453.2	436.7
Grams oil recovered by remelting foots	0.2	0.0	0.2	0.0	0.2	0.2	7.2	29.2
Total grams of oil	460.4	469.0	461.1	467.4	456.7	462.2	460.4	465.9
Number times foots were remelted	one	one	one	one	one	one	three	three
Loss (per cent)	7.9	6.2	7.8	6.5	8.7	7.6	7.9	6.8
Color of oil (red)	9.6	9.7	9.7	9.7	8.7	9.6	7.9	8.9
Condition of foots	hard	hard	hard	hard	hard	hard	soft	sloppy
Break at end of fast agitation	slight	slight	slight	slight	slight	slight	slight	slight
Break at end of slow agitation	good	good	good	good	good	good	good	good
Color taken on by oil upon addition of lye	creamy	creamy	creamy	creamy	creamy	creamy	creamy	creamy
Oil set overnight before pouring off.								
F.F.A. 0.5.								

SOYA BEAN OIL REFINING—EXTRACTED CLARIFIED—SERIES NO. 11—SEASON 1937-38
(90 min. fast agitation 20-24° C. 15 min. slow agitation 65° C.)

	—14 Beaumé—		—16 Beaumé—		—18 Beaumé—	
	Max. Amt. Lye Used for C.S. Oil	% Max. Amt. Lye Used for C.S. Oil	Max. Amt. Lye Used for C.S. Oil	% Max. Amt. Lye Used for C.S. Oil	Max. Amt. Lye Used for C.S. Oil	% Max. Amt. Lye Used for C.S. Oil
Per cent lye used	6.5	5.7	5.6	4.9	4.9	4.3
Grams lye used	32.5	28.5	28.0	24.5	24.5	21.5
Grams dry NaOH used for 500 grams of oil	3.088	2.710	3.100	2.710	3.110	2.730
Grams H ₂ O used for 500 grams of oil	29.412	25.790	24.900	21.790	21.390	18.770
Grams of oil first pour off	469.0	473.5	460.2	464.0	466.4	465.0
Grams of oil recovered by remelting foots	0.5	0.4	4.4	3.6	1.4	5.3
Total grams of oil	469.5	473.9	464.6	467.6	467.8	470.3
Number times foots were remelted	one	two	three	two	one	three
Loss (per cent)	6.1	5.2	7.1	6.5	6.4	5.9
Color of oil (red)	Excess lye in oil	9.6	9.6	9.7	9.5	9.5
Condition of foots	soft	soft	soft	soft	soft	soft
Break at end of fast agitation	slight	slight	slight	slight	slight	slight
Break at end of slow agitation	good	good	good	good	good	good
Color taken on by oil upon addition of lye	creamy	creamy	creamy	creamy	creamy	creamy
Oil set overnight before pouring off.						
F.F.A. 0.4.						

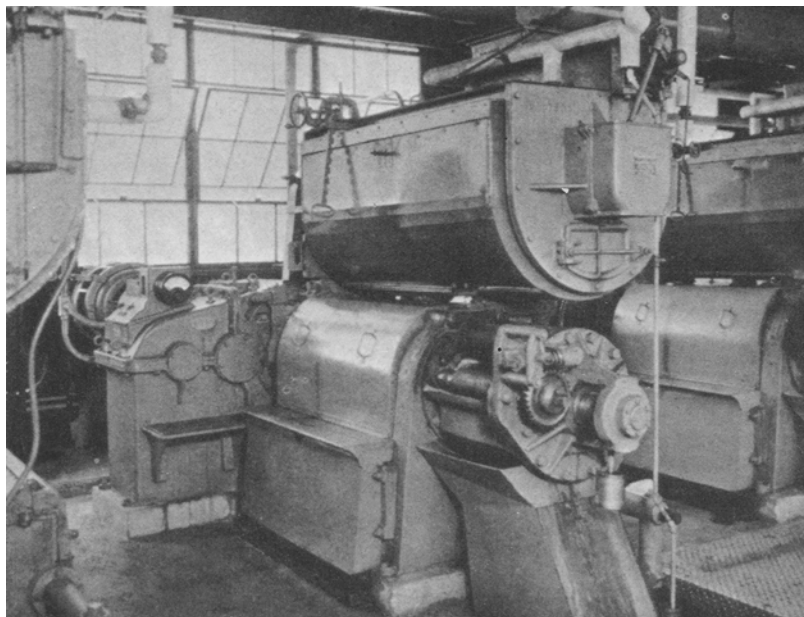
SOYA BEAN OIL REFINING—EXTRACTED CLARIFIED—SERIES NO. 12—SEASON 1937-38
(90 min. fast agitation 20-24° C. 20 min. slow agitation 65° C.)

	—14 Beaumé—		—16 Beaumé—		—18 Beaumé—	
	Max. Amt. Lye Used for C.S. Oil	% Max. Amt. Lye Used for C.S. Oil	Max. Amt. Lye Used for C.S. Oil	% Max. Amt. Lye Used for C.S. Oil	Max. Amt. Lye Used for C.S. Oil	% Max. Amt. Lye Used for C.S. Oil
Per cent lye used	6.5	5.7	5.6	4.9	4.9	4.3
Grams lye used	32.5	28.5	28.0	24.5	24.5	21.5
Grams dry NaOH used for 500 grams of oil	3.088	2.710	3.100	2.710	3.110	2.730
Grams H ₂ O used for 500 grams of oil	29.412	25.790	24.900	21.790	21.390	18.770
Grams of oil first pour off	464.4	470.9	452.9	458.2	463.7	456.7
Grams of oil recovered by remelting foots	0.2	0.1	15.5	9.5	0.3	12.0
Total grams of oil	464.6	471.0	468.4	468.7	464.0	468.7
Number times foots were remelted	one	three	three	three	one	three
Loss (per cent)	7.1	5.8	6.7	6.3	7.2	6.3
Color of oil (red)	Excess lye in oil	9.4	9.4	9.5	9.6	9.6
Condition of foots	hard	hard	soft	soft	hard	soft
Break at end of fast agitation	slight	slight	slight	slight	slight	slight
Break at end of slow agitation	good	good	good	good	good	good
Color taken on by oil upon addition of lye	creamy	creamy	creamy	creamy	creamy	creamy
Oil set overnight before pouring off.						
F.F.A. 0.4.						

SOYA BEAN OIL REFINING—EXTRACTED CLARIFIED—SERIES NO. 13—SEASON 1937-38
(90 min. fast agitation 20-24° C. 25 min. slow agitation 65° C.)

	—14 Beaumé—		—16 Beaumé—		—18 Beaumé—	
	Max. Amt. Lye Used for C.S. Oil	% Max. Amt. Lye Used for C.S. Oil	Max. Amt. Lye Used for C.S. Oil	% Max. Amt. Lye Used for C.S. Oil	Max. Amt. Lye Used for C.S. Oil	% Max. Amt. Lye Used for C.S. Oil
Per cent lye used	6.5	5.7	5.6	4.9	4.9	4.3
Grams lye used	32.5	28.5	28.0	24.5	24.5	21.5
Grams dry NaOH used for 500 grams of oil.....	3.088	2.710	3.100	2.710	3.110	2.730
Grams of H ₂ O used for 500 grams of oil.....	29.412	25.790	24.900	21.790	21.390	18.770
Grams of oil first pour off.....	466.5	470.5	462.2	467.0	463.2	452.5
Grams of oil recovered by remelting foots.....	0.2	0.4	1.3	0.6	2.5	17.1
Total grams of oil	466.7	470.9	463.5	467.6	465.7	469.6
Number times foots were remelted	one	one	one	one	two	three
Loss (per cent)	6.7	5.8	7.3	6.5	6.9	6.1
Color (red)	Excess lye in oil	hard	9.5	9.7	9.6	9.4
Condition of foots	hard	hard	hard	hard	soft	soft
Break at end of fast agitation	slight	slight	slight	slight	slight	slight
Break at end of slow agitation.....	good	good	good	good	good	good
Color taken on by oil upon addition of lye.....	creamy	creamy	creamy	creamy	creamy	creamy
Oil set overnight before pouring off.						
F.F.A. 0.4.						

At the right is shown the screw press used in pressing soya beans at Swift & Company Soya Bean Plant, Champaign, Ill.



THE VAPOR PRESSURE OF COMMERCIAL SOAPS

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Abstract

This paper describes a technique for obtaining the vapor pressures of commercial soaps at low temperatures. The effect of various relative humidities on the equilibrium water content of concentrated soap is discussed, and the vapor pressures of the soap at various moisture contents are given.

THE physical chemist likes to work with dilute solutions, and most of the physical chemical data related to soaps in the literature refer to soap solutions which contain but little soap. On the other hand soaps are manufactured and sold in concentrated form, and it is with the properties of these concentrated bars, flakes and powders that

the manufacturer has to deal. As an example, the vapor pressures of dilute solutions of soap are fairly well worked out¹ but the vapor pressures of bar soap or flaked soap in granule form are not so well understood.

Now the vapor pressure of a bar or flake or granule of soap is important in many theoretical connections. This paper will not consider these theoretical matters, however, but will deal with one of the more practical problems in which vapor pressure data may be useful. More particularly the effect of various relative humidities on the equilibrium water content of concentrated soap will be discussed.

Method of Measuring Vapor Pressure of Soap

Several methods of measuring vapor pressures of soaps have been investigated in our laboratories. Some of these methods are suitable under one set of conditions and some under another. For fairly concentrated soaps at room temperature the "dew point" method as developed by McBain² gives satisfactory results. This method is relatively simple and requires no very complicated apparatus.

The dew point tube itself is a copper brass tube, either silver or chromium plated, about 1 in. in diameter and 3¼ in. long. It is