a peroxide value of 50.0; and third, it would appear that the same process which takes place when a fresh oil becomes rancid also takes place in another portion of the same oil which had previously acquired a relatively high peroxide value as a result of having been protected by a sextant green filter.

Just why the peroxides that have developed under a green filter do not exhibit the characteristics of those developed under full light is now being studied.

Conclusions

(1) Peroxides in oils increase at a uniform rate when the oils are irradiated with light from a constant source, such as CX lamps.

(2) An oil which has been protected by a sextant green filter and which has already developed a certain amount of peroxides will, when exposed simultaneously to light of CX lamps with a fresh sample of the same oil, continue to develop peroxides, and at the same rate as that of the fresh oil.

(3) The induction period of an oil which has been protected by a sextant green filter is unaffected by the peroxides which were developed during protection and is equal to that of a fresh sample of the same oil.

(4) The development of rancidity in oils that have been protected by a sextant green filter proceeds independently of the peroxides that may be already formed.

(5) Peroxides which develop under a sextant green filter do not increase the susceptibility of the oil to become rancid.

Acknowledgment

The author wishes to express his appreciation to Dr. J. A. LeClerc, Chief of the Cereal Section of the Food Research Division, Bureau of Chemistry and Soils, for his interest and helpful suggestions in preparing the manuscript.

REPORT OF REFINING COMMITTEE AMERICAN OIL CHEMISTS' SOCIETY 1936-1937

THE personnel of the Refining Committee was increased this year to 15 members. The general interest in refining problems is evidenced by the excellent cooperation given the chairman by the entire group.

The study of Soya Bean Oil refining occupied the entire attention of the committee this year. A proposed plan for the study of this problem was sent to the committee on November 3, 1936, and the work, which was later carried on by Mr. H. L. Kevern in Swift & Company's Chemical Laboratory from January 5, 1937, to March 6, 1937, followed the suggestions outlined in this plan.

The detailed particulars of the Soya Bean Oil refining tests carried on in the Swift Laboratories were furnished to the committee in a report dated April 14, 1937. The refining study led to procedures which appeared to give satisfactory results with Expeller and Hydraulic type oils. The methods which were accepted for cooperative study were as follows:

Crude Soya Bean Refining—Expeller and Hydraulic Types

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

Strength of lye shall be 12° for expeller soya bean oil and 20° for hydraulic soya bean oil. Two tests shall be made on each oil using the maximum amount of sodium hydroxide as calculated from the formula $\frac{\text{F.F.A.}}{5.2} + .54$ and ⅔ of this maximum quantity of sodium hydroxide.

Expeller soya bean 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 65° C. bath and stirred at 70 ± 5 r.p.m. for exactly 12 minutes. Temperature of oil must then be 65° C. ± 2° C., adjusting the temperature of the water bath if necessary within the limits specified to obtain this final oil temperature.

Hydraulic soya bean oil shall be agitated at 20-24° C. for 45 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 65° C. bath and handled as directed under Expeller soya bean oil.

At the end of the slow agitation period of refining both Expeller and Hydraulic soya bean oils shall be allowed to settle in the 65° bath for one hour. Cool by setting in a cold water bath at 20-24° C. for one hour. The oil shall then be allowed to set over night before pouring off. If the oil has become warm over night it should be chilled in a bath at 20-24° C. for 30 minutes.

The soapstock may be hardened by chilling in water at a temperature of 20-24° C. if necessary to permit draining the oil from the soapstock.

Cooperative samples of Expeller and Hydraulic soya bean oil were sent to the committee on March 22, 1937. The results obtained in this cooperative study, using the method outlined above, are given on the attached tabulations. These results may in general be considered quite satisfactory for a cooperative study of this kind.

The method suggested for Expeller and Hydraulic oils did not appear to give the most satisfactory results on Extracted oil. A longer period of slow agitation, however, led to considerably improved results, but the study of this type of oil was not considered to be of sufficient extent to permit definite conclusions.

Recommendations

The committee recommends (1) that the method for refining Expeller and Hydraulic soya bean oil as outlined above be suggested as a tentative method to replace the one now given in the American Oil Chemists' Society Methods; (2) that the work on Extracted soya bean oil be continued next year.

H. S. MITCHELL, Chairman.

A.O.C.S. REFINING COMMITTEE COOPERATIVE TESTS—SOYA BEAN OIL—EXPELLER—SAMPLE MARKED No. 1

Committee Member	Date Reported	Free Fatty Acids as Oleic	Maximum 12 Bé Lye	Loss	Color Refined Oil Yel.	Color Refined Oil Red	Color Bleached Oil Yel.	Color Bleached Oil Red	⅔ Max. 12 Bé Lye	Loss	Color Refined Oil Yel.	Color Refined Oil Red	Color Bleached Oil Yel.	Color Bleached Oil Red
C. B. Cluff	4/13/37	0.60	8.30	4.4	70	6.0	25	2.4	5.50	5.0	70	6.2	25	2.3
R. H. Fash	4/ 6/37	0.70	8.40	4.4	70	5.8	20	1.9	5.60	4.4	70	6.2	20	2.0
E. R. Barrow	4/ 7/37	0.60	8.20	4.5	70	6.1	22	2.2	5.50	4.4	70	6.2	22	2.2
A. R. Gudheim	4/15/37	0.50	6.40	4.1	70	5.3	20	2.2	4.30	3.9	70	5.5	20	2.3
W. D. Hutchins	4/10/37	0.60	8.20	4.5	70	5.3	20	2.1	5.40	4.5	70	6.1	20	2.2
A. D. Rich	4/ 9/37	0.60	8.20	4.1	70	6.5	20	2.0	5.47	4.1	70	7.1	20	2.0
C. A. Coffey	4/ 7/37	0.48	7.90	4.0	70	6.0	35	1.8	5.30	4.6	70	6.1	35	2.0
T. C. Law	4/ 7/37	0.60	8.20	4.6	70	6.0	20	2.3	5.50	4.6	70	6.2	20	2.3
L. A. Spielman	4/17/37	0.42	7.80	4.5	70	5.5	35	2.1	5.20	4.5	70	5.9	35	2.3
M. M. Durkee	4/24/37	0.52	8.00	4.4	70	6.1	..	...	5.33	4.5	70	7.0	..	...
N. F. True	4/15/37	0.78*	8.60	6.6*	..	...	..	...	5.70	5.3*	..	...	..	...
H. E. Moore	4/ 6/37	0.60	....	4.2	70	5.4	30	1.6	....	5.1	70	6.1	30	1.6
Lamar Kishlar	4/12/37	0.45	....	4.6	70	7.2	20	2.1	....	4.6	70	7.4	20	2.2
H. S. Mitchell	4/ 6/37	0.50	7.95	4.3	70	5.5	25	2.2	5.30	4.5	70	6.1	20	2.0
Average		0.55		4.4		5.9		2.1		4.5		6.3		2.1
High		0.70		4.6		7.2		2.4		5.1		7.4		2.3
Low		0.42		4.0		5.3		1.6		3.9		5.5		1.6
Results on Average		..		3		..		3		4		..		..
Results Within 0.1 of Average		11		4		4		4		5		4		7
Results Within 0.2 of Average		2		3		2		2		..		4		4
Results Within 0.3 of Average		..		2		..		2		..		..		..
Results Within 0.4 of Average		..		1		2		..		1		1		..
Results Within 0.5 of Average		..		..		1		1		1		..		1
Results More than 0.5 from Avg.		..		..		4		..		2		4		..

A.O.C.S. REFINING COMMITTEE COOPERATIVE TESTS—SOYA BEAN OIL—HYDRAULIC—SAMPLE MARKED No. 2

Committee Member	Date Reported	Free Fatty Acids as Oleic	Maximum 20 Bé Lye	Loss	Color Refined Oil Yel.	Color Refined Oil Red	Color Bleached Oil Yel.	Color Bleached Oil Red	⅔ Max. 20 Bé Lye	Loss	Color Refined Oil Yel.	Color Refined Oil Red	Color Bleached Oil Yel.	Color Bleached Oil Red
C. B. Cluff	4/13/37	0.80	4.80	5.5	70	6.2	25	2.3	3.80	5.8	70	6.4	25	2.4
R. H. Fash	4/ 6/37	0.90	4.90	6.1	70	6.0	20	1.9	3.30	5.6	70	6.4	20	2.0
E. R. Barrow	4/ 7/37	0.80	4.80	5.4	70	6.2	21	2.1	3.20	5.1	70	6.4	22	2.2
A. R. Gudheim	4/15/37	0.70	3.80	5.9	70	5.6	20	2.4	2.60	4.8	70	5.7	20	2.4
W. D. Hutchins	4/10/37	0.80	4.80	6.4	70	6.1	20	2.2	3.20	5.3	70	6.7	20	2.3
A. D. Rich	4/ 9/37	0.80	4.80	5.4	70	6.7	20	2.0	3.20	5.1	70	7.2	20	2.0
C. A. Coffey	4/ 7/37	0.76	4.78	5.4	70	6.2	35	1.8	3.18	5.8	70	6.9	35	1.9
T. C. Law	4/ 7/37	0.90	4.90	5.5	70	6.5	..	...	3.30	6.4	70	6.5	..	...
L. A. Spielman	4/17/37	0.72	4.70	5.5	70	5.9	35	1.9	3.10	4.9	70	6.0	35	2.0
M. M. Durkee	4/24/37	0.80	4.86	5.8	70	7.1	..	...	3.24	5.8	70	7.1	..	...
N. F. True	4/15/37	0.99*	5.10	6.2*	..	...	..	...	3.40	7.2*	..	...	..	...
H E. Moore	4/ 6/37	0.80	....	5.7	70	5.8	30	1.5	....	5.4	70	6.3	20	1.6
Lamar Kishlar	4/12/37	0.87	....	5.6	70	7.1	20	2.2	....	4.8	70	7.5	20	2.1
H. S. Mitchell	4/ 6/37	0.80	4.80	5.7	70	5.7	20	1.4	3.20	5.4	70	5.9	20	1.6
Average		0.80		5.7		6.2		2.0		5.4		6.5		2.0
High		0.90		6.4		7.1		2.4		6.4		7.5		2.4
Low		0.72		5.4		5.6		1.4		4.8		5.7		1.6
Result on Average		7		2		3		1		2		1		3
Results Within 0.1 of Average		6		2		1		3		1		3		2
Results Within 0.2 of Average		..		4		1		3		1		2		..
Results Within 0.3 of Average		..		3		2		1		2		..		1
Results Within 0.4 of Average		..		1		1		1		3		1		4
Results Within 0.5 of Average		..		..		2		1		1		1		..
Results More than 0.5 from Avg.		..		1		3		1		3		5		1

A. O. C. S. Refining Committee Tests—Soya Bean Oil—Swift & Company Laboratories

Expeller oil was used at the start of the refining test work. The F.F.A. content of the expeller oil used was 0.50 per cent and remained constant throughout the tests. The equipment used was the official type as described in the A.O.C.S. methods. The maximum lye used was calculated from the formula for hydraulic pressed cottonseed oil $\left(\frac{\text{F.F.A.}}{5.2} + .54 = \text{maximum NaOH}\right)$. The bath temperature for melting the foots in all cases followed the official method ($75 \pm 2°$ C.). A melting time of 30 minutes was also used in all cases.

Expeller Oil

The following summaries refer to attached detailed tabulation:

Test Series No. 1

Fast Agitation	15 minutes—20-24° C.
Slow Agitation	12 minutes—65° C.
Be' Lye Used	Amounts
12°	Maximum
14°	2/3 Maximum
16°	1/2 Maximum
20°	

Regular breaking crude cottonseed oil method was used on expeller oil with varying amounts of 12, 14, 16, and 20° Be' lyes. Unsatisfactory results were obtained as follows: (a) Very little coagulation of foots at end of agitation; (b) High loss resulting from difficulty in pouring off oil from very sloppy foots.

Test Series No. 2

Fast Agitation	45 minutes—20-24° C.
Slow Agitation	20 minutes—65° C.
Be' Lye Used	Amounts
12°	Maximum
14°	4/5 Maximum
16°	2/3 Maximum
20°	1/2 Maximum

The slow breaking crude cottonseed oil method was used on expeller oil with varying amounts of 12, 14, 16, and 20° Be' lyes This method gave better results than the regular breaking refining method in that a better coagulation of foots was obtained with all lye concentrations except the ½ maximum, which gave very sloppy foots. A larger quantity of oil was obtained in the first pour off, indicating that the change in agitation time gave an improved foots.

Test Series No. 3

Fast Agitation	45 minutes—28° C.
Slow Agitation	20 minutes—65° C.
Be' Lye Used	Amounts
12°	Maximum
14°	4/5 Maximum
16°	2/3 Maximum
20°	

In this series the temperature of fast agitation in the slow breaking method used in Series No. 2 was raised from 20-24° C. to 28° C. The strength and amounts of lye used were the same as Series No. 2, with the exception that the ½ maximum was eliminated. No improvement in character of foots was noted from the increase in temperature of fast agitation. The losses were increased and the foots from 20° Be′ lye were so soft, not only in this series but also in the previous series, that it was thought desirable to drop this strength for expeller oil.

Test Series No. 4

Fast Agitation	45 minutes—32° C.
Slow Agitation	20 minutes—65° C.
Be′ Lye Used	Amounts
10°	Maximum
12°	2/3 Maximum
14°	5/9 Maximum
16°	

Even though the increased temperature of fast agitation in Series No. 3 gave poor results it was thought advisable to use a still higher temperature to complete the data. The temperature of fast agitation was, therefore, increased to 32°C. 10° Be′ lye was substituted for 20° Be′. The results of these changes were, as in Series No. 3, unsatisfactory. The condition of the foots was poor and the losses high.

Test Series No. 5

Fast Agitation	45 minutes—20-24° C.
Slow Agitation	12 minutes—65° C.
Be′ Lye Used	Amounts
10°	Maximum
12°	2/3 Maximum
14°	5/9 Maximum
16°	

Previous series had indicated a possible improvement in break before the end of the slow agitation period. The time of slow agitation was, therefore, cut to 12 minutes. This change appeared to bring about an improvement in the character of the foots and gave, in most cases, a large initial pour off. It was noted, however, that only the maximum amount of lye gave a firm foots.

Test Series No. 6

Fast Agitation	45 minutes—20-24° C.
Slow Agitation	12 minutes—65° C.
Be′ Lye Used	Amounts
8°	Maximum
10°	2/3 Maximum
12°	5/9 Maximum
14°	

With the exception of the substitution of 8° Be′ lye for 16° Be′, this series is a duplication of Series No. 5. The condition of the foots and the varying losses between Series No. 4 and Series 5 indicated the need for further change in the method.

Test Series No. 7

Fast Agitation	45 minutes—20-24° C.
Slow Agitation	12 minutes—75° C.
Be′ Lye Used	Amounts
8°	Maximum
10°	2/3 Maximum
12°	5/9 Maximum
14°	

An increase of temperature of slow agitation from 65° C. to 75° C. gave somewhat better foots, lower losses, and fewer remelts.

Test Series No. 8

Fast Agitation	45 minutes—20-24° C.
Slow Agitation	12 minutes—85° C.
Be′ Lye Used	Amounts
8°	Maximum
10°	2/3 Maximum
12°	5/9 Maximum
14°	

A further 10° C. increase of temperature of slow agitation gave unsatisfactory results. This temperature brought the foots, in most cases, to the top of the oil.

Test Series No. 9

Fast Agitation	45 minutes—20-24° C.
Slow Agitation	12 minutes—75° C.
Be′ Lye Used	Amounts
20° Be′	Maximum
Water added to bring to 8-10-12-14 Beaumes.	2/3 Maximum 5/9 Maximum

In this series the varying amounts of 20° Be′ lye were added and the oil agitated for 30 minutes of the fast agitation period. Sufficient water was then added during the continued agitation to bring the lye strengths to 8-10-12-14 Beaumes on the theory that the addition of the stronger lye, followed by the addition of water, would bring about more satisfactory foots and lower losses. The results, however, were unsatisfactory even though it appeared that this procedure would give a good break.

Test Series No. 10

Fast Agitation	45 minutes—20-24° C
Slow Agitation	12 minutes—70° C.
Be′ Lye Used	Amounts
10°	Maximum
12°	Slightly over Maximum
14°	2/3 Maximum
	5/9 Maximum

The temperature of slow agitation was increased 5° C. over regular (65° C.) to compare with Series No. 7 in which the increase had been 10° C. A slightly larger excess of caustic than maximum was also tried in this series. This series was accepted as indicating that there was no advantage in the use of 70° C. as against 75° C. in the slow agitation. The increased amounts of caustic did not appear to help.

Test Series No. 11

Fast Agitation	45 minutes—20-24° C.
Slow Agitation	12 minutes—75° C.
Bé Lye Used	Amounts
10°	Maximum
12°	Slight excess over Max.
14°	2/3 Maximum
	5/9 Maximum

The somewhat favorable results in Test Series No. 7 led to a repetition of the procedure in this series, using 10, 12, and 14° Be′ lyes. It was found that the larger quantities of lyes gave firmer foots and the lesser quantities led to soft foots, requiring additional remeltings.

Test Series No. 12

Fast Agitation	60 minutes—20-24° C.
Slow Agitation	12 minutes—75° C.
Bé Lye Used	Amounts
10°	Maximum
12°	Slight excess over Max.
14°	2/3 Maximum
	5/9 Maximum

Observations made in Test Series No. 7 and No. 11 indicated that a longer period of agitation in the cold might improve the foots, especially with the lesser amounts of lye. These observations were substantiated at least in part by somewhat lower losses and less pour offs on the lower lye quantities. The foots with the smaller quantities of lye were still soft.

Test Series No. 13

Fast Agitation	75 minutes—20-24° C.
Slow Agitation	12 minutes—75° C.
Bé Lye Used	Amounts
10°	Maximum
12°	Slight excess over Max.
14°	2/3 Maximum
	5/9 Maximum

Following the lead obtained in Series No. 12, the time of agitation in the cold was increased to 75 minutes. This resulted in better foots, a lesser number of pour offs, and lower losses. Floating foots were encountered with the 5/9 maximum lye.

Test Series No. 14

Fast Agitation	90 minutes—20-24° C.
Slow Agitation	12 minutes—75° C.
Bé Lye Used	Amounts
8°	Maximum
10°	2/3 Maximum
12°	1 1/3 Maximum
14°	

A further increase of 15 minutes in the fast agitation time seemed tc improve the foots. The breaks were good in all cases and the losses were low. Only one remelting was required in all cases except one. The increased amounts of lye appeared to help. Floating foots still remained as a difficulty in this series.

Test Series No. 15

Fast Agitation	75 minutes—20-24° C.
Slow Agitation	8 minutes—75° C.
Bé Lye Used	Amounts
10°	Maximum
12°	1 1/5 Maximum
14°	1 1/3 Maximum
	2/3 Maximum

It was felt that a decrease in the time of slow agitation might eliminate the floating foots difficulty. The period was, therefore, cut from 12 minutes to 8 minutes. This change appeared to stop the floating foots, but the losses were somewhat higher in spite of the apparently satisfactory condition of the foots.

Test Series No. 16

Fast Agitation	90 minutes—20-24° C.
Slow Agitation	8 minutes—75° C.
Bé Lye Used	Amounts
10°	1 1/3 Maximum
12°	1 1/5 Maximum
14°	Maximum
	2/3 Maximum

The foots in this series were quite firm and satisfactory. The losses were somewhat lower than in Series No. 14. The 10° and 12° Be′ lyes give the best results in this series.

Test Series No. 17

Fast Agitation	75 minutes—20-24° C.
Slow Agitation	8 minutes—75° C.
Bé Lye Used	Amounts
8°	1 1/3 Maximum
10°	1 1/5 Maximum
12°	Maximum
	2/3 Maximum

This series was intended as a check on Series No. 15. It will be noted that the foots again appeared satisfactory and that the results checked fairly close. The 75 minute agitation, however, appeared to give a slightly higher loss than the longer period at the cold temperature.

Test Series No. 18

Fast Agitation	90 minutes—32° C.
Slow Agitation	8 minutes—75° C.
Bé Lye Used	Amounts
8°	1 1/3 Maximum
10°	1 1/5 Maximum
12°	Maximum
	2/3 Maximum

It was thought that a higher temperature in the fast agitation with the longer time would give improved results. The temperature was increased from 20-24° C. to 32° C. This change led to higher losses, although the breaks continued good and the foots firm.

Test Series No. 19

Fast Agitation	120 minutes—20-24° C.
Slow Agitation	8 minutes—75° C.
Bé Lye Used	Amounts
8°	1 1/3 Maximum
10°	1 1/5 Maximum
12°	Maximum
	2/3 Maximum

This series was intended to indicate whether improvement could be brought about by further increasing the time of fast agitation. This change, however, did not bring about an improvement in losses even though the character of the foots remained satisfactory.

Test Series No. 20

Fast Agitation	90 minutes—20-24° C.
Slow Agitation	8 minutes—75° C.
Bé Lye Used	Amounts
8°	1 1/3 Maximum
10°	1 1/5 Maximum
12°	Maximum
	2/3 Maximum

This series was intended as a check on Series No. 16. The results were quite close, and the conclusions were at this point that a method had been found which would be satisfactory for expeller oil.

Test Series No. 21

Fast Agitation	90 minutes—20-24° C.
Slow Agitation	8 minutes—75° C.
Bé Lye Used	Amounts
8°	1 1/3 Maximum
10°	1 1/5 Maximum
12°	Maximum
	2/3 Maximum

The method used in Series No. 20 was tried on a tank car of oil received at the Swift & Company plant in Chicago. The results were quite satisfactory in that a good break was obtained, the character of the foots was good, and in practically all cases only one remelting of the foots was found to be necessary. The 12° Be′ lye gave the best results, a fact which was also noted in Series No. 20.

Test Series No. 22

Fast Agitation	45 minutes—20-24° C.
Slow Agitation	30 minutes—50-53° C.
Bé Lye Used	Amounts
8°	Maximum
10°	80% Maximum
12°	
14°	

This series was made to try out the suggestions made by Mr. Cluff that the addition of 0.50 per cent of N grade sodium silicate to 14° lye was advantageous. His suggestions as to times and temperatures of agitation were also used. This method showed considerable promise. The foots were firm and the losses low. It was felt that this procedure, however, should not be followed further at this time because of the various complications involved unless the work finally indicated that a satisfactory method could not be developed except through the addition of some substance such as silicate.

Hydraulic Oil

At this point the study of hydraulic oil was taken up. The sample used had a F.F.A. content of 0.80 per cent. The same general procedure was used with hydraulic oil as had been followed in the work on expeller oil.

Test Series No. 23

Fast Agitation	90 minutes—20-24° C.
Slow Agitation	8 minutes—75° C.
Bé Lye Used	Amounts
8°	1 1/3 Maximum
10°	1 1/5 Maximum
12°	Maximum
	2/3 Maximum

The method which had shown the most promise on expeller oil was selected for the initial tests on hydraulic oil. The break was quite satisfactory, the foots settled out firm for the first pour off. On remelting, however, four pour offs the foots did not resolidify. This made further oil recovery difficult.

Test Series No. 24

Fast Agitation	90 minutes—20-24° C.
Slow Agitation	8 minutes—75° C.
Bé Lye Used	Amounts
8°	1 1/3 Maximum
10°	1 1/5 Maximum
12°	Maximum
	2/3 Maximum

This test constituted a check on test Series No. 23. With the exception of the 12° B′ lye, the losses did not agree particularly well.

Test Series No. 25

Fast Agitation	90 minutes—20-24° C.
Slow Agitation	8 minutes—75° C.
Bé Lye Used	Amounts
14°	1 1/3 Maximum
16°	1 1/5 Maximum
20°	Maximum
	2/3 Maximum

14° and 16° Be′ lyes gave foots comparable to those obtained with 8-10-12° lyes in the previous series. The 20° Be′ lye, however, gave a better break, firmer foots, and lower losses.

Test Series No. 26

Fast Agitation	60 minutes—20-24° C.
Slow Agitation	8 minutes—75° C.
Bé Lye Used	Amounts
14°	1 1/3 Maximum
16°	1 1/5 Maximum
20°	Maximum
	2/3 Maximum

The 14° and 16° Be′ lyes gave unsatisfactory results. The 20° Be′ lye, however, acted very well, The 30 minute decrease in time of fast agitation did not appear to be detrimental in the case of 20° Be′ lye. Further tests at this point indicated that the time of fast agitation could be reduced to 45 minutes with equally satisfactory results using the 20° Be′ lye, which had been shown to be definitely superior.

Extracted Oil

Extracted and clarified extracted oils were next studied. The F.F.A. content of the extracted oil was 0.50 per cent and that of the clarified extracted, 0.50 per cent.

Test Series No. 27 (Extracted Oil)

Fast Agitation	90 minutes—20-24° C.
Slow Agitation	8 minutes—75° C.
Bé Lye Used	Amounts
8°	1 1/3 Maximum
10°	1 1/5 Maximum
12°	Maximum
	2/3 Maximum

The results obtained with this procedure were quite unsatisfactory. The break was fairly good, but the foots were soft and sloppy, which indicated high losses and colors.

Test Series No. 28 (Extracted Oil)

Fast Agitation	90 minutes—20-24° C.
Slow Agitation	8 minutes—75° C.
Bé Lye Used	Amounts
14°	1 1/3 Maximum
16°	1 1/5 Maximum
20°	Maximum
	2/3 Maximum

The higher Be′ lyes gave better results than those obtained in the previous series, with the 14° and 16° B′ lyes giving the best results. The 20° Be′ lye tended toward soft foots.

Test Series No. 29 (Extracted Oil)

Fast Agitation	90 minutes—20-24° C.
Slow Agitation	8 minutes—75° C.
Bé Lye Used	Amounts
12°	1 3/4 Maximum
14°	1 1/2 Maximum
16°	

The increase in amounts of lye used did not bring about improved results over those obtained in test Series No. 28.

Test Series No. 30 (Extracted Oil)

Fast Agitation	90 minutes—20-24° C.
Slow Agitation	12 minutes—75° C.
Bé Lye Used	Amounts
14°	1 1/3 Maximum
16°	1 1/5 Maximum
18°	Maximum
	2/3 Maximum

The increase in slow agitation time improved the character of the foots obtained. The majority of the losses were lower and there were fewer remelts necessary.

Test Series No. 31 (Clarified Extracted Oil)

Fast Agitation	90 minutes—20-24° C.
Slow Agitation	12 minutes—75° C.
Bé Lye Used	Amounts
14°	1 1/3 Maximum
16°	1 1/5 Maximum
18°	Maximum
	2/3 Maximum

The procedure used in Series No. 30 on extracted oil was tried on clarified extracted oil. The foots were soft and sloppy but were not particularly difficult to handle in the remelting.

Test Series No. 32 (Clarified Extracted Oil)

Fast Agitation	90 minutes—20-24° C.
Slow Agitation	15 minutes—75° C.
Bé Lye Used	Amounts
12°	Maximum
14°	7/8 Maximum
16°	
18°	

An increase in the time of slow agitation and smaller amounts of lyes appeared to give better results than obtained in Series No. 31.

Test Series No. 33 (All types oil)

Expeller Oil:	
Fast Agitation	90 minutes—20-24° C.
Slow Agitation	12 minutes—65° C.
Bé Lye Used	Amounts
12°	Maximum
	2/3 Maximum
Hydraulic Oil:	
Fast Agitation	45 minutes—20-24° C.
Slow Agitation	12 minutes—65° C.
Bé Lye Used	Amounts
20°	Maximum
	2/3 Maximum
Extracted Oil:	
Fast Agitation	90 minutes—20-24° C.
Slow Agitation	25 minutes—65° C.
Bé Lye Used	Amounts
12-14°	Maximum
	7/8 Maximum
Clarified Extracted Oil:	
Fast Agitation	90 minutes—20-24° C.
Slow Agitation	25 minutes—65° C.
Bé Lye Used	Amounts
12-14°	Maximum
	7/8 Maximum

Additional test work was carried on between Series No. 32 and Series No. 33 to determine the possibility of using 65° C. as the temperature of slow agitation. This was found to be quite satisfactory, especially with the longer period of slow agitation (12 minutes, expeller and hydraulic; 25 minutes, extracted and clarified extracted).

Test Series No. 33 was the first of several to try out the methods which observations and results had indicated most satisfactory for the several oils.

The tests as described above suggest the following tentative method for use in the refining of soya bean oil:

Suggested Tentative Method for Refining Crude Soya Bean Oil

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

Strength of lye shall be 12° for expeller soya bean oil and 20° for hydraulic soya bean oil. Two tests shall be made on each oil using the maximum amount of sodium hydroxide as calculated from the formula

$$\frac{\text{F.F.A.}}{5.2} + .54$$

and ⅔ of this maximum quantity of sodium hydroxide.

Expeller soya bean 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 65° C. bath and stirred at 70 ± 5 r.p.m. for exactly 12 minutes. Temperature of oil must then be

65° C. ± 2° C., adjusting the temperature of the water bath if necessary within the limits specified to obtain this final oil temperature.

Hydraulic soya bean oil shall be agitated at 20-24° C. for 45 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 65° C. bath and handled as directed under Expeller soya bean oil.

At the end of the slow agitation period of refining both Expeller and Hydraulic soya bean oils shall be allowed to settle in the 65° bath for one hour. Cool by setting in a cold water bath at 20-24° C. for one hour. The oil shall then be allowed to set overngiht before pouring off. If the oil has become warm overnight it should be chilled in a bath at 20-24° C. for 30 minutes.

The soapstock may be hardened by chilling in water at a temperature of 20-24° C. if necessary to permit draining the oil from the soapstock.

It will be noted that the suggested method does not include Extracted or Clarified Extracted oil. It is felt that more work should be done with these types of oil. The method covered by test series No. 33, however, gave very promising results and should be tested by cooperative studies. This method included the specification of 14° Be′ lye, using maximum as calculated from the formula given above and ⅞ maximum. The oils were agitated 90 minutes at 20-24° C. and 25 minutes at 65° C.

SOYA BEAN OIL REFINING—EXPELLER OIL

Test Series No. 1

Method used for Regular Breaking Crude Cottonseed Oil
15 Minutes fast agitation—Temp. 20-24° C.
12 Minutes slow agitation—Temp. 65° C.

	12 Beaumé			14 Beaumé			16 Beaumé			20 Beaumé		
	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. used for CS Oil	1/2 Max. Amt. used for CS Oil	Max. Amt. used for CS Oil	2/3 Max. Amt. used for CS Oil	1/2 Max. Amt. used for CS Oil	Max. Amt. used for CS Oil	2/3 Max. Amt. used for CS Oil	1/2 Max. Amt. used for CS Oil	Max. Amt. used for CS Oil	2/3 Max. Amt. used for CS Oil	1/2 Max. Amt. used for CS Oil
Per cent Lye used	8.0	5.9	4.0	6.7	4.4	3.3	5.75	3.83	2.9	4.4	2.9	2.2
Grams of Lye used for 500 grams of oil	40.0	29.5	20.0	33.5	22.0	16.5	28.8	19.2	14.5	22.0	14.5	11.0
Grams of dry NaOH used for 500 grams of oil	3.2	2.36	1.60	3.1825	2.090	1.568	3.185	2.124	1.604	3.159	2.082	1.580
Grams of H_2O used for 500 grams of oil	36.800	27.140	18.400	30.3175	19.910	14.932	25.615	17.076	13.896	18.841	12.418	9.420
Grams of oil—first pour off	430.5	422.5	392.0	425.9	395.0	393.0	426.5	390.9	389.7	451.4	391.4	400.7
Grams of oil recovered by remelting foots	22.5	40.5	81.6	30.1	74.9	83.6	25.9	79.3	82.8	15.0	77.5	49.2
Total Grams of oil	453.0	463.0	473.6	456.0	469.9	476.6	452.4	470.2	472.5	466.4	468.9	449.9
Number of times foots were remelted	three	three	five	three	three	six	three	four	six	three	five	five
Loss (per cent)	9.4	7.4	5.4	8.8	6.0	4.7	9.5	6.0	5.5	6.7	6.2	10.0
Color of Oil (red)	5.0	5.5	6.3	5.3	5.9	6.6	5.5	6.0	6.5	5.8	6.2	6.7
Condition of foots	sloppy	sloppy	sloppy	sloppy	sloppy	sloppy	sloppy	sloppy	sloppy	hard	sloppy	sloppy
Break at end of fast agitation	none	none	none	none	none	none	none	none	none	slight	very slight	none
Break at end of slow agitation	slight	very slight	very slight	slight	very slight	very slight	slight	very slight	very slight	good	slight	very slight
Color taken on by oil upon addition of lye	creamy	creamy	creamy	creamy	creamy	creamy	gr'nish yellow	gr'nish yellow	gr'nish yellow	gr'nish brown	gr'nish brown	gr'nish brown

SOYA BEAN OIL REFINING—EXPELLER OIL

Test Series No. 2

Method used for Slow Breaking Crude Cottonseed Oil
45 Minutes fast agitation—Temp. 20-24° C.
20 Minutes slow agitation—Temp. 65° C.

	12 Beaumé				14 Beaumé			
	Max. Amt. Lye used for CS Oil	4/5 Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	1/2 Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil	4/5 Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	1/2 Max. Amt. Lye used for CS Oil
Per cent of lye used	8.0	6.4	5.9	4.0	6.7	5.3	4.4	3.3
Grams of lye used for 500 grams of oil	40.0	32.0	29.5	20.0	33.5	26.5	22.0	16.5
Grams of dry NaOH used for 500 grams oil	3.2	2.5	2.360	1.600	3.183	2.517	2.090	1.568
Grams of H_2O used for 500 grams of oil	36.800	29.400	27.140	18.400	30.317	23.983	19.910	14.932
Grams of oil first pour off	476.5	475.5	473.0	461.0	473.5	471.5	473.0	411.0
Grams of oil recovered by remelting foots	0.0	0.9	3.0	22.6	0.5	1.8	1.0	66.3
Total grams of oil	476.5	476.4	476.0	483.6	474.5	473.3	474.0	477.3
Number of times foots were remelted	none	one	two	three	one	one	one	four
Loss (per cent)	4.7	4.7	4.8	3.3	5.2	5.3	5.2	4.5
Color of oil (red)	5.4	5.4	5.7	6.2	5.4	5.5	5.7	6.7
Condition of foots	hard	hard	soft	sloppy	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	fair	good	good	good	fair
Color taken on by oil upon addition of lye	creamy	creamy	creamy	creamy	creamy	creamy	creamy	creamy

	16 Beaumé				20 Beaumé			
	Max. Amt. Lye used for CS Oil	4/5 Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	1/2 Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil	4/5 Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	1/2 Max. Amt. Lye used for CS Oil
Per cent of lye used	5.75	4.6	3.83	2.9	4.4	3.5	2.9	2.2
Grams of lye used for 500 grams of oil	28.8	23.0	19.2	14.5	22.0	17.5	14.5	11.0
Grams of dry NaOH used for 500 grams oil	3.185	2.544	2.124	1.604	3.159	2.513	2.082	1.580
Grams of H_2O used for 500 grams of oil	25.615	20.456	17.076	13.896	18.841	14.987	12.418	9.420
Grams of oil first pour off	475.7	475.0	473.0	389.5	464.5	470.2	431.0	393.5
Grams of oil recovered by remelting foots	0.7	1.1	2.7	89.6	.7	3.4	41.6	56.2
Total grams of oil	476.4	476.1	475.7	479.1	465.2	473.6	472.6	449.7
Number of times foots were remelted	one	one	two	eight	one	three	four	six
Loss (per cent)	4.9	4.8	4.8	4.2	7.0	5.3	5.5	10.0
Color of oil (red)	5.4	5.6	5.9	6.7	5.7	5.8	6.2	6.5
Condition of foots	hard	hard	soft	sloppy	hard	soft	soft	sloppy
Break at end of fast agitation	slight	slight	slight	slight	fair	slight	slight	slight
Break at end of slow agitation	good	good	good	fair	good	good	good	fair
Color taken on by oil upon addition of lye	greenish yellow	greenish yellow	greenish yellow	greenish yellow	greenish brown	greenish brown	greenish brown	greenish brown

SOYA BEAN OIL REFINING—EXPELLER OIL

Test Series No. 3

45 Minutes fast agitation—Temp. 28° C.
20 Minutes slow agitation—Temp. 65° C.

	12 Beaumé			14 Beaumé			16 Beaumé			20 Beaumé		
	Max. Amt. Lye used for CS Oil	4/5 Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil	4/5 Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil	4/5 Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil	4/5 Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil
Per cent of lye used	8.0	6.4	5.9	6.7	5.3	4.4	5.75	4.6	3.83	4.4	3.5	2.9
Grams of lye used for 500 grams of oil	40.0	32.0	29.5	33.5	26.5	22.0	28.8	23.0	19.20	22.0	17.5	14.5
Grams of dry NaOH used for 500 grams of oil	3.2	2.500	2.360	3.182	2.517	2.090	3.185	2.544	2.124	3.159	2.513	2.082
Grams of H_2O used for 500 grams of oil	36.800	29.440	27.140	30.318	23.983	19.910	25.615	20.456	17.076	18.841	14.987	12.418
Grams of oil first pour off	474.0	469.5	470.0	468.0	470.0	470.0	465.0	470.0	469.5	466.0	469.0	415.5
Grams of oil recovered by remelting foots	0.0	2.1	2.0	0.0	2.2	2.7	3.9	3.8	2.8	1.5	2.6	57.6
Total grams of oil	474.0	471.6	472.0	468.0	272.2	472.7	468.9	473.8	472.3	467.5	471.6	473.1
Number of times foots were remelted	one	two	two	one	two	two	two	two	two	one	two	five
Loss (per cent)	5.2	5.7	5.6	6.4	5.6	5.5	6.2	5.2	5.5	6.5	5.7	5.4
Color of oil (red)	5.4	5.8	6.1	5.5	5.8	6.2	5.5	5.9	6.4	5.6	6.3	6.7
Condition of foots	hard	soft	soft	hard	soft	soft	soft	soft	soft	soft	soft	sloppy
Break at end of fast agitation	slight	slight	slight	slight	slight	slight	slight	slight	slight	slight	slight	slight
Break at end of slow agitation	good	good	good	good	good	good	good	good	good	good	good	good
Color taken on by oil upon addition of lye	creamy	creamy	creamy	creamy	creamy	creamy	gr'nish yellow	gr'nish yellow	gr'nish yellow	gr'nish brown	gr'nish brown	gr'nish brown

SOYA BEAN OIL REFINING—EXPELLER OIL

Test Series No. 4

45 Minutes fast agitation—Temp. 32° C.
20 Minutes slow agitation—Temp. 65° C.

	10 Beaumé			12 Beaumé			14 Beaumé			16 Beaumé		
	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	5/9 Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	5/9 Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	5/9 Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	5/9 Max. Amt. Lye used for CS Oil
Per cent of lye used	9.7	6.5	5.4	8.0	5.9	4.44	6.7	4.4	3.7	(*)	3.83	3.2
Grams of lye used for 500 grams of oil	48.5	32.5	27.0	40.0	29.5	22.00	23.5	22.0	18.6	(*)	19.2	16.0
Grams of dry NaOH used for 500 grams of oil	3.274	2.194	1.823	3.2	2.360	1.760	3.183	2.090	1.767	(*)	2.123	1.769
Grams of H_2O used for 500 grams of oil	45.226	30.306	25.177	36.8	27.140	20.240	30.317	19.910	16.833	(*)	17.07	14.23
Grams of oil first pour off	474.0	466.5	468.0	473.5	464.5	469.0	468.0	463.0	422.0	(*)	456.000	394.10
Grams of oil recovered by remelting foots	0.0	3.7	6.8	0.0	5.4	4.9	0.0	8.8	52.50	(*)	15.40	75.9
Total grams of oil	474.0	470.2	474.8	473.5	469.9	473.9	468.0	471.8	474.50	(*)	471.4	470.0
Number of times foots were remelted	one	two	two	one	two	two	one	two	four	(*)	two	five
Loss (per cent)	5.2	6.0	5.0	5.3	6.0	5.2	6.4	5.6	5.1	(*)	5.7	6.0
Color of oil (red)	5.2	6.0	5.0	5.5	6.1	6.5	5.5	6.0	6.7	(*)	6.1	6.1
Condition of foots	hard	soft	soft	hard	soft	soft	hard	soft	soft	(*)	soft	sloppy
Break at end of fast agitation	slight	slight	slight	slight	slight	slight	slight	slight	slight	(*)	slight	slight
Break at end of slow agitation	good	good	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	(*)	creamy	creamy

(*) Determination spoiled.

SOYA BEAN OIL REFINING—EXPELLER OIL

Test Series No. 5

45 Minutes fast agitation—Temp. 20-24° C.
12 Minutes slow agitation—Temp. 65° C.

	10 Beaumé			12 Beaumé			14 Beaumé			16 Beaumé		
	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	5/9 Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	5/9 Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	5/9 Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	5/9 Max. Amt. Lye used for CS Oil
Per cent of lye used	9.7	6.5	5.4	8.0	5.9	4.44	6.7	4.4	3.7	5.75	3.83	3.2
Grams of lye used for 500 grams of oil	48.5	32.5	27.0	40.0	29.5	22.00	33.5	22.5	18.6	28.8	19.2	16.0
Grams of dry NaOH used for 500 grams of oil	3.274	2.194	1.823	3.200	2.360	1.760	3.183	2.090	1.767	3.185	2.124	1.769
Grams of H_2O used for 500 grams of oil	45.226	30.306	25.177	36.800	27.140	20.240	30.317	19.910	16.833	25.615	17.076	14.231
Grams of oil first pour off	476.5	468.5	461.5	476.0	464.0	444.0	473.5	466.5	434.5	473.0	467.5	403.5
Grams of oil recovered by remelting foots	0.0	5.0	9.3	0.3	8.9	29.2	0.4	8.0	39.8	1.4	6.3	74.9
Total grams of oil	476.5	473.5	470.8	476.3	472.9	474.2	473.9	474.5	474.3	474.4	473.8	476.4
Number of times foots were remelted	one	two	three	one	two	three	one	three	three	one	two	four
Loss (per cent)	4.7	5.3	5.8	4.7	5.4	5.2	5.2	5.1	5.1	5.1	5.2	4.7
Color of oil (red)	5.9	6.5	6.7	5.7	6.0	6.5	5.4	5.9	6.5	5.4	5.9	6.5
Condition of foots	hard	soft	soft	hard	soft	soft	hard	soft	soft	hard	soft	sloppy
Break at end of fast agitation	slight	slight	slight	slight	slight	slight	slight	slight	slight	slight	slight	slight
Break at end of slow agitation	good	good	good	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	gr'nish yellow	gr'nish yellow	gr'nish yellow

SOYA BEAN OIL REFINING—EXPELLER OIL

Test Series No. 6

45 Minutes fast agitation—Temp. 20-24° C.
12 Minutes slow agitation—Temp. 65° C.

	8 Beaumé			10 Beaumé			12 Beaumé			14 Beaumé		
	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	5/9 Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	5/9 Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	5/9 Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	5/9 Max. Amt. Lye used for CS Oil
Per cent of lye used	11.4	7.6	6.3	9.7	6.5	5.4	8.0	5.9	4.44	6.7	4.4	3.7
Grams of lye used for 500 grams of oil	57.0	38.0	31.5	48.5	32.5	27.0	40.0	29.5	22.0	33.5	22.0	18.5
Grams of dry NaOH used for 500 grams of oil	3.192	2.128	1.764	3.274	2.194	1.823	3.200	2.360	1.760	3.183	2.090	1.767
Grams of H_2O used for 500 grams of oil	53.808	35.872	29.736	45.226	30.306	25.177	36.800	27.140	20.240	30.317	19.910	16.833
Grams of oil first pour off	466.5	456.5	440.0	474.5	465.5	446.0	474.5	472.7	434.7	474.5	467.0	441.7
Grams of oil recovered by remelting foots	1.8	8.4	29.1	0.0	2.6	25.7	0.4	1.1	40.7	0.5	7.5	33.2
Total grams of oil	468.3	464.9	469.1	474.5	468.1	471.7	474.9	473.8	475.4	475.0	474.5	474.9
Number of times foots were remelted	one	two	three	one	two	three	one	one	four	one	two	three
Loss (per cent)	6.3	7.0	6.2	5.1	6.4	5.7	5.0	5.2	4.9	5.1	5.1	5.2
Color of oil (red)	5.5	6.1	6.4	5.5	6.0	6.3	5.5	5.9	6.1	5.4	5.8	6.3
Condition of foots	soft	soft	soft	hard	soft	soft	hard	soft	soft	hard	soft	soft
Break at end of fast agitation	slight	slight	slight	slight	slight	slight	slight	slight	slight	slight	slight	slight
Break at end of slow agitation	medium	medium	medium	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	creamy	creamy	creamy

Oil set over night before pouring off.

SOYA BEAN OIL REFINING—EXPELLER OIL

Test Series No. 7

45 Minutes fast agitation—Temp. 20-24° C.
12 Minutes slow agitation—Temp. 75° C.

	8 Beaumé			10 Beaumé			12 Beaumé			14 Beaumé		
	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	5/9 Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	5/9 Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	5/9 Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	5/9 Max. Amt. Lye used for CS Oil
Per cent of lye used	11.4	7.4	6.3	9.7	6.5	5.4	8.0	5.9	4.44	6.7	4.4	3.7
Grams of lye used for 500 grams of oil	57.0	37.0	31.5	48.5	32.5	27.0	40.0	29.5	22.0	33.5	22.0	18.5
Grams of dry NaOH used for 500 grams of oil	3.192	2.128	1.764	3.274	2.194	1.823	3.200	2.360	1.760	3.183	2.090	1.767
Grams of H_2O used for 500 grams of oil	53.808	35.872	29.736	45.226	30.306	25.177	36.800	27.140	20.240	30.317	19.910	16.833
Grams of oil first pour off	469.500	461.7	459.0	476.5	470.0	469.8	477.2	473.8	470.9	477.0	472.0	468.7
Grams of oil recovered by remelting foots	0.0	6.7	9.1	0.0	3.4	2.9	0.2	1.1	3.9	0.2	2.0	6.6
Total grams of oil	469.5	468.4	468.1	476.5	473.4	472.7	477.4	474.9	474.8	477.2	474.0	475.3
Number of times foots were remelted	one	two	two	one	two	two	one	one	two	one	two	two
Loss (per cent)	6.1	6.3	6.4	4.7	5.3	5.5	4.5	5.0	5.0	4.6	5.2	4.9
Color of oil (red)	5.6	5.9	6.6	5.2	5.8	6.7	5.3	5.5	6.3	4.6	6.2	6.7
Condition of foots	soft	soft	soft	hard	soft	soft	hard	soft	soft	hard	soft	soft
Break at end of fast agitation	slight	slight	slight	slight	slight	slight	slight	slight	slight	slight	slight	slight
Break at end of slow agitation	medium	medium	medium	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	creamy	creamy	creamy

Oil set over night before pouring off.

SOYA BEAN OIL REFINING—EXPELLER OIL

Test Series No. 8

45 Minutes fast agitation—Temp. 20-24° C.
12 Minutes slow agitation—Temp. 85° C.

	8 Beaumé			10 Beaumé			12 Beaumé			14 Beaumé		
	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	5/9 Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	5/9 Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	5/9 Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	5/9 Max. Amt. Lye used for CS Oil
Per cent of lye used	11.4	7.4	6.3	9.7	6.5	5.4	8.0	5.9	4.44	6.7	4.4	3.7
Grams of lye used for 500 grams of oil	57.0	37.0	31.5	48.5	32.5	27.0	40.0	29.5	22.0	33.5	22.0	18.5
Grams of dry NaOH used for 500 grams of oil	3.192	2.128	1.764	3.187	2.194	1.823	3.200	2.360	1.760	3.183	2.090	1.767
Grams of H_2O used for 500 grams of oil	53.808	35.872	29.736	45.313	30.306	25.177	36.800	27.140	20.240	30.317	19.910	16.833
Grams of oil first pour off	469.8	449.8	442.4	474.2	463.5	467.5	476.0	472.5	471.0	474.5	471.5	438.5
Grams of oil recovered by remelting foots	0.8	17.0	25.5	0.2	5.0	5.1	0.2	0.9	0.6	0.6	3.3	38.5
Total grams of oil	470.6	466.8	467.9	474.4	468.5	472.6	476.2	473.4	471.6	475.1	474.8	477.0
Number of times foots were remelted	one	four	three	one	three	two	one	one	one	one	two	four
Loss (per cent)	5.9	6.6	6.4	5.1	6.3	5.7	4.8	5.3	5.7	5.0	5.0	4.6
Color of oil (red)	6.3	6.6	6.7	5.4	6.4	6.5	5.4	5.6	5.8	5.4	5.6	6.0
Condition of foots	hard	soft	soft	hard	soft	soft	hard	soft	soft	hard	soft	soft
Break at end of fast agitation	slight	slight	slight	slight	slight	slight	slight	slight	slight	slight	slight	slight
Break at end of slow agitation	good	good	good	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	creamy	creamy	creamy
Oil set over night before pouring off												
F.F.A. on refined oil	0.2			0.02			0.03			0.02		
	Part of the foots were floating on top of oil			Part of the foots were floating on top of oil			Part of foots were floating on top of oil			Small amount of foots were floating on the oil		Part of foots were floating on top of oil

SOYA BEAN OIL REFINING—EXPELLER OIL

Test Series No. 9

Started with 20 Beaumé Lye-agitated 30 min. then added H_2O in quantities to make to the following Beaumés.
45 Minutes fast agitation—Temp. 20-24° C.
12 Minutes slow agitation—Temp. 75° C.

	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	5/9 Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	5/9 Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	5/9 Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	5/9 Max. Amt. Lye used for CS Oil
Per cent of lye used	11.4	7.4	6.3	9.7	6.5	5.4	8.0	5.9	4.44	6.7	4.4	3.7
Grams of lye used for 500 grams of oil	57.0	37.0	31.5	48.5	32.5	27.0	40.0	29.5	22.00	33.5	22.0	18.5
Grams of dry NaOH used for 500 grams of oil	3.192	2.128	1.764	3.187	2.194	1.823	3.200	2.360	1.760	3.183	2.090	1.767
Grams of H_2O used for 500 grams of oil	53.808	35.872	29.736	45.313	30.306	25.177	36.800	27.140	20.240	30.317	19.910	16.833
Grams of oil first pour off	457.2	465.2	456.0	455.2	461.0	458.0	469.0	470.5	433.0	471.0	467.0	406.8
Grams of oil recovered by remelting foots	2.1	3.9	16.5	4.2	11.0	15.6	0.2	3.6	41.6	0.2	6.3	66.8
Total grams of oil	459.3	469.1	472.5	459.4	472.0	473.6	469.2	474.1	474.6	471.2	473.3	473.6
Number of times foots were remelted	two	two	three	two	two	three	one	two	four	one	two	six
Loss (per cent)	8.1	6.2	5.5	8.1	5.6	5.3	6.2	5.2	5.1	5.8	5.3	5.3
Color of oil (red)	5.7	6.2	6.6	5.7	6.4	6.8	6.2	6.4	6.4	5.9	6.2	6.6
Condition of foots	soft	soft	soft	soft	soft	soft	hard	soft	sloppy	hard	soft	sloppy
Break at end of fast agitation	slight	slight	slight	slight	slight	slight	slight	slight	slight	slight	slight	slight
Break at end of slow agitation	good	good	good	good	good	good	good	good	good	good	good	good
Color taken on by oil upon addition of lye	br'nish	br'nish	br'nish	br'nish	br'nish	br'nish	br'nish	br'nish	br'nish	br'nish	br'nish	br'nish
Oil set over night before pouring off F.F.A. of refined oil	0.025			0.020			0.020					0.020
Per cent of 20 Beaumé lye used	4.4	2.9	2.2	4.4	2.9	2.2	4.4	2.9	2.2	4.4	2.9	2.2
Grams of 20 Beaumé lye used for 500 grams of oil	22.0	14.5	11.0	22.0	14.5	11.0	22.0	14.5	11.0	22.0	14.5	11.0
Grams of H_2O added after 30 minutes of agitation	35.000	22.500	20.500	26.500	18.0	16.0	18.000	15.000	11.000	11.500	7.500	7.500

SOYA BEAN OIL REFINING—EXPELLER OIL

Test Series No. 10

45 Minutes fast agitation—Temp. 20-24° C.
12 Minutes slow agitation—Temp. 70° C.

	10 Beaumé				12 Beaumé				14 Beaumé			
	Max. Amt. Lye used for CS Oil plus slight excess	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	5/9 Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil plus slight excess	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	5/9 Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil plus slight excess	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	5/9 Max. Amt. Lye used for CS Oil
Per cent of lye used	9.9	9.7	6.5	5.4	8.2	8.0	5.9	4.44	6.9	6.7	4.4	3.7
Grams of lye used for 500 grams of oil	49.5	48.5	32.5	27.0	41.0	40.0	29.5	22.0	34.5	33.5	22.0	18.5
Grams of dry NaOH used for 500 grams of oil	3.252	3.186	2.194	1.822	3.280	3.200	2.360	1.760	3.278	3.183	2.090	1.767
Grams of H_2O used for 500 grams of oil	46.248	45.314	30.306	25.178	37.720	36.800	27.140	20.240	31.222	30.317	19.910	16.833
Grams of oil first pour off	479.4	470.7	461.2	451.5	474.7	472.2	467.9	438.6	470.5	471.2	464.2	429.5
Grams of oil recovered by remelting foots	0.2	0.2	6.6	22.6	0.4	0.3	4.0	34.8	0.2	0.3	7.2	43.1
Total grams of oil	470.6	470.9	467.8	474.1	475.1	472.5	471.9	473.9	470.7	471.5	471.4	472.6
Number of times foots were remelted	one	one	two	three	one	one	two	three	one	one	two	four
Loss (per cent)	5.9	5.8	6.4	5.2	5.0	5.5	5.6	5.3	5.9	5.7	5.7	5.5
Color of oil (red)	6.2	5.8	7.0	7.4	6.6	6.7	7.1	7.4	6.2	6.5	7.0	7.3
Condition of foots	hard	hard	soft	soft	hard	hard	soft	soft	hard	hard	soft	soft
Break at end of fast agitation	slight	slight	slight	slight	slight	slight	slight	slight	slight	slight	slight	slight
Break at end of slow agitation	good	good	good	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	creamy	creamy	creamy
Oil set over night before pouring off												

SOYA BEAN OIL REFINING—EXPELLER OIL

Test Series No. 11

45 Minutes fast agitation—Temp. 20-24° C.
12 Minutes slow agitation—Temp. 75° C.

	Max. Amt. Lye used for CS Oil plus slight excess	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	5/9 Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil plus slight excess	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	5/9 Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil plus slight excess	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	5/9 Max. Amt. Lye used for CS Oil
Per cent of lye used	9.9	9.7	6.5	5.4	8.2	8.0	5.9	4.44	6.9	6.7	4.4	3.7
Grams of lye used for 500 grams of oil	49.5	48.5	32.5	27.0	41.0	40.0	29.5	22.0	34.5	33.5	22.5	18.5
Grams of dry NaOH used for 500 grams of oil	46.248	45.314	30.365	25.177	37.720	36.800	27.140	20.240	31.222	30.317	19.910	16.833
Grams of oil first pour off	475.2	474.7	465.5	458.2	474.7	474.7	467.0	464.8	472.5	473.5	458.8	471.5
Grams of oil recovered by remelting foots	0.6	0.7	5.0	11.5	0.7	0.8	5.7	10.3	3.1	1.4	11.3	3.4
Total grams of oil	475.8	475.4	470.5	469.7	475.4	475.5	472.7	475.1	475.6	474.9	470.1	474.9
Number of times foots were remelted	one	one	two	three	one	one	two	three	two	one	three	two
Loss (per cent)	4.8	4.9	5.9	6.1	4.9	4.9	5.5	5.0	4.9	5.0	6.0	5.0
Color of oil (red)	6.2	6.8	7.4	7.6	6.2	6.5	7.1	7.4	6.1	6.5	7.4	7.5
Condition of foots	hard	hard	soft	soft	hard	hard	soft	soft	hard	hard	soft	soft
Break at end of fast agitation	slight	slight	slight	slight	slight	slight	slight	slight	slight	slight	slight	slight
Break at end of slow agitation	good	good	good	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	creamy	creamy	creamy
Oil set over night before pouring off												

SOYA BEAN OIL REFINING—EXPELLER OIL

Test Series No. 12

60 Minutes fast agitation—Temp. 20-24° C.
12 Minutes slow agitation—Temp. 75° C.

	Max. Amt. Lye used for CS Oil plus slight excess	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	5/9 Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil plus slight excess	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	5/9 Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil plus slight excess	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	5/9 Max. Amt. Lye used for CS Oil
Per cent of lye used	9.9	9.7	6.5	5.4	8.2	8.0	5.9	4.44	6.9	6.7	4.4	3.7
Grams of lye used for 500 grams of oil	49.5	48.5	32.5	27.0	41.0	40.0	29.5	22.0	34.5	33.5	22.5	18.5
Grams of dry NaOH used for 500 grams of oil	3.252	3.186	2.194	1.823	3.280	3.200	2.360	1.760	3.278	3.183	2.090	1.767
Grams of H_2O used for 500 grams of oil	46.248	45.314	30.306	25.177	37.720	36.800	27.140	20.240	31.222	30.317	19.910	16.833
Grams of oil first pour off	478.0	476.5	472.5	469.0	478.5	478.0	475.5	469.5	475.0	475.5	473.5	470.0
Grams of oil recovered by remelting foots	0.0	0.0	4.0	3.3	0.0	0.0	1.2	5.2	0.0	0.2	2.4	4.5
Total grams of oil	478.0	476.5	476.5	472.3	478.5	478.0	476.7	474.7	475.0	475.7	475.9	474.5
Number of times foots were remelted	one	one	two	two	one	one	one	two	one	one	two	two
Loss (per cent)	4.4	4.7	4.7	5.5	4.3	4.4	4.7	5.1	5.0	4.9	4.8	5.1
Color of oil (red)	6.4	6.4	7.1	7.3	6.5	6.5	6.9	7.2	6.4	6.4	7.1	7.4
Condition of foots	hard	hard	soft	soft	hard*	hard	soft	soft	hard	hard	soft	soft
Break at end of fast agitation	slight	slight	slight	slight	slight	slight	slight	slight	slight	slight	slight	slight
Break at end of slow agitation	good	good	good	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	creamy	creamy	creamy
Oil set over night before pouring off			Part of the foots were floating on these two tests				Part of the foots on these two tests were floating				Part of the foots were floating on these two tests	

SOYA BEAN OIL REFINING—EXPELLER OIL

Test Series No. 13

75 Minutes fast agitation—Temp. 20-24° C.
12 Minutes slow agitation—Temp. 75° C.

	10 Beaumé				12 Beaumé				14 Beaumé			
	Max. Amt. Lye used for CS Oil plus slight excess	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	5/9 Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil plus slight excess	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	5/9 Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil plus slight excess	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	5/9 Max. Amt. Lye used for CS Oil
Per cent of lye used	9.9	9.7	6.5	5.4	8.2	8.0	(*)	4.4	6.9	6.7	4.4	3.7
Grams of lye used for 500 grams of oil	49.5	48.5	32.5	27.0	41.0	40.0	(*)	22.0	34.5	33.5	22.0	18.5
Grams of dry NaOH used for 500 grams of oil	3.252	3.186	2.194	1.823	3.280	3.200	(*)	1.760	3.278	3.183	2.090	1.767
Grams of H_2O used for 500 grams of oil	46.248	45.314	30.306	25.177	37.720	36.800	(*)	20.240	31.222	30.317	19.910	16.833
Grams of oil first pour off	479.0	478.5	474.5	467.5	478.5	478.5	(*)	474.0	476.0	477.0	476.0	473.0
Grams of oil recovered by remelting foots	0.1	0.0	1.0	8.6	0.2	0.3	(*)	3.7	1.2	0.7	0.8	4.7
Total grams of oil	479.1	478.5	475.5	476.1	478.7	478.8	(*)	477.7	477.2	477.7	476.8	477.7
Number of times foots were remelted	one	one	one	two	one	one	(*)	two	one	one	one	two
Loss (per cent)	4.2	4.3	4.9	4.8	4.3	4.2	(*)	4.5	4.6	4.5	4.6	4.5
Color of oil (red)	6.0	6.2	6.6	7.0	6.2	6.4	(*)	7.1	6.3	6.7	6.8	7.2
Condition of foots	hard	hard	soft	soft	hard	hard	(*)	soft	hard	hard	soft	soft
Break at end of fast agitation	slight	slight	slight	slight	slight	slight	(*)	slight	slight	slight	slight	slight
Break at end of slow agitation	good	good	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	creamy	creamy
Oil set two hours before pouring off				Part of the foots were floating				Part of the foots were floating				Part of the foots were floating

*No test.

After the refined oil had set over night there was a thin deposit of foots on the bottom of the cup.

SOYA BEAN OIL REFINING—EXPELLER OIL

Test Series No. 14

90 Minutes fast agitation—Temp. 20-24° C.
12 Minutes slow agitation—Temp. 75° C.

	8 Beaumé			10 Beaumé			12 Beaumé			14 Beaumé		
	Max. Amt. Lye used for CS Oil plus 1/3 Max.	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil plus 1/3 Max.	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil plus 1/3 Max.	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil plus 1/3 Max.	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil
Per cent of lye used	15.2	11.4	7.6	12.9	9.7	6.5	10.7	8.0	5.9	8.9	6.7	4.4
Grams of lye used for 500 grams of oil	75.0	57.0	38.0	64.5	48.5	32.5	53.5	40.0	29.5	44.5	33.5	22.0
Grams of dry NaOH used for 500 grams of oil	4.200	3.192	2.128	4.238	3.186	2.135	4.280	3.200	2.360	4.228	3.183	2.090
Grams of H_2O used for 500 grams of oil	70.800	53.808	35.872	60.262	45.314	30.365	49.220	36.800	27.140	40.272	30.317	19.910
Grams of oil first pour off	477.5	476.5	475.5	477.5	477.5	472.0	477.5	478.5	479.0	478.5	478.0	477.5
Grams of oil recovered by remelting foots	0.0	0.2	1.0	0.0	0.2	3.1	0.3	0.2	0.2	0.2	0.9	1.1
Total grams of oil	477.5	476.7	476.5	477.5	477.7	475.1	477.8	478.7	479.2	478.7	478.9	478.6
Number times foots were remelted	one	one	one	one	one	two	one	one	one	one	one	one
Loss (per cent)	4.5	4.7	4.7	4.5	4.5	5.0	4.4	4.3	4.2	4.3	4.2	4.3
Color of oil (red)	6.3	6.5	7.0	6.1	6.4	6.7	5.7	6.0	6.3	5.7	5.9	6.2
Condition of foots	hard	hard	soft	hard	hard	soft	hard	hard	hard	hard	hard	hard
Break at end of fast agitation	slight	slight	slight	slight	slight	slight	slight	slight	slight	slight	slight	slight
Break at end of slow agitation	very good	very good	very good	very good	very good	very good	very good	very good	very good	very good	very good	very good
Oil set over night before pouring off	Some of foots were floating, probably due to too long agitation slow, at 75° C.											

SOYA BEAN OIL REFINING—EXPELLER OIL

Test Series No. 15

75 Minutes fast agitation—Temp. 20-24° C.
8 Minutes slow agitation—Temp. 75° C.

	10 Baumé				12 Baumé				14 Baumé			
	Max. Amt. Lye used for CS Oil plus 1/3 Max.	Max. Amt. Lye used for CS Oil plus 1/5 Max.	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil plus 1/3 Max.	Max. Amt. Lye used for CS Oil plus 1/5 Max.	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil plus 1/3 Max.	Max. Amt. Lye used for CS Oil plus 1/5 Max.	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil
Per cent lye used	12.9	11.6	9.7	6.5	10.7	9.6	8.0	5.9	8.9	8.0	6.7	4.4
Grams lye used for 500 grams of oil	64.5	58.0	48.5	32.5	53.5	48.0	40.0	29.5	44.5	40.0	33.5	22.0
Grams of dry NaOH used for 500 grams of oil	4.238	3.811	3.186	2.135	4.280	3.840	3.200	2.360	4.228	3.800	3.183	2.090
Grams H_2O used for 500 grams of oil	60.262	54.189	45.313	30.365	49.220	44.160	36.800	27.140	40.272	36.200	30.317	19.910
Grams of oil first pour off	476.5	476.5	477.0	469.5	475.5	475.5	477.0	477.0	474.5	475.5	474.5	475.5
Grams oil recovered by remelting foots	0.1	0.1	0.1	5.9	0.2	0.8	0.3	6.2	0.1	0.6	1.0	1.0
Total grams of oil	477.6	476.6	477.1	475.4	475.7	476.3	477.3	477.2	474.6	476.1	475.5	476.5
Number times foots remelted	one	one	one	two	one	one	one	one	one	one	one	one
Loss (per cent)	4.7	4.7	4.6	4.9	4.9	4.5	4.5	4.6	5.1	4.8	4.9	4.7
Color of oil (red)	5.5	5.9	6.0	6.2	5.5	6.0	6.2	6.3	5.7	6.0	6.2	6.4
Condition of foots	hard	hard	hard	soft	hard	hard	hard	hard	hard	hard	hard	hard
Break at end of fast agitation	medium very	medium very	medium very	medium very	medium very	medium very	medium very	medium very	medium very	medium very	medium very	medium very
Break at end of slow agitation	good	good	good	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	creamy	creamy	creamy

Oil set overnight before pouring off.

SOYA BEAN OIL REFINING—EXPELLER OIL

Test Series No. 16

90 Minutes fast agitation—Temp. 20-24° C.
8 Minutes slow agitation—Temp. 75° C.

	10 Baumé				12 Baumé				14 Baumé			
	Max. Amt. Lye used for CS Oil plus 1/3 Max.	Max. Amt. Lye used for CS Oil plus 1/5 Max.	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil plus 1/3 Max.	Max. Amt. Lye used for CS Oil plus 1/5 Max.	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil plus 1/3 Max.	Max. Amt. Lye used for CS Oil plus 1/5 Max.	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil
Per cent of lye used	12.9	11.6	9.7	6.5	10.7	9.6	8.0	5.9	8.9	8.0	6.7	4.4
Grams lye used for 500 grams of oil	64.5	58.0	48.5	32.5	53.5	48.0	40.0	29.5	44.5	40.0	33.5	22.0
Grams dry NaOH used for 500 grams of oil	4.238	3.811	3.186	2.135	4.280	3.840	3.200	2.360	4.228	3.800	3.183	2.090
Grams H_2O used for 500 grams of oil	60.262	54.189	45.314	30.365	49.220	44.160	36.800	27.140	40.272	36.200	30.317	19.910
Grams oil first pour off	478.0	478.3	478.2	470.5	478.0	478.0	477.0	479.0	476.0	476.0	473.0	477.0
Grams oil recovered by remelting foots	0.0	0.3	0.2	5.2	0.3	0.5	0.5	0.6	0.3	0.8	1.4	2.6
Total grams of oil	478.0	478.3	478.2	475.7	478.3	478.5	477.5	479.6	476.3	476.8	474.4	479.6
Number times foots were remelted	one	one	one	two	one	one	one	one	one	one	one	two
Loss (per cent)	4.4	4.4	4.4	4.9	4.3	4.3	4.5	4.1	4.7	4.6	5.1	4.1
Color of oil (red)	5.4	5.4	5.7	6.0	5.4	5.5	5.7	6.1	5.5	5.8	5.9	6.1
Condition of foots	hard	hard	hard	soft	hard	hard	hard	hard	hard	hard	hard	soft
Break at end of fast agitation	medium very	medium very	medium very	medium very	medium very	medium very	medium very	medium very	medium very	medium very	medium very	medium very
Break at end of slow agitation	good	good	good	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	creamy	creamy	creamy

Oil set overnight before pouring off.

SOYA BEAN OIL REFINING—EXPELLER OIL

Test Series No. 17

75 Minutes fast agitation—Temp. 20-24° C.
8 Minutes slow agitation—Temp. 75° C.

	8 Baumé				10 Baumé				12 Baumé			
	Max. Amt. Lye used for CS Oil plus 1/3 Max.	Max. Amt. Lye used for CS Oil plus 1/5 Max.	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil plus 1/3 Max.	Max. Amt. Lye used for CS Oil plus 1/5 Max.	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil pius 1/3 Max.	Max. Amt. Lye used for CS Oil plus 1/5 Max.	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil
Per cent lye used	15.2	13.7	11.4	7.6	12.9	11.6	(*)	6.5	10.7	9.6	8.0	5.9
Grams lye used for 500 grams of oil	75.0	68.5	57.0	38.0	64.5	58.0	(*)	32.5	53.5	48.0	40.0	29.5
Grams dry NaOH used for 500 grams of oil	4.200	3.836	3.192	2.128	4.238	3.811	(*)	2.135	4.280	3.840	3.200	2.360
Grams H_2O used for 500 grams of oil	70.800	64.664	53.808	35.872	60.262	54.189	(*)	30.365	49.220	44.160	36.800	27.140
Grams oil first pour off	476.0	476.0	476.5	475.5	476.0	477.0	(*)	469.0	477.2	477.5	477.5	477.5
Grams oil recovered by remelting foots	0.4	0.0	0.5	0.7	0.2	0.2	(*)	5.6	0.2	0.4	0.3	0.6
Total grams oil	476.4	476.0	477.0	476.2	476.2	477.2	(*)	474.6	477.4	477.9	477.8	478.1
Number times foots remelted	one	one	one	one	one	one	(*)	three	one	one	one	one
Loss (per cent)	4.7	4.8	4.6	4.8	4.8	4.6	(*)	5.1	4.5	4.4	4.4	4.4
Color oil (red)	5.7	5.8	6.0	6.2	5.2	5.3	(*)	5.7	5.3	5.3	5.6	5.8
Condition of foots	hard	hard	hard	hard	hard	hard	(*)	soft	hard	hard	hard	hard
Break at end of fast agitation	slight very	slight very	slight very	slight very	slight very	slight very	(*)	slight very	slight very	slight very	slight very	slight very
Break at end of slow agitation	good	good	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	creamy	creamy	creamy

*No test.
Oil set overnight before pouring off.

SOYA BEAN OIL REFINING—EXPELLER OIL

Test Series No. 18

90 Minutes fast agitation—Temp. 32° C.
8 Minutes slow agitation—Temp. 75° C.

	8 Beaumé				10 Beaumé				12 Beaumé			
	Max. Amt. Lye used for CS Oil plus 1/3 Max.	Max. Amt. Lye used for CS Oil plus 1/5 Max.	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil plus 1/3 Max.	Max. Amt. Lye used for CS Oil plus 1/5 Max.	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil plus 1/3 Max.	Max. Amt. Lye used for CS Oil plus 1/5 Max.	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil
Per cent lye used	15.2	13.7	11.4	7.6	12.9	11.6	9 7	6.5	10.7	9.6	8.0	5.9
Grams lye used for 500 grams of oil	75.0	68.5	57.0	38.0	64.5	58.0	48.5	32.5	53.5	48.0	40.0	29.5
Grams dry NaOH used for 500 grams of oil	4.200	3.836	3.192	2.128	4.238	3.811	3.186	2.135	4.280	3.840	3.200	2.360
Grams H_2O used for 500 grams of oil	70.800	64.664	53.808	35.872	60.262	54.189	45.314	30.365	49.220	44.160	36.800	27.140
Grams oil first pour off	473.7	474.0	471.5	472.0	475.0	477.0	474.3	461.5	474.9	475.6	475.2	475.4
Grams oil recovered by remelting foots	0.3	0.2	0.3	2.6	0.3	0.6	0.2	10.8	0.9	1.4	1.2	1.4
Total grams oil	474.0	474.2	471.8	474.6	475.3	477.6	474.5	472.3	474.9	475.6	475.2	475.4
Number times foots were remelted	one	one	one	two	one	one	one	two	one	one	one	one
Loss (per cent)	5.2	5.2	5.6	5.1	4.9	4.6	5.1	5.5	5.0	4.9	5.0	4.9
Color oil (red)	5.6	6.1	6.3	6.6	5.6	5.6	6 1	6.3	5.2	5.4	5.7	5.9
Condition of foots	hard	hard	hard	soft	hard	hard	hard	soft	hard	hard	hard	hard
Break at end of fast agitation	medium very	medium very	medium very	medium very	medium very	medium very	medium very	medium very	medium very	medium very	medium very	medium very
Break at end of slow agitation	good	good	good	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	creamy	creamy	creamy

Oil set overnight before pouring off.

SOYA BEAN OIL REFINING—EXPELLER OIL

Test Series No. 19

120 Minutes fast agitation—Temp. 20-24° C.
8 Minutes slow agitation—Temp. 75° C.

	8 Beaumé				10 Beaumé				12 Beaumé			
	Max. Amt. Lye used for CS Oil plus 1/3 Max.	Max. Amt. Lye used for CS Oil plus 1/5 Max.	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil plus 1/3 Max.	Max. Amt. Lye used for CS Oil plus 1/5 Max.	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil plus 1/3 Max.	Max. Amt. Lye used for CS Oil plus 1/5 Max.	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil
Per cent lye used	15.2	13.7	11.4	7.6	12.9	11.6	9.7	6.5	10.7	9.6	8.0	5.9
Grams lye used for 500 grams of oil	75.0	68.3	57.0	38.0	64.5	58.0	48.5	32.5	53.5	48.0	40.0	29.5
Grams of dry NaOH used for 500 grams of oil	4.200	3.836	3.192	2.128	4.238	3.810	3.186	2.135	4.280	3.840	3.200	2.300
Grams H_2O used for 500 grams of oil	70.800	64.664	53.808	35.872	60.262	54.190	45.314	30.365	49.220	44.160	36.800	27.140
Grams oil first pour off	477.0	478.2	477.0	473.0	476.0	478.0	477.0	477.5	473.5	476.0	476.0	474.5
Grams oil recovered by remelting foots	0.0	0.0	0.2	3.6	0.2	0.2	0.2	0.5	1.2	1.0	0.2	1.1
Total grams oil	477.0	478.2	477.2	476.6	476.2	478.2	477.3	478.0	474.7	477.0	476.2	475.6
Number of times foots were remelted	one	one	one	two	one	one	one	one	one	one	one	one
Loss (per cent)	4.6	4.4	4.7	4.6	4.7	4.4	4.5	4.4	5.1	4.6	4.8	4.9
Color oil (red)	5.3	5.6	5.9	6.1	5.3	5.4	5.5	5.6	5.2	5.3	5.8	6.0
Condition of foots	hard	hard	hard	soft	hard	hard	hard	hard	hard	hard	hard	hard
Break at end of fast agitation	medium very	medium very	medium very	medium very	medium very	medium very	medium very	medium very	medium very	medium very	medium very	medium very
Break at end of slow agitation	good	good	good	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	creamy	creamy	creamy

Oil set overnight before making first pour off.

SOYA BEAN OIL REFINING—EXPELLER OIL

Test Series No. 20

90 Minutes fast agitation—Temp. 20-24° C.
8 Minutes slow agitation—Temp. 75° C.

	8 Beaumé				10 Beaumé				12 Beaumé			
	Max. Amt. Lye used for CS Oil plus 1/3 Max.	Max. Amt. Lye used for CS Oil plus 1/5 Max.	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil plus 1/3 Max.	Max. Amt. Lye used for CS Oil plus 1/5 Max.	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil plus 1/3 Max.	Max. Amt. Lye used for CS Oil plus 1/5 Max.	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil
Per cent lye used	15.2	13.7	11.4	7.6	12.9	11.6	9.7	6.5	10.7	9.6	8.0	5.9
Grams lye used for 500 grams of oil	75.0	68.5	57.0	38.0	64.5	58.0	48.5	32.5	53.5	48.0	40.0	29.5
Grams dry NaOH used for 500 grams of oil	4.200	3.836	3.192	2.128	4.238	3.810	3.186	2.135	4.280	3.840	3.200	2.360
Grams H_2O used for 500 grams of oil	70.800	64.664	53.808	35.872	60.262	54.190	45.314	30.365	49.220	44.160	36.800	27.140
Grams of oil first pour off	478.0	478.0	477.0	475.0	477.0	478.5	478.5	473.5	478.5	478.5	478.0	479.5
Grams oil recovered by remelting foots	0.0	0.0	0.0	2.4	0.1	0.1	0.0	2.6	0.0	0.3	0.3	0.0
Total grams oil	478.0	478.0	477.0	477.4	477.1	478.6	478.5	476.1	478.5	478.8	478.3	479.5
Number times foots remelted	one	one	one	two	one	one	one	two	one	one	one	one
Loss (per cent)	4.4	4.4	4.6	4.5	4.6	4.3	4.3	4.8	4.3	4.2	4.3	4.1
Color oil (red)	5.7	5.8	6.1	6.8	5.4	5.7	5.7	6.0	5.1	5.4	5.5	5.7
Condition of foots	hard	hard	hard	soft	hard	hard	hard	soft	hard	hard	hard	hard
Break at end of fast agitation	medium very	medium very	medium very	medium very	medium very	medium very	medium very	medium very	medium very	medium very	medium very	medium very
Break at end of slow agitation	good	good	good	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	creamy	creamy	creamy

Oil set overnight before pouring off.

SOYA BEAN OIL REFINING

Tank Car of Soya Bean Oil received at Swift & Company Refinery

Test Series No. 21

90 Minutes fast agitation—Temp. 20-24° C.
8 Minutes slow agitation—Temp. 75° C.

	8 Baumé				10 Baumé				12 Baumé			
	Max. Amt. Lye used for CS Oil plus 1/3 Max.	Max. Amt. Lye used for CS Oil plus 1/5 Max.	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil plus 1/3 Max.	Max. Amt. Lye used for CS Oil plus 1/5 Max.	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil plus 1/3 Max.	Max. Amt. Lye used for CS Oil plus 1/5 Max.	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil
Per cent lye used	16.1	14.5	12.1	8.0	13.7	12.4	10.3	6.8	11.2	10.1	8.4	6.3
Grams of lye used for 500 grams of oil	80.5	72.5	60.5	40.0	68.5	62.0	51.5	34.0	56.0	50.5	42.0	31.5
Grams dry NaOH used for 500 grams of oil	4.508	4.060	3.388	2.240	4.501	4.070	3.384	2.234	4.480	4.040	3.360	2.520
Grams H_2O used for 500 grams of oil	75.992	68.440	57.112	37.760	63.999	57.930	48.116	31.766	51.520	46.460	38.640	28.980
Grams oil first pour off	469.5	464.0	461.5	469.5	475.2	475.0	470.5	472.7	475.0	476.3	478.0	470.5
Grams oil recovered by remelting foots	0.7	1.8	1.6	1.1	0.2	0.0	1.5	2.7	0.2	0.0	0.2	1.3
Total grams oil	470.2	465.8	463.1	470.6	475.4	475.0	472.0	472.7	475.2	476.3	478.2	471.8
Number of times foots were remelted	one	two	two	one	one	one	one	two	one	one	one	one
Loss (per cent)	6.0	6.8	7.4	5.9	5.0	5.0	5.9	5.5	5.0	4.7	4.4	5.6
Color oil (red)	6.7	6.7	7.0	7.3	6.5	6.7	6.9	7.2	6.4	6.6	6.7	7.2
Condition of foots	soft	soft	soft	soft	hard	hard	soft	soft	hard	hard	hard	soft
Break at end of fast agitation	slight	slight	slight	slight	slight	slight	slight	slight	very slight	very slight	very slight	slight
Break at end of slow agitation	good	good	good	good	very good	very good	very good	very good	very good	very good	very good	very good
Color taken on by oil upon addition of lye	creamy	creamy	creamy	creamy	creamy	creamy	creamy	creamy	creamy	creamy	creamy	creamy

Oil set overnight before pouring off.
F. F. A. .7%.

SOYA BEAN OIL REFINING—EXPELLER OIL—Using Sodium Silicate.

Test Series No. 22

45 Minutes fast agitation—Temp. 20-24° C.
30 Minutes slow agitation—Temp. 50-53° C.

	8 Baumé		10 Baumé		12 Baumé		14 Baumé	
	Max. Amt. Lye used for CS Oil	80% Max.	Max. Amt. Lye used for CS Oil	80% Max.	Max. Amt. Lye used for CS Oil	80% Max.	Max. Amt. Lye used for CS Oil	80% Max.
Per cent lye used	11.4	9.12	9.7	7.8	8.0	6.4	6.7	5.4
Grams lye used for 500 grams of oil	57.0	45.6	48.5	39.0	40.0	32.0	33.5	27.0
Grams dry NaOH used for 500 grams oil	3.192	2.554	3.186	2.562	3.200	2.560	3.183	2.546
Grams H_2O used for 500 grams of oil	53.808	43.046	45.314	36.438	36.800	29.440	30.317	24.454
Per cent sodium silicate	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Grams sodium silicate used for 500 grams	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Grams oil first pour off	479.0	477.0	478.0	478.0	475.5	477.0	472.5	477.0
Grams oil recovered by remelting foots	0.2	0.5	1.8	0.9	3.5	2.5	3.1	2.3
Total grams oil	479.2	477.5	479.8	478.9	479.0	479.5	475.6	479.3
Number times foots remelted	one	one	two	one	two	two	two	two
Loss (per cent)	4.2	4.5	4.0	4.2	4.2	4.1	4.9	4.1
Color oil (red)	6.3	6.4	5.7	6.0	5.7	5.9	5.4	5.6
Condition of foots	hard	hard	hard	hard	hard	hard	hard	hard
Break at end of fast agitation	medium	medium	medium	medium	medium	medium	medium	medium
Break at end of slow agitation	very good	very good	very good	very good	very good	very good	very good	very good
Color taken on by oil upon addition of silicate and NaOH	greenish yellow	greenish yellow	greenish yellow	greenish yellow	greenish yellow	greenish yellow	greenish yellow	greenish yellow

Oil stood overnight before pouring off.

SOYA BEAN OIL REFINING—HYDRAULIC OIL

Test Series No. 23

90 Minutes fast agitation—Temp. 20-24° C.
8 Minutes slow agitation—Temp. 75° C.

	8 Baumé				10 Baumé				12 Baumé			
	Max. Amt. Lye used for CS Oil plus 1/3 Max.	Max. Amt. Lye used for CS Oil plus 1/5 Max.	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil plus 1/3 Max.	Max. Amt. Lye used for CS Oil plus 1/5 Max.	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil plus 1/3 Max.	Max. Amt. Lye used for CS Oil plus 1/5 Max.	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil
Per cent lye used	16.3	14.7	12.2	8.16	14.1	12.7	10.6	7.0	11.6	10.4	8.7	5.8
Grams lye used for 500 grams of oil	81.5	73.5	61.0	41.0	70.5	63.5	53.0	35.0	58.0	52.0	43.50	29.00
Grams dry NaOH used for 500 grams of oil	4.564	4.116	3.416	2.296	4.630	4.171	3.482	2.299	4.640	4.160	3.480	2.320
Grams H_2O used for 500 grams of oil	76.936	69.384	57.584	38.704	65.870	59.329	49.518	32.701	53.360	47.840	40.020	26.680
Grams oil first pour off	476.0	475.5	476.5	470.0	477.0	476.5	473.5	475.5	474.5	474.0	474.0	472.5
Grams oil recovered by remelting foots	0.0	0.1	0.1	0.6	0.0	0.0	0.1	0.2	0.7	0.3	0.2	0.3
Total grams oil	476.0	475.6	476.6	470.6	477.0	476.5	473.3	475.7	475.2	474.3	474.2	472.8
Number times foots were remelted	one	one	one	one	one	one	one	one	one	one	one	one
Loss (per cent)	4.8	4.9	4.7	5.9	4.6	4.7	5.3	4.9	5.0	5.1	5.2	5.4
Color oil (red)	5.5	5.6	5.7	5.7	4.9	5.1	5.3	5.7	5.0	5.1	5.3	5.7
Condition of foots	hard	hard	hard	soft	hard	hard	hard	hard	hard	hard	hard	hard
Break at end of fast agitation	very slight	very slight	very slight	very slight	very slight	very slight	very slight	very slight	very slight	very slight	very slight	very slight
Break at end of slow agitation	good	good	good	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	creamy	creamy	creamy

Oil set overnight before pouring off.
F. F. A. .8%.
The foots obtained in this test were firm after the first pour off. But after melting for additional oil they remained soft, making it difficult to recover any oil.

SOYA BEAN OIL REFINING—HYDRAULIC OIL

Test Series No. 24

90 Minutes fast agitation—Temp. 20-24° C.
8 Minutes slow agitation—Temp. 75° C.

	8 Baumé				10 Baumé				12 Baumé			
	Max. Amt. Lye used for CS Oil plus 1/3 Max.	Max. Amt. Lye used for CS Oil plus 1/5 Max.	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil plus 1/3 Max.	Max. Amt. Lye used for CS Oil plus 1/5 Max.	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil plus 1/3 Max.	Max. Amt. Lye used for CS Oil plus 1/5 Max.	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil
Per cent lye used	16.3	14.7	12.2	8.16	14.1	12.7	10.6	7.0	11.6	10.4	8.7	5.8
Grams lye used for 500 grams of oil	81.5	73.5	61.0	41.0	70.5	63.5	53.0	35.0	58.0	52.0	43.50	29.0
Grams dry NaOH used for 500 grams of oil	4.564	4.116	3.416	2.296	4.631	4.171	3.482	2.299	4.640	4.160	3.480	2.320
Grams H_2O used for 500 grams of oil	76.936	69.384	57.584	38.704	65.869	59.329	49.518	32.701	53.360	47.840	40.020	26.680
Grams oil first pour off	472.5	471.5	475.0	470.0	476.0	474.0	474.0	475.5	475.0	474.0	472.9	474.5
Grams oil recovered by remelting foots	0.0	0.2	0.1	2.1	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.2
Total grams oil	472.5	471.7	475.1	472.1	476.0	474.0	474.0	475.6	475.0	474.1	472.9	474.7
Number times foots were remelted	one	one	one	two	one	one	one	one	one	one	one	one
Loss (per cent)	5.5	5.7	5.0	5.6	4.8	5.2	5.2	4.9	5.0	5.2	5.4	5.1
Color oil (red)	5.4	5.4	5.5	5.6	4.9	5.2	5.2	5.4	5.0	5.0	5.3	5.3
Condition of foots	hard	hard	hard	soft	hard	hard	hard	hard	hard	hard	hard	hard
	very	very	very	very	very	very	very	very	very	very	very	very
Break at end of fast agitation	slight	slight	slight	slight	slight	slight	slight	slight	slight	slight	slight	slight
Break at end of slow agitation	good	good	good	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	creamy	creamy	creamy

Oil set over Sunday before pouring off.

The foots obtained in this test were firm after the first pour off. But after melting for additional oil they remained soft making it difficult to recover any oil.

SOYA BEAN OIL REFINING—HYDRAULIC OIL

Test Series No. 25

90 Minutes fast agitation—Temp. 20-24° C.
8 Minutes slow agitation—Temp. 75° C.

	14 Baumé				16 Baumé				20 Baumé			
	Max. Amt. Lye used for CS Oil plus 1/3 Max.	Max. Amt. Lye used for CS Oil plus 1/5 Max.	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil plus 1/3 Max.	Max. Amt. Lye used for CS Oil plus 1/5 Max.	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil plus 1/3 Max.	Max. Amt. Lye used for CS Oil plus 1/5 Max.	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil
Per cent lye used	9.7	8.8	7.3	4.8	8.4	7.6	6.3	4.2	6.4	5.8	4.8	3.2
Grams lye used for 500 grams of oil	48.5	44.0	36.5	24.0	42.0	38.0	31.5	21.0	32.0	29.0	24.0	16.0
Grams dry NaOH used for 500 grams of oil	4.607	4.180	3.467	2.280	4.645	4.203	3.484	2.323	4.595	4.164	3.446	2.298
Grams H_2O used for 500 grams of oil	43.893	39.820	33.033	21.720	37.355	33.797	38.016	18.677	27.405	24.836	20.554	13.702
Grams oil first pour off	471.5	473.0	473.0	472.0	471.8	471.0	473.5	472.0	476.0	476.0	475.5	471.0
Grams of oil recovered by remelting foots	2.7	0.4	0.5	0.8	1.2	2.7	0.6	1.5	0.2	0.2	0.5	5.1
Total grams oil	474.2	473.4	473.5	472.8	473.0	473.7	474.1	473.5	476.2	476.2	476.0	476.1
Number times foots were remelted	two	one	one	one	one	two	one	one	one	one	one	two
Loss (per cent)	5.2	5.4	5.3	5.4	5.4	5.3	5.2	5.3	4.8	4.8	4.8	4.8
Color of oil (red)	5.7	5.8	5.9	6.4	5.4	5.3	5.2	5.3	5.7	5.8	5.8	6.0
Condition of foots	hard	hard	hard	hard	hard	hard	hard	hard	hard	hard	hard	hard
	very	very	very	very	very	very	very	very				
Break at end of fast agitation	slight	slight	slight	slight	slight	slight	slight	slight	good	good	good	good
									very	very	very	very
Break at end of slow agitation	medium	medium	medium	medium	medium	medium	medium	medium	good	good	good	good
Color taken on by oil upon addition of lye	creamy	creamy	creamy	creamy	creamy	creamy	creamy	creamy	creamy	creamy	creamy	creamy

Oil set overnight before making first pour off.

The foots obtained with 14-16° lyes were firm on the first pour off. After melting for additional oil they remained soft, making it difficult to obtain any oil.

SOYA BEAN OIL REFINING—HYDRAULIC OIL

Test Series No. 26

60 Minutes fast agitation—Temp. 20-24° C.
8 Minutes slow agitation—Temp. 75° C.

	14 Baumé				16 Baumé				20 Baumé			
	Max. Amt. Lye used for CS Oil plus 1/3 Max.	Max. Amt. Lye used for CS Oil plus 1/5 Max.	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil plus 1/3 Max.	Max. Amt. Lye used for CS Oil plus 1/5 Max.	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil plus 1/3 Max.	Max. Amt. Lye used for CS Oil plus 1/5 Max.	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil
Per cent lye used	9.7	8.8	7.3	4.8	8.4	7.6	6.3	4.2	6.4	5.8	4.8	3.2
Grams lye used for 500 grams of oil	48.5	44.0	36.5	24.0	42.0	38.0	31.5	21.0	32.0	29.0	24.0	16.0
Grams dry NaOH used for 500 grams of oil	4.607	4.180	3.467	2.280	4.645	4.203	3.484	2.323	4.595	4.163	3.446	2.298
Grams H_2O used for 500 grams of oil	43.893	39.820	33.033	21.720	37.355	33.797	38.016	18.677	27.405	24.836	20.554	13.702
Grams oil first pour off	470.0	472.0	472.0	473.3	463.8	467.0	472.0	472.7	475.5	475.0	475.0	471.0
Grams oil recovered by remelting foots	1.8	0.2	0.2	0.4	4.2	1.0	0.2	4.3	0.2	0.4	0.5	5.2
Total grams oil	471.8	472.2	472.2	473.7	468.0	468.0	472.2	477.0	475.7	475.4	475.5	476.2
Number times foots were remelted	two	one	one	one	two	one	one	two	one	one	one	two
Loss (per cent)	5.6	5.6	5.6	5.3	6.4	6.4	5.6	4.6	4.9	4.9	4.9	4.8
Color of oil (red)	5.8	6.0	6.1	6.5	5.5	6.0	6.1	6.3	5.4	5.5	6.0	6.2
Condition of foots	hard	hard	hard	soft	hard	hard	hard	hard	hard	hard	hard	hard
	very	very	very	very	very	very	very	very				
Break at end of fast agitation	slight	slight	slight	slight	slight	slight	slight	slight	good	good	good	good
Break at end of slow agitation	medium	medium	medium	medium	medium	medium		very	very	very	very	very
Color taken on by oil upon addition of lye	creamy	creamy	creamy	creamy	creamy	creamy	medium good	creamy	creamy	creamy	creamy	creamy

Oil set overnight before pouring off.

SOYA BEAN OIL REFINING—EXTRACTED OIL

Test Series No. 27

90 Minutes fast agitation—Temp. 20-24° C.
8 Minutes slow agitation—Temp. 75° C.

	8 Baumé				10 Baumé				12 Baumé			
	Max. Amt. Lye used for CS Oil plus 1/3 Max.	Max. Amt. Lye used for CS Oil plus 1/5 Max.	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil plus 1/3 Max.	Max. Amt. Lye used for CS Oil plus 1/5 Max.	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil plus 1/3 Max.	Max. Amt. Lye used for CS Oil plus 1/5 Max.	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil
Per cent lye used	15.2	13.7	11.4	7.6	12.9	11.6	9.7	6.5	10.7	9.6	8.0	5.9
Grams lye used for 500 grams of oil	75.0	68.5	57.0	38.0	64.5	58.0	48.5	32.5	53.5	48.0	40.0	29.5
Grams dry NaOH used for 500 grams of oil	4.200	3.836	3.192	2.128	4.237	3.811	3.186	2.193	4.280	3.840	3.200	2.360
Grams H_2O used for 500 grams of oil	70.800	64.664	53.808	35.872	60.263	54.189	45.314	30.307	49.220	44.160	36.800	27.140
Grams oil first pour off	428.0	438.0	436.3	425.0	404.3	417.0	420.0	334.2	447.6	453.0	454.5	440.0
Grams of oil recovered by remelting foots	26.2	17.1	18.9	32.6	49.5	32.6	30.3	112.4	1.0	0.6	1.4	13.2
Total grams of oil	454.2	455.1	455.2	458.6	453.8	449.6	450.3	446.6	448.6	453.6	455.9	453.2
Number of times foots were remelted	four	three	five	five	three	three	four	four	one	one	one	four
Loss (per cent)	9.2	9.0	9.0	8.3	11.2	10.2	9.8	10.7	10.3	9.3	8.8	9.4
Color oil (red)	9.8	10.1	10.3	10.3	9.3	9.6	9.8	10.0	9.3	9.4	9.7	10.0
Condition of foots	sloppy very	sloppy very	sloppy very	sloppy very	sloppy very	sloppy very	sloppy very	sloppy very	soft very	soft very	soft very	sloppy very
Break at end of fast agitation	slight	slight	slight	slight	slight	slight	slight	slight	slight	slight	slight	slight
Break at end of slow agitation	poor	poor	poor	poor	poor	poor	poor	poor	good	good	good	good
Color taken on by oil upon addition of lye	creamy	creamy	creamy	creamy	creamy	creamy	creamy	creamy	creamy	creamy	creamy	creamy

Oil set overnight before pouring off.
F. F. A. .5%.

SOYA BEAN OIL REFINING—EXTRACTED OIL

Test Series No. 28

90 Minutes fast agitation—Temp. 20-24° C.
8 Minutes slow agitation—Temp. 75° C.

	14 Baumé				16 Baumé				18 Baumé			
	Max. Amt. Lye used for CS Oil plus 1/3 Max.	Max. Amt. Lye used for CS Oil plus 1/5 Max.	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil plus 1/3 Max.	Max. Amt. Lye used for CS Oil plus 1/5 Max.	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil plus 1/3 Max.	Max. Amt. Lye used for CS Oil plus 1/5 Max.	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil
Per cent lye used	8.9	8.0	6.7	4.4	7.7	7.0	5.8	3.8	5.8	5.3	4.4	2.8
Grams lye used for 500 grams of oil	44.5	40.0	33.5	22.0	38.5	35.0	29.0	19.0	29.0	26.5	22.0	14.0
Grams dry NaOH used for 500 grams of oil	4.230	3.800	3.180	2.090	4.260	3.870	3.210	2.100	4.160	3.810	3.160	2.010
Grams H_2O used for 500 grams of oil	40.270	36.200	30.320	19.910	34.240	31.130	25.790	16.900	24.840	22.690	18.840	11.990
Grams oil first pour off	452.7	453.5	454.2	394.0	448.8	451.8	458.0	386.8	417.4	372.2	340.0	374.8
Grams oil recovered by remelting foots	0.5	1.8	4.2	57.9	2.4	2.7	2.6	75.2	32.2	79.2	120.1	85.7
Total grams of oil	453.2	455.3	458.4	451.9	451.2	454.5	460.6	462.0	449.6	451.4	460.1	460.5
Number times foots were remelted	one	two	two	four	two	two	two	four	four	four	seven	ten
Loss (per cent)	9.4	8.9	8.3	9.6	9.8	9.1	7.7	7.6	10.1	9.7	8.0	7.9
Color oil (red)	9.7	9.7	9.8	10.4	9.0	9.6	9.9	10.0	9.3	9.6	10.0	10.3
Condition of foots	soft very	soft very	soft very	sloppy very	soft very	soft very	soft very	sloppy very	sloppy very	sloppy very	sloppy very	sloppy very
Break at end of fast agitation	slight	slight	slight	slight	slight	slight	slight	slight	slight	slight	slight	slight
Break at end of slow agitation	good	good	good	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	creamy	creamy	creamy

Oil set overnight before making first pour off.

SOYA BEAN OIL REFINING—EXTRACTED OIL

Test Series No. 29

90 Minutes fast agitation—Temp. 20-24° C.
8 Minutes slow agitation—Temp. 75° C.

	12 Baumé		14 Baumé		16 Baumé	
	Max. Amt. Lye used for CS Oil plus 1/2 Max.	Max. Amt. Lye used for CS Oil plus 3/4 Max	Max. Amt. Lye used for CS Oil plus 1/2 Max.	Max. Amt. Lye used for CS Oil plus 3/4 Max	Max. Amt. Lye used for CS Oil plus 1/2 Max.	Max. Amt. Lye used for CS Oil plus 3/4 Max
Per cent lye used	12.0	14.0	10.0	11.5	8.7	10.0
Grams lye used	60.0	70.0	50.0	57.5	43.4	50.0
Grams dry NaOH used for 500 grams oil	4.800	5.600	4.750	5.500	4.810	5.530
Grams H_2O used for 500 grams of oil	55.200	64.400	45.250	52.000	38.690	44.470
Grams oil first pour off	452.2	452.0	446.2	446.0	442.5	436.4
Grams oil recovered by remelting foots	1.4	0.0	0.2	0.2	0.3	0.3
Total grams oil	453.6	452.0	446.4	446.2	442.8	436.7
Number of times foots were remelted	one	one	one	one	one	one
Loss (per cent)	9.3	9.6	10.7	10.8	11.4	12.7
Color of oil (red)	9.1	8.5	8.5	8.4	8.4	8.5
Condition of foots	hard	hard	hard	hard	hard	hard
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.

SOYA BEAN OIL REFINING—EXTRACTED OIL

Test Series No. 30

90 Minutes fast agitation—Temp. 20-24° C.
12 Minutes slow agitation—Temp. 75° C.

	14 Beaumé				16 Beaumé				18 Beaumé			
	Max. Amt. Lye used for CS Oil plus 1/3 Max.	Max. Amt. Lye used for CS Oil plus 1/5 Max.	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil plus 1/3 Max.	Max. Amt. Lye used for CS Oil plus 1/5 Max.	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil plus 1/3 Max.	Max. Amt. Lye used for CS Oil plus 1/5 Max.	Max. Amt. Lye used for CS Oil	2/3 Max Amt. Lye used for CS Oil
Per cent lye used	8.9	8.0	6.7	4.4	7.7	7.0	5.8	3.8	6.7	6.0	5.0	3.4
Grams lye used for 500 grams of oil	44.5	40.0	33.5	22.0	38.5	35.0	29.0	19.0	33.5	30.0	25.0	17.0
Grams dry NaOH used for 500 grams oil	4.230	3.800	3.180	2.090	4.260	3.870	3.210	2.100	4.250	3.800	3.170	2.160
Grams H_2O used for 500 grams of oil	40.270	36.200	30.320	19.910	34.240	31.130	25.790	16.900	29.250	26.200	21.830	14.840
Grams oil first pour off	444.8	455.7	458.8	384.2	446.0	453.0	452.0	378.0	452.8	456.3	453.3	372.7
Grams oil recovered by remelting foots	0.5	1.0	2.4	84.7	1.1	0.5	9.3	93.1	1.0	4.2	14.9	98.3
Total grams oil	445.3	456.7	461.2	468.9	447.1	453.5	461.3	471.1	453.8	460.5	468.2	471.0
Number times foots were remelted	one	one	two	four	one	one	three	five	one	two	four	five
Loss (per cent)	10.9	8.7	7.8	6.2	10.6	9.3	7.7	5.8	9.2	7.9	6.4	5.8
Color of oil (red)	9.3	9.4	9.4	9.5	8.5	8.5	8.5	9.1	8.6	8.6	8.7	8.7
Condition of foots	soft	soft	soft	sloppy	soft	soft	soft	sloppy	soft	soft	soft	sloppy
Break at end of fast agitation	very slight	very slight	very slight	very slight	very slight	very slight	very slight	very slight	slight	slight	slight	very slight
Break at end of slow agitation	good	good	good	medium	very good	very good	good	medium	very good	very good	very good	good
Color taken on by oil upon addition of lye	creamy	creamy	creamy	creamy	creamy	creamy	creamy	creamy	creamy	creamy	creamy	creamy

Oil set overnight before pouring off.

SOYA BEAN OIL REFINING—EXTRACTED CLARIFIED

Test Series No. 31

90 Minutes fast agitation—Temp. 20-24° C.
12 Minutes slow agitation—Temp. 75° C.

	14 Beaumé				16 Beaumé				18 Beaumé			
	Max. Amt. Lye used for CS Oil plus 1/3 Max.	Max. Amt. Lye used for CS Oil plus 1/5 Max.	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil plus 1/3 Max.	Max. Amt. Lye used for CS Oil plus 1/5 Max.	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil plus 1/3 Max.	Max. Amt. Lye used for CS Oil plus 1/5 Max.	Max. Amt. Lye used for CS Oil	2/3 Max. Amt. Lye used for CS Oil
Per cent lye used	8.9	8.0	6.7	4.4	7.7	7.0	5.8	3.8	6.7	6.0	5.0	3.4
Grams lye used for 500 grams of oil	44.5	40.0	33.5	22.0	38.5	35.0	29.0	19.0	33.5	30.0	25.0	17.0
Grams dry NaOH used for 500 grams oil	4.230	3.800	3.180	2.090	4.260	3.870	3.210	2.100	4.250	3.800	3.170	2.160
Grams H_2O used for 500 grams of oil	40.270	36.200	30.320	19.910	34.240	31.130	25.790	16.900	29.250	26.200	21.830	14.840
Grams oil first pour off	436.5	447.5	456.3	463.0	441.8	447.5	454.2	375.3	440.0	445.2	450.3	364.0
Grams oil recovered by remelting foots	0.2	0.7	0.6	5.8	3.2	2.6	1.5	90.0	4.0	3.5	6.2	96.7
Total grams oil	436.7	448.2	456.9	468.8	445.0	450.1	455.7	465.3	444.0	449.7	456.5	460.7
Number times foots were remelted	one	one	one	two	two	two	one	five	two	two	three	seven
Loss (per cent)	11.2	10.4	8.6	6.2	11.0	10.0	8.9	6.9	11.2	10.0	8.7	7.9
Color of oil (red)	9.8	9.8	9.8	10.3	9.6	9.6	9.7	10.0	9.6	9.6	9.7	10.1
Condition of foots	soft	soft	soft	soft	soft	soft	soft	sloppy	soft	soft	soft	sloppy
Break at end of fast agitation	very slight	very slight	very slight	very slight	very slight	very slight	very slight	very slight	very slight	very slight	very slight	very slight
Break at end of slow agitation	good	good	good	medium	good	good	good	medium	very good	very good	good	medium
Color taken on by oil upon addition of lye	creamy	creamy	creamy	creamy	creamy	creamy	creamy	creamy	creamy	creamy	creamy	creamy

Oil set overnight before pouring off.
F. F. A. .5%.

SOYA BEAN OIL REFINING—EXTRACTED CLARIFIED

Test Series No. 32

90 Minutes fast agitation—Temp. 20-24° C.
15 Minutes slow agitation—Temp. 75° C.

	12 Beaumé 7/8		14 Beaumé 7/8		16 Beaumé 7/8		18 Beaumé 7/8	
	Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil
Per cent lye used	8.0	7.0	6.7	5.9	5.8	5.1	5.0	4.3
Grams lye used for 500 grams of oil	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_2O used for 500 grams of oil	36.800	32.200	30.320	26.700	25.790	22.700	21.830	18.770
Grams oil first pour off	457.5	462.5	462.5	460.9	454.5	459.3	425.0	415.2
Grams oil recovered by remelting foots	1.4	1.0	0.5	3.4	1.1	3.6	32.7	47.6
Total grams oil	458.9	463.5	463.0	463.4	455.6	462.9	457.7	462.8
Number times foots were remelted	one	one	one	two	one	two	three	four
Loss (per cent)	8.2	7.3	7.4	7.3	8.9	7.4	8.5	7.4
Color of oil (red)	10.0	10.3	9.6	10.1	9.6	10.2	9.6	9.9
Condition of foots	soft	soft	hard	hard	hard	hard	soft	soft
Break at end of fast agitation	slight	slight	slight	slight	slight	slight	slight	slight
Break at end of slow agitation	very good	very good	very good	very good	very good	very good	very good	very good
Color taken on by oil upon addition of lye	creamy	creamy	creamy	creamy	creamy	creamy	creamy	creamy

Oil set overnight before pouring off.

Test Series No. 33

SOYA BEAN OIL REFINING

	Expeller Oil —12 Beaumé—		Hydraulic Oil —20 Beaumé—		Extracted Oil —12 Beaumé—		Extracted Oil —14 Beaumé—		Extracted Oil —12 Beaumé—		Clarified Oil —14 Beaumé—	
	2/3		2/3		7/8		7/8		7/8		7/8	
	Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil	Max. Amt. Lye used for CS Oil
Per cent lye used	8.0	5.9	4.8	3.2	8.0	7.0	6.7	5.9	8.0	7.0	6.7	5.9
Grams lye used for 500 grams of oil	40.0	29.5	24.0	16.0	40.0	35.0	33.5	29.5	40.0	35.0	33.5	29.5
Grams dry NaOH used for 500 grams of oil	3.200	2.300	3.446	2.298	3.200	2.800	3.180	2.800	3.200	2.800	3.180	2.800
Grams H_2O used for 500 grams of oil	36.800	27.140	20.554	13.702	36.800	32.200	30.320	26.700	36.800	32.200	30.320	26.700
Grams oil first pour off	479.2	477.9	472.8	471.5	453.8	450.1	463.7	463.1	462.9	459.1	460.0	465.8
Grams oil recovered by remelting foots	0.1	0.2	0.4	4.4	0.5	5.1	0.3	1.4	0.8	0.5	0.4	0.4
Total grams oil	479.3	478.1	473.2	475.9	454.3	455.2	464.0	464.5	463.7	459.6	460.4	466.2
Number times foots were remelted	one	one	one	two	one	two	one	one	one	one	one	one
Loss (per cent)	4.1	4.4	5.6	4.8	9.1	9.0	7.2	7.1	7.3	8.1	7.9	6.8
Color of oil (red)	5.3	5.4	5.3	5.4	9.8	9.9	9.8	10.1	9.9	10.1	10.0	10.3
Condition of foots	hard	hard	hard	hard	hard	soft	hard	hard	hard	hard	hard	hard
Break at end of fast agitation	slight	slight	good	good	slight	slight	slight	slight	slight	slight	slight	slight
Break at end of slow agitation	very good	very good	very good	very good	very good	good	very good	very good	very good	medium	very good	very good
Color taken on by oil upon addition of lye	creamy	creamy	creamy	creamy	creamy	creamy	creamy	creamy	creamy	creamy	creamy	creamy
Oil set overnight before pouring off.	90 min. fast agitation— Temp. 20-24° C. 12 min. slow agitation— Temp. 65° C.		45 min. fast agitation— Temp. 20-24° C. 12 min. slow agitation— Temp. 65° C.		90 min. fast agitation— Temp. 20-24° C. 25 min. slow agitation— Temp. 65° C.				90 min. fast agitation— Temp. 20-24° C. 25 min. slow agitation— Temp. 65° C.			

ABSTRACTS

Oils and Fats

Edited by
M. M. PISKUR and Ruth LINDAHL

Fat chemistry in the battle against food spoilage. K. Taufel. *Fette u. Seifen* **44,** 179-87 (1937). A review on spoilage of fats.

Antioxidants and stabilizers for fats. F. Wittka. *Chem.-Ztg.* **61,** 386-9 (1937). Review of patents and literature on antioxidants.

Vegetable oils as defoaming agents. *Chem.-Ztg.* **61,** 397-8 (1937). Review.

Society work of the D. G. F. 4. The hydroxyl number. H. P. Kaufmann. *Fette u. Seifen* **44,** 150-3 (1937). A review of methods.

Committee report of D. G. F. 5. Whale oil standards. H. P. Kaufmann. *Fette u. Seifen* **44,** 196-201 (1937).

Antioxidants and the autoxidation of fats. IX. The antioxidant properties of the tocopherols. H. S. Olcott and O. H. Emerson. *J. Amer. Chem. Soc.* **59,** 1008-9 (1937). α, β and γ tocopherols and their allophanates are effective antioxidants in lard. The degree of protection afforded by the tocopherols is not proportional to their vitamin E activity.

Action of microorganisms on fats. L. B. Jensen and D. P. Grettie. *Food Res.* **2,** 97-116 (1937). Methods are indicated for study of hydrolyzing bacteria on emulsified and continuous fat substrates. Certain strains of bacteria producing two kinds of enzymes —lipases and oxidases—appear to be responsible for rapid development both of free fatty acid and of oxidation products. The phenomenon parallels oxidative rancidity of so-called chemical or oxygen-light origin. Numerous determinations of bacteria and stability tests on bacon fats indicate a connection with numbers of bacteria on the original fat and tendency towards rancidity when held at —17.8° C. Moisture-free fats do not support growth of the microorganisms tested, whereas .3 per cent moisture or more in an animal fat aids in promoting growth of the same microbes. Fat-soluble pigments of various microorganisms cause "pink" fats and purple "stamping ink" discolorations by oxidation-reduction mechanisms.

Color reactions of vegetable oils. Fosco Provvedi. *Olii minerali, olii e grassi, colori vernici* **16,** 103-4 (1936).—Carr and Price's reagent (1-2 cc. oil and 4-5 cc. reagent) gave in 5 min. with cottonseed oil dark red-brown, olive oil light green, sesame oil very light pink-yellow, peanut oil very light pink, colza oil blue-green, rape-seed oil very light green, poppy-seed oil yellow, apricot oil very light sky blue with slight opalescence, sunflower oil brown-yellow (turbid), grape-seed oil green-brown (turbid), corn oil yellow, soybean oil violet-gray with slight opalescence, raw linseed oil green (turbid), boiled linseed oil black-green (turbid), sweet-almond oil violet-blue with slight opalescence. Rancid colza oil reacts similarly to cottonseed oil. Rancid olive oil behaves differently from the neutral, and the chloroform soln. of $SbCl_3$ can be used to detect rancidity by development of a visible opalescence. In nonrancid oils the reagent identifies cottonseed oil. (*Chem. Abs.*)

The catalytic interchange of esters of fatty oils by alcoholic-potassium hydroxide. H. Kurz. *Fette u. Seifen* **44,** 144-5 (1937). In test on treatment of oils with various amts. of alc.-KOH soln. it was found that considerable splitting of the glycerides takes place before any free glycerin is apparent. The splitting was evaluated by detg. the sapon. and Ac values of the reaction products. The data are presented in 12 tables.

The fatty acids associated with banana starch. L. Lehrman and E. A. Kabat. *J. Amer. Chem. Soc.* **59,** 1050-1 (1937). The amt. of fatty acids liberated