$$b = \frac{\%\ \text{glycerine in the water of the lye}}{\%\ \text{glycerine in the water of the soap}}$$

Ratio—a—represents the true distribution ratio of the glycerine between the phases. In certain tubes the phases present are neat soap and nigre. The distribution ratio between these two phases is .36. When neat-nigre-lye is present, the distribution ratio between the neat and lye is .31 and this ratio holds for all strengths of electrolyte in the layer. Thus no matter how "soft" the grain or how "hard" the grain the ratio remains fairly constant. It is likewise independent of the absolute amount of glycerine in the system, within the limits of the experiment, for an average ratio of .33 is found for the tubes contain 2 per cent glycerine at the start, and an average ratio of .31 for tubes initially containing 5 per cent glycerine.

The ratio—b—which refers to the glycerine in the water of the layers averages approximately 1.13. It varies somewhat from tube to which may be due to the fact that water was determined by difference and combined errors may center here. However, the results seem to show an approach to a ratio of about 1.0 as the electrolyte strength increases or as the soap becomes more grainy.

THE CHARACTERISTICS OF KAPOK OIL

From the Laboratories of
Swift & Company, Chicago, Ill.

By VIRGIL C. MEHLENBACHER

WITHIN the last half decade kapok oil has assumed such a position in the vegetable oil industry as to make further knowledge of its composition and characteristics most desirable. Information relating to the source of kapok oil is readily available in the literature, so that no further mention will be made of this. (1) Jamieson and McKinney recently reported an analysis of kapok oil, but in view of the fact that the total available information regarding the constants and characteristics of this oil is comparatively meager, it was thought best to proceed with a report of this investigation, which had already been begun. (2)

The sample of oil which was used for the analysis, in this case, represented a shipment into this country of several hundred tons from Japan. It was of normal character, comparing favorably in quality and similar in action and characteristics to several previous shipments which had been received. This lot of oil was classed as semi-refined as received, but was re-refined and filtered before analysis to insure the use of a purely refined product for the development of the analytical and physical data.

The chemical characteristics and physical constants of the glycerides are given in Tables I and II.

TABLE I

Free Fat Acids as Oleic (F.A.C.)	0.06%
Color Reading (F.A.C.—Lovibond) 35 yellow	4.4 red
Color Reading (after F.A.C. bleach) 20 yellow	1.5 red
Halphen Test (F.A.C.)	Positive
Besson Test (3)	Positive

TABLE II

Saponification Number (F.A.C.)	191.2
Iodine Number (Wijs—F.A.C.)	100.5
Thiocyanogen Number (F.A.C.)	70.95
Acetyl Value (F.A.C.)	26.8
Unsaponifiable Matter (F.A.C.)	0.53
Iodine Number of Unsaponifiable Matter (Wijs—F.A.C.)	42.8
Specific Gravity at 15° C. (Westphal)	0.920
Refractive Index (Zeiss Butyro @ 40° C.)	57.60

No crystals were obtained with acetic anhydride when using the AOAC alcohol extraction method for phytosterol.

The oil exhibited the normal degree of fluorescence which is almost characteristic for the so-called oriental oils.

From the iodine number and thiocyanogen value of the oil, the olein and linolein content was calculated, assuming, of course, the complete absence of other unsaturants.

The solid fatty acids were separated by the lead salt ether method (Twitchell Modified—F.A.C.) and calculated to the glycerides, using as the equivalent factor the value 95.5. The composition of the oil as indicated by these analyses is given in Table III.

TABLE III

	Per cent
Olein glyceride (calculated)	48.2
Linolein glyceride (calculated)	34.1
Solid glycerides (corrected) (Twitchell Modified—F.A.C.)	16.3
Unsaponifiable Matter (F.A.C.)	0.53

If the saturated glycerides are calculated from the values given above for unsaponifiable matter, olein, and linolein, a figure varying from the solid glycerides, as obtained by actual analysis, by 0.87 per cent, results. This is probably within the limits of the accuracy of the methods used. No attempt was made to isolate individual solid acids.

The fat acids were separated from the oil and the physical constants also determined on these. The data follow in Table IV.

TABLE IV

Titer (F.A.C.)	30.4
Refractive Index (Zeiss Butyro @ 40° C.)	45.40
Iodine Number (Wijs—F.A.C.)	102.2
Saponification Number (F.A.C.)	199.5
Melting Point (F.A.C.)	35.4° C.
Soluble acids as Butyric (A.O.A.C.)	0.7%
Insoluble acids (Hehner—A.O.A.C.)	94.3%

So far as we know, no one has made any report on attempts to refine kapok oil. Jamieson and McKinney have suggested that due to the smaller amount of non-oil constituents present in kapok oil than in cottonseed oil, correspondingly lower losses should result. (4) Our experience in the laboratory refining of many samples representing several hundred thousand pounds of kapok oil has indicated that equivalent results are easily obtainable, but we have not been able to prove any great superiority in this respect.

After considerable experimentation with the reactions of kapok oil in various methods of refining, two factors of importance were developed. An agitation period of greater duration than that required by regular hot pressed cottonseed oil was vitally necessary for a good "break" or separation of the saponified material, and extended high temperature agitation was most essential for coagulation of the foots. These facts were indicated in laboratory refining tests and most emphatically borne out in factory kettle refinings.

For purposes of laboratory refining, the official method for cottonseed oil designated slow-breaking fulfills both of the requirements specified above. (5) Further than this, our experience indicates that by this method good results can be obtained in the refining of kapok oil, if we are willing to use as a basis for comparison normal cottonseed oil with an equivalent free fatty acid content. We recognize that this criterion is not necessarily correct, inasmuch as even lower losses might be obtained by some other method of refining; however, until the development of more data and information point the way to a superior method, the procedure suggested heretofore does offer a uniform and equitable basis for comparison. No difficulty was encountered, when using the slow-breaking method, in obtaining good separation or settling of the foots. Some indication of the order of the results obtained may be had by referring to Table V, in which are tabulated a few results obtained by using the official refining test as designated for slow-breaking cottonseed oil.

The average loss to acid ratio for normal cottonseed oil with an equivalent free fatty acid content and without an unusual amount of extraneous matter or meal is about the same as the value found for kapok oil, that is, 3.7. This was actually calculated for cottonseed oil from averages of yearly results at a west coast refinery. It must be remembered that these values for loss to acid ratio are based on averages and as such cannot be applied to individual or specific instances or samples. However, as an average index obtained under uniform and comparative conditions of testing, it furnishes a good basis for comparison. This value, of course, varies with free fat acid content, inversely as the latter increases.

TABLE V

%	——NaOH——		Best Loss	Color (Refined Oil)		Bleach (Refined Oil)	
FFA	%	° Be	%	Y	R	Y	R
3.9	13.6	14	12.8	35	4,2	20	1.7
4.1	12.0	16	14.2	35	5.0	20	2.6
5.3	12.3	18	16.9	35	5.2	20	2.4
4.5	12.7	16	12.4	35	4.8	20	2.2
4.2	12.2	16	12.3	35	5.0	20	2.3
4.2	12.2	16	12.5	35	5.0	20	2.3
2.6	10.5	12	6.7	35	4.0	20	1.5
2.6	10.5	12	8.9	35	4.6	20	1.8
3.1	12.0	14	10.6	35	4.6	20	1.9
3.8	13.4	14	16.8	35	4.8	20	2.4
1.5	7.0	14	7.6	35	2.8	20	1.7
3.3	12.4	14	14.4	35	3.5	20	1.9
2.3	7.1	16	9.3	35	4.4	20	1.6
4.9	13.5	16	18.7	35	4.2	20	1.5
2.0	6.7	16	10.0	35	5.6	20	3.2
1.8	8.9	12	6.1	35	3.2	20	1.2
3.0	11.2	12	10.8	35	4.2	20	1.5
2.3	9.9	12	9.6	35	3.5	20	1.2
2.9	11.0	12	11.2	35	4.2	20	1.4
3.9	13.6	14	15.0	35	5.0	20	2.2
2.4	10.1	12	11.1	35	4.2	20	1.9
3.7	13.2	16	11.4	35	4.0	20	1.2
3.1	12.0	14	11.1	35	3.4	20	1.5
2.9	8.0	16	10.0	35	5.6	20	2.2
3.0	8.1	16	10.6	35	5.0	20	1.6
4.9	13.5	16	15.9	35	4.8	20	1.6

Average Free Fatty Acid as Oleic 3.3%
Average Loss 11.6%
Average loss to acid ratio 3.5

The foregoing data and information are furnished for the purpose of adding to our accumulation of knowledge pertaining to the characteristics and composition of fats and oils. The great increase in the different kinds of oils which have come into common use during the last few years has emphasized our lack of complete knowledge of the behavior of many of these. In many cases the physical constants, when available, are of such old standing as to be unreliable due to changes in methods of analysis and changes in certain characteristics of the oils. A fact that all fat and oil chemists can well afford to remember is that one analysis of one sample of any kind of oil does not define that type of oil in general, but only the sample analyzed. Thus it is necessary to have many analyses of many samples of that kind of oil so that we may establish the practical limits of variation of the factors which define that oil and differentiate it in its action, its composition, and its characteristics from any other oil.

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SOYBEAN PHOSPHATIDES AND THEIR USES

A REVIEW

By G. A. WIESEHAHN
AGFA ANSCO CORPORATION, BINGHAMTON, N. Y.

THE term "lecithin," which is generally applied to the phosphatides of the soybean, is convenient, but from the scientific standpoint as misleading as are those of "stearin" and "olein" for the complex mixtures of glycerides which they represent in the fat industries. Only a minor proportion of the technical products sold as lecithin is in the form of the choline esters of diglyceride phosphoric acids. With four of the five fatty acids detected in soybean phosphatides[1], stearic, palmitic, oleic, linoleic, linolenic, including the stereo-isomers, the presence of 70 different lecithins is possible according to Suzuki and Yokoyama[2]. These investigators found that by treatment with warm acetone the cadmium chloride compounds with beta-lecithins (in which the phosphoric acid is linked to the center, beta, carbon atom of the glycerine radical) go into solution while those with alpha-lecithins remain undissolved. In this way and by means of fractionation of the brominated phophatides in various solvents they identified from among the alpha-phosphatides palmito-linoleo-, dioleo-, oleo-linoleo-, and dilinoleo- lecithin. Among the beta- compounds were palmito-oleo-, palmito-linoleo-, palmito-linoleno-, dioleo-, oleo-linoleo-lecithin.

Cephalins, which differ from the lecithins in their amino-component,