tained from the wild soybean, this oil is characterized by a high percentage of unsaponifiable matter. In contrast to the relatively high phosphorus content of the whole soybean, the phosphorus content of the oil is extremely low, and of the same order of magnitude as is normally observed in the case of alkali-refined oils. When this oil is heated by the official heat-break method in the presence of acid, the oil bleaches to a very light greenish yellow color and produces practically no break.

TABLE III.—PHYSICAL AND CHEMICAL CHARACTERISTICS OF THE OILS

Characteristic	Wild beans	Seneca	Peking	Illini
Iodine number	151.4	139.4	137.8	131.6
Thiocyanogen number	87.4	85.1	84.5	81.3
Saponification number	188.8	193.0	191.2	193.5
Acid number	0.41	0.47	0.78	0.93
Diene number	0.0	1.6	0.0	0.74
Hydroxyl number	4.1	4.9	5.4	5.8
Unsaponifiable, percent	2.20	0.61	0.93	0.84
Break, percent	0.03	0.11	0.09	.....
Phosphorus, percent	0.0003	0.026	0.024	0.046
	70Y	70Y	70Y	35Y
Color (1" cell)	6.74R	6.2R	6.64R	4.0R
Refractive index N_D^{25}	1.4759	1.4740	1.4741	1.4727
Specific gravity 25/25	0.9219	0.9203	0.9214	0.9195
Total acids, iodine number	157.6	144.5	143.4	138.0
Total acids, thiocyanogen number	89.4	87.0	85.9	84.0
Saturated acids, pct. det'd	13.6	12.14	12.7	13.2
Saturated acids, iodine number	2.0	1.6	3.4	2.9
Saturated acids, thiocyanogen number	2.2	2.2	3.0	3.3
Saturated acids, pct. corrected	13.5	11.92	12.4	12.7

The distribution of the fatty acids was calculated from the data given in Table III, and the results, together with those obtained in a similar previous study (1) on low iodine number oils, are shown in Table IV. The distribution of the unsaturated fatty acids was calculated on the assumption that the only unsaturated acids present in these oils were oleic, linoleic, and linolenic. According to Hilditch and Jasperson (3) normal soybean oils contain about 0.5 per cent of hexadecenoic or palmitoleic acid, $\Delta 9$:10-$C_{15}H_{29}COOH$, and it is not known to what extent this acid is present in soybean oils of abnormal iodine number.

TABLE IV.—COMPARISON OF THE IODINE NUMBER AND THE DISTRIBUTION OF FATTY ACIDS DERIVED FROM VARIOUS SOYBEAN OILS

Seed	Oil	Fatty acids				
			Unsaturated			
Variety, location, and crop year	Iodine number	Saturated	Total	Oleic	Linoleic	Linolenic
		Pct.	Pct.	Pct.	Pct.	Pct.
Dunfield—Mo., 1936	102.9	12.0	88.0	60.0	25.0	2.9
Dunfield—Mo., 1937	124.0	13.2	86.8	34.0	49.1	3.6
Dunfield—Ind., 1937	127.3	13.1	86.9	34.8	46.0	6.0
Illini—Ill., 1936	131.6	12.7	87.3	27.7	53.7	5.9
Peking—Ill., 1937	137.8	12.4	87.6	24.4	56.2	7.3
Seneca—N. Y., 1938	139.4	11.9	88.1	24.7	55.4	8.0
Wild beans—Ill., 1938	151.4	13.5	86.5	11.5	63.1	12.1

Inspection of the data in Table IV indicates that there is a remarkable constancy in the ratio of saturated to unsaturated acids of these soybean oils, which appears to be wholly independent of the iodine number of the oil from which the acids were derived. Of the seven soybean oils having iodine numbers ranging from 102.9 to 151.4, the saturated acids were found to comprise 12.7 ± 0.8 per cent and the unsaturated acids, 87.3 ± 0.8 per cent of the total acids present. It is also to be noted that within the limits of experimental error, the percentages of linoleic and linolenic acids increase more or less regularly with increasing iodine numbers of the oils, whereas the reverse is true of the oleic acid, which decreases progressively with the increase in iodine numbers of the oils.

Although the data recorded in Table IV are limited with respect to the number of samples of soybeans which have been examined; nevertheless, in view of the randomness of their selection, they indicate that the distribution of the saturated and various unsaturated fatty acids in the soybean seed bears a definite relation to the iodine number of the oil, and their formation in these proportions is governed by a specific and relatively invariable biochemical process, independent of varietal, climatic, or pedological conditions. These observations may be summarized as follows:

(1) The ratio of saturated to unsaturated acids in soybean oil is fairly constant, irrespective of the total amount of oil present in the seed or of the iodine number of the extracted oil.

(2) The distribution of the unsaturated acids varies in a specific manner with the iodine number of the oil derived from the seed, but is independent of the total amount of acids which are formed during growth and maturation and stored by the seed in the form of various lipids.

LITERATURE CITED

(1) Dollear, F. G., Krauczunas, P., and Markley, K. S., Oil and Soap, *15*, 263-4 (1938).
(2) Wiggans, R. G. Private communication to the authors.
(3) Hilditch, T. P., and Jasperson, H., J. Soc. Chem. Ind., *57*, 84-87 (1938); *58*, 187-9 (1939).

Report of the Referee Board

FOR THE YEAR 1939-40 the Referee Board renewed 32 referee certificates, granted one new one and acted on a total of 35 applications. Again 5 check samples of crude cottonseed oil and 10 check samples of cottonseed were distributed, reports on the seed samples being tabulated by Mr. R. T. Doughtie of the Bureau of Agricultural Economics.

This report of the Referee Board's activity closely resembles those of the past few years. The Board wants to follow fairly stable procedures, but not to get into a rut, and will welcome constructive criticism of its work such as has come from referee chemists and other members at some of the annual meetings in the past.

There is some demand for new referee chemists who are especially qualified to examine and grade soybean oil and who are located in the centers of trading in that product. Interest in the problem has arisen among the traders, and there is no immediate prospect of a large volume of business for the chemists. It has been suggested that the Referee Board recommend laboratories to be interested in equipping themselves to perform the determinations which are now required and will in the future be required to grade soybean oil and also soybean meal. Obviously the problem is one of interest to our society, but it will be a difficult matter to incite the active interest of chemists and at the same time to be as critical of their qualifications and to subject them to as many collaborative tests as the standards of the Referee Board require. The problem will be inherited by the next Referee Board.

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