gave the following results:
Specific Gravity @ 15.5—0.9192.
Iodine Value (Wijs)—103.5.
Thiocyanogen-Iodine Value—68.8.
Saponification Value—188.8.
Unsaponifiable Matter—4.89%.
Acid Value—101.5.
Free Fatty Acids (Oleic)—51.05%.
Titre—23.9° C.
Color Lovibond (1-in. cell)—
35 Yellow-6.0 Red.
Color (FAC)—Not darker than 21.
Halphen Test (for cottonseed oil)—
Negative.
Villavechia Test (for sesame oil)—
Negative.
Bellier Test (for peanut oil)—
Negative.

Assuming the absence of linolenic acid in this sample, these figures would indicate the following composition:

Oleic Acid—39.56%.
Linoleic Acid—39.91%.
Saturated Acids—15.64%.
Unsaponifiable Matter—4.89%.

Expressed Kapok Seed Oil

By G. S. JAMIESON AND R. S. McKINNEY

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KAPOK seed from which the commercial oil is obtained is a by-product of the kapok fiber industry. For those not familiar with kapok it may be mentioned that the fiber or down is not only impermeable to moisture but also very buoyant. On account of these properties, it is used in life preservers of various types as well as for stuffing cushions, pillows, and mattresses. Although Java produces about 90 per cent of the kapok fiber grown, increasing quantities are being produced in India, Malaya, and the Philippines.

There are 54 species of tropical trees that produce seed fiber. These are grouped under the genera of Ceiba, Bombax, Chlorisa, and Gossampinus. At the present time only two of these trees yield fiber of commercial importance. On account of the superiority of its fiber, Ceiba pentandra (also commonly known as Eriodendron anfractuosum) is the most important. The other species, Bombax malabaricum, is called Indian kapok and is found throughout tropical India and Ceylon. Its seed oil gives iodine numbers ranging from 74 to 78, whereas that from C. pentandra, with which the present investigation is concerned, gives values from 86 to 98. The oils from both species, as is well known, give a more intense Halphin color test than does cottonseed oil.

Several years ago, Dr. C. L. Alsberg, during a visit to Java, collected a small quantity of kapok seed, the oil of which was examined by us (E. P. Griffing and C. L. Alsberg, Ind. Eng. Chem. 23, 908, 1931). Owing to the small quantity of oil available, only a partial investigation of it was possible. This oil, which gave an iodine number of 94.1 by the Hanus method, was found to contain 17.15 per cent of saturated and 76.32 per cent of unsaturated acids. From these data it was calculated that the oil contained 49.6 per cent of oleic acid and 26.7 per cent of linoleic acid.

About the same time A. O. Cruz and A. P. West (Phil. J. Sci. 46, 131-137, 1931), reported the results of an extensive investigation on the oil of Ceiba pentandra expressed from Philippine seed. This oil, which gave an iodine number (Hanus) of 95.6, contained 18.6 per cent of saturated and 75.7 per cent of unsaturated acids. From the data obtained they calculated that the oil contained the following percentages of fatty acids: Oleic 49.8, linoleic 29.3, myristic 0.3, palmitic 15.9, stearic 2.3 and arachidic 0.8. The unsaponifiable matter amounted to 0.8 per cent.

In view that from time to time considerable quantities of kapok seed from Java are pressed for oil by various mills in California, it became of interest to make an investigation of this particular product. The oil to be described was expressed with Anderson oil expellers at the mill of the Pacific Vegetable Oil Company, Inc., San Francisco, from seed imported from Java during the winter of 1934. This firm also furnished us with a pound sample of the seed. The seeds were found to contain 24.6 per cent of oil and 7.16 per cent of moisture. It should be mentioned that this non-drying oil, after refining, is used for edible purposes for which it is well adapted. In contrast to crude cottonseed oil, crude kapok oil contains but little non-oil constituents. On this account it would be expected to have a correspondingly smaller refining loss. However, no laboratory refining tests were undertaken by us.

The chemical and physical characteristics, determined on the crude expressed oil, are given in Table I.

TABLE I.
Chemical and Physical Characteristics of Kapok Seed Oil.

Refractive index at 25°	1.4696
Iodine number (Hanus)	96.0
*Thiocyanogen value (Kaufmann)	75.9
Saponification value	190.7
Acid value	3.7
Acetyl value (Andre-Cook)	12.9
Unsaponifiable matter, per cent	0.8
Saturated acids (corrected) per cent	19.0
Unsaturated acids (corrected) per cent	74.3

*For an unknown reason this value is abnormally low and not in proportion to the iodine number of this oil and the percentage of the saturated acids. During the course of the investigation, the thiocyanogen value was determined in duplicate three times and all the results were in good agreement.

Unsaturated Acids

The percentages of oleic and linoleic acids were calculated in the customary manner from the iodine number of the oil, taking into consideration the actual quantity of the unsaturated acids present.

The results are given in Table II.

TABLE II.
Unsaturated Acids.

	Per cent	Per cent in Oil
Oleic	57.88	43.0
Linoleic	42.12	31.3
	100.00	74.3

Saturated Acids

The saturated acids, which were separated from the saponified oil by the lead-salt ether method, were esterified with anhydrous ethyl alcohol in the presence of dry hydrogen chloride (J. Amer. Chem. Soc. 42, p. 1200, 1920). The esters, amounting to 75.45 grams after being freed from solvent and moisture, were fractionally distilled under a pressure of 3 mm. from a Ladenburg fractionation flask. Five fractions, distilling from 168° to 215° C., were collected, and from the results of their analyses, the composition of each was determined by the methods previously described (J. Amer. Chem. Soc. 46, p. 775, 1924). The final results calculated from the analytical data are given in Table III.

TABLE III.
Saturated Acids

	Per cent	Per cent in Oil
Palmitic	51.43	9.77
Stearic	42.09	8.00
Arachidic	6.25	1.19
Lignoceric	0.23	.04
	100.00	19.00

The acids were recovered from the ester fractions and the small undistilled residues by saponifying them with alcoholic potash and decomposing the soaps, after the removal of the alcohol and solution in water, with hydrochloric acid. The acids were collected and completely separated from potassium chloride and any hydrochloric acid by remelting them with hot distilled water in the usual manner. The acids obtained from the five ester fractions and the undistilled residue were subjected to fractional crystallization from ethyl alcohol. No myristic acid could be detected in the acids from the first ester fraction. Arachidic acid was separated from the acids of ester fraction five as well as those from the undistilled residue which also contained the lignoceric acid. The acids from the distilled ester fractions, which were isolated and identified in each case, confirmed the deductions previously made from the mean molecular weights of the saturated acid esters. The composition of the oil in terms of glycerides is given in Table IV.

TABLE IV.
Percentages of Fatty Acids as Glycerides.

Glycerides of—	Per cent
Oleic	45.2
Linoleic	32.9
Palmitic	10.2
Stearic	8.4
Arachidic	1.2
Lignoceric	0.04
Unsaponifiable matter	0.8

Upon comparing these results with those reported by Cruz and West (loc. cit.) it will be observed that the respective proportions of palmitic and stearic acids found in the two oils are very different, and that in contrast to the Philippine oil, no myristic acid could be detected in the product from Java seed.

Frames For Protecting And Repairing Lovibond Color Glasses

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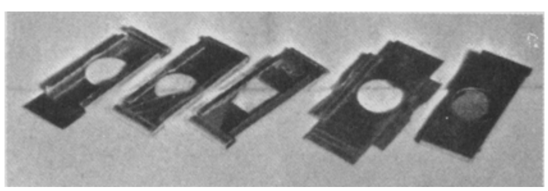
THE cost of Lovibond color glasses is such that should make us welcome any device designed to reduce the likelihood of their breaking when handled carelessly, to protect them from deterioration through their acquiring scratches, and to facilitate the utilization of fragments after breakage has occurred. In the more advanced designs of colorimeters (Oil & Soap, January, 1936), in which the glasses are mounted in revolving discs, these contingencies are not met; but it is believed that few laboratories possess such instruments, and it seems probable that some refineries may, like the one with which the writer is associated, have several sets of glasses in use at various stations in the plant, where they are subject to rough usage and careless handling, and where, accordingly, the use of the device I describe here should effect some saving.

This device is merely a light frame made from 28 gauge (0.014 in.) sheet aluminum. The writer received the cue for this application from the somewhat similar mounting frames designed by Mr. Kenneth Clough of the W. H. Curtin Company for holding microscope slides containing forams, or minute fossil shells. The design is clearly shown by the illustration.



Showing Design of Frame

Dimensions are not given, because the thickness of the glasses varies. In making these frames in quantity, it was found convenient to have two or more small slabs of steel each of the length and breadth of color glasses but with different thicknesses—to use as forms around which to bend the aluminum. Neat, angular bends are made by backing the aluminum sheet with a similar steel plate and holding in a vice. The bend is made by folding the metal over with a steel rule. The perforations were made cleanly and quickly by clamping a stack of the sheets (before bending, of course), between two short sections of heavy strap iron in which were drilled ⅝-in. holes. A piece of ⅝-in. shafting, squared off sharply on one end, was used as a punch. Some care is required to insure all the plates being exactly centered with respect to the holes.

When broken pieces of color glasses are to be mounted, the spaces in the frames not occupied by the glass are filled with pieces of sheet aluminum 1/16-in. thick, cut to such shape by chiseling and filing as to make a complete rectangle, when combined with the fragment, of the size of a whole glass. These portions of the assembly serve as convenient surfaces in which to stamp the numbers of the glasses. When whole glasses are mounted, the numbers may be scratched on the thin frame or marked on it by means of an electric device. After rubbing the numbers with a contrasting oil-proof impregnating material, such as a nitrocellulose lacquer, the numbers stand out in fine clarity, and will gladden the heart of the oil chemist who has depended upon reading the figures scratched on the glass, or who has despaired of trying to keep paper labels cemented to the ends of the glasses.

A further advantage in the application of these frames will be