Suggested Definitions for Special Grade Soybean and Cottonseed Soapstocks

USERS of fatty acids derived from soybean and cottonseed soapstocks are becoming increasingly demanding as to the uniformity and composition of the products they buy. Resin production, for example, is keyed more and more to fixed-specification chemicals, such as supplied by the petrochemical industry. Buyers dislike having to adapt standard formulations to variations in natural products from shipment to shipment, or from season to season.

At the same time improved methods of extracting and alkali-refining of edible vegetable oils are such as to degrade the by-product soapstocks, or at least not to encourage concern as to their quality. Unwanted constituents have tended to increase relative to total fatty acid content. The refiner sees no advantage in allowing any economically recoverable value to remain in the "foots."

Specifically the fatty acid user wants to buy a purified product on the basis of a specific level of iodine value. Yet the processor of soapstocks must work from a range of iodine values that is peculiarly variable, even assuming there is no deliberate nor accidental admixture of stocks.

All this means that the producer of fatty acids is in a "squeeze" as to quality. He certainly cannot down-grade the requirements of his customers as to product composition and uniformity. Therefore, he must meet their requirements by a) more selective processing, or b) more selective purchasing, or some combination of the two. If he does more selective processing, his plant costs will be higher and the increment available to buy his raw materials necessarily less. To the extent that more selective purchasing of soapstocks can result in a more uniform product, he can afford to consider a premium for such uniformity.

Aside from isolated arrangements developed between individual buyers and sellers, the idea of quality standards for soapstocks—other than fatty acid content—has been looked upon rather dubiously by suppliers.

In defining raw or acidulated soapstocks for general transactions, Rule 104 of the National Soybean Processors Association, or Rules 195 and 196 of the National Cottonseed Products Association customarily apply. In addition to fatty acid content limits, both are specific in that they state: when the name of the oil or origin is specified, soapstock must not be adulterated with any other oil or soapstock without the consent of the purchaser.

The weakness of this last provision is that no abstract standard or test for the effects of adulteration or of an accidental contamination is included or referred to. Yet, to the processor whose target is a finished product with a certain uniform composition of acids (as indicated by iodine value), adulteration, contamination, or even natural variation due to abnormal crop conditions may be of equal concern. Drying time is no respecter of motive.

SEVERAL efforts have been made, both independently and cooperatively, to determine the natural range of iodine values to be expected in soapstocks of soybean or cottonseed origin. One such compilation, applying to acidulated soybean soapstocks, is shown in Chart I. It indicates, on a 4-crop-year basis, about 20% below 125 iodine value.

Similarly surveys of the I. V. level of cottonseed soapstocks have indicated a high percentage within the 95-112 iodine value ranges, as measured on total fatty acids.

Paralleling the processor's interest in iodine value is his interest in avoiding a stock which, for one reason or another, can be expected to result in low yield, processing difficulty, or off-grade finished goods. The determination of oxidized fatty acids (American Oil Chemists' Society Tentative Method G-3-53) has been established as a practical measure of the "processing quality" of the soapstock. Actually the test measures impurities of the soapstock which are soluble in ethyl ether but not in petroleum ether. A maximum level of 2.5% oxidized fatty acid (as a percentage of total fatty acids) has been suggested as the critical level above which processing operations or product quality are affected. In the case of cottonseed soapstock, where ultimate product specifications are not quite so rigorous, 5.0% oxidized fatty acids have been suggested as an upper limit.

As a protection against mineral acidity in acidulated soapstock it has also been felt that a reasonable range of pH value,

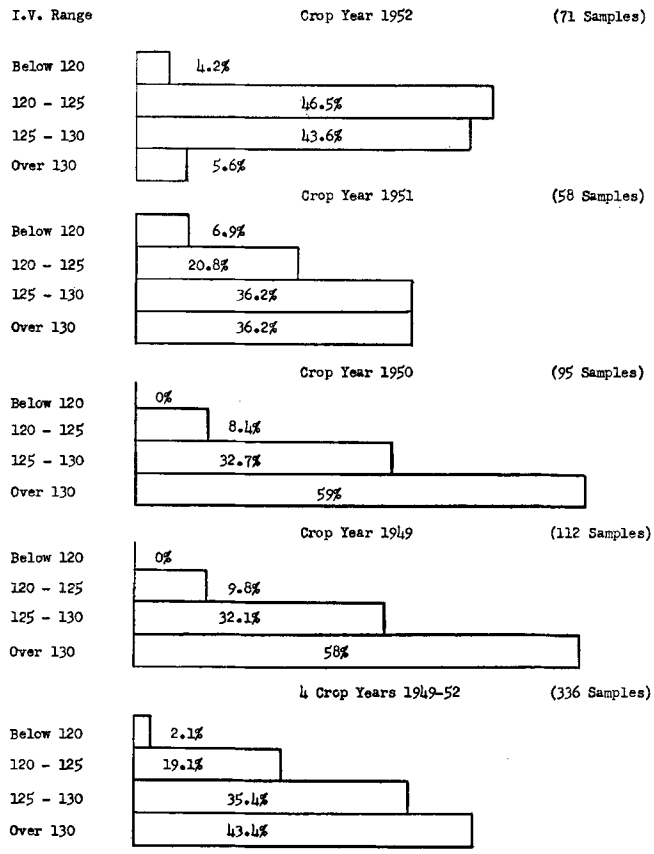

CHART I.
Iodine Values of Acidulated Soybean Soapstocks.

normal to properly handled soapstock, be established. This is given as 7.0 maximum to 4.0 minimum.

Taken together, then, we have three or four simple specifications, for which established methods exist, that will permit a "premium-grade" soapstock to be defined. The supplier of soapstock to the fatty acid industry may thus elect, if he prefers, to segregate certain of his stocks to meet these requirements. By a few simple precautions in handling and storage, he may be able to dispose of practically all his soapstock as "special." Or he may continue to sell the standard grade as now defined in the NSPA and NCPA rules.

Originally fatty acid producers had approached this problem as one of upgrading soapstocks generally, to definite limits of iodine value and the like. It now appears more realistic to allow the present rather loose definitions to remain as the ordinary product of commerce but to add an optional "special-grade" definition to cover both the raw and acidulated forms of soybean and cottonseed soapstocks. These definitions are presented under "Suggested Definitions."

No estimate is currently possible, of course, as to the percentage of soapstocks which might come on the market in these more strictly defined categories nor as to the extra saleability or possible premium they might command. Possibly, too, interests of both buyers and sellers would be served by a somewhat different range of specifications than those originally suggested, for example, a minimum I. V. level for soybean soapstock of 120. If less than 20% of soybean soapstocks will fall below 125 I. V. however, it seems logical that a premium grade be held at this level.

The economics of this proposal will have to evolve. The principle however is a fairly straightforward one. Suggested definitions are offered to the trade and to the Rules Committees of the organizations concerned for a "special-grade" of soapstock defined as to a) total fatty acids, b) oxidized fatty acids, c) iodine value of total fatty acids, and (in the case of acidulated stocks) pH value. No change is suggested in the regular grades as now defined in the NSPA and NCPA Trading Rules.

These suggested "special" grades have currently no official standing as the Fatty Acid Division does not establish official specifications, trading rules, or test methods. However the specifications given below are open for discussion and for such usage

as individual suppliers and buyers may determine. We suspect that usage on this basis would be of value in establishing the fact that strict definition of these materials, by eliminating pig-in-a-poke buying, will benefit all concerned.

Suggested Definitions

Soybean Soap Stock

1. Raw Soybean Soapstock
   a) *Raw Soybean Soapstock—Special Grade.* This is a product which is uncontaminated with soapstock or oil of any other origin and meets the following specifications in addition to those given for soapstock Regular Grade.

	Maximum	Minimum
Total Fatty Acids	....	30.0%
Oxidized Fatty Acids	2.5%	....
Iodine Value of Total Fatty Acids	....	125

   b) *Raw Soybean Soapstock—Regular Grade.* (Identical with Section I, Rule 104, National Soybean Processors Association Trading Rules.)
2. Acidulated Soybean Soapstock
   a) *Acidulated Soybean Soapstock—Special Grade.* This is a product of the complete acidulation of raw soybean soapstock, which is uncontaminated with soapstock or oil of any other origin and meets the following specifications in addition to those given for acidulated soapstock Regular Grade.

	Maximum	Minimum
Total Fatty Acids	....	85.0%
Oxidized Fatty Acids	2.5%	....
Iodine Value of Total Fatty Acids	....	125
pH	7.0	4.0

   b) *Acidulated Soybean Soapstock—Regular Grade.* (Identical with Section 2, Rule 104, National Soybean Processors Association Trading Rules.)

Cottonseed Soap Stock

1. Raw Cottonseed Soapstock
   a) *Raw Cottonseed Soapstock—Special Grade.* This is a product which is uncontaminated with soapstock or oil of any other origin and meets the following specifications in addition to those given for soapstock Regular Grade.

	Maximum	Minimum
Total Fatty Acids	....	35.0%
Oxidized Fatty Acids	5.0%	....
Iodine Value of Total Fatty Acids	112	95

   b) *Raw Cottonseed Soapstock—Regular Grade.* (Identical with Rule 195, National Cottonseed Products Association Trading Rules.)
2. Acidulated Cottonseed Soapstock
   a) *Acidulated Cottonseed Soapstock—Special Grade.* This is a product of the complete acidulation of raw cottonseed soapstock, which is uncontaminated with soapstock or oil of any other origin, and meets the following specifications in addition to those given for acidulated cottonseed soapstock Regular Grade.

	Maximum	Minimum
Total Fatty Acids	....	85.0%
Oxidized Fatty Acids	5.0%	....
Iodine Value of Total Fatty Acids	112	95
pH	7.0	4.0

   b) *Acidulated Cottonseed Soapstock—Regular Grade.* (Identical with Rule 196, National Cottonseed Products Association Trading Rules.)

Methods

1. *Total Fatty Acids*—American Oil Chemists' Society Tentative Method G-3-53.
2. *Oxidized Fatty Acids*—American Oil Chemists' Society Tentative Method G-3-53. Percentage of oxidized fatty acid as determined by A.O.C.S. Method should be multiplied by

$$\frac{100}{\text{Percentage T.F.A.}}$$

   Example:

O.F.A. by G-3-53	2.0%
T.F.A. by G-3-53	91.0%
O.F.A. (on T.F.A. basis)	$\frac{2.0\% \times 100}{91.0} = 2.2\%$

3. *Iodine Value*—American Oil Chemists' Society Official Method Cd 1-25.
4. *pH (Mineral Acidity)*

   Definition: This method determines the mineral acidity as pH.

   Scope: Applicable to acidulated soapstock.

   A. Apparatus: beakers, 50 ml. and 250 ml.; hot plate; pipet, 50 ml.; and pH meter.

   B. Procedure:
      1. Mix 50 ml. of acidulated soapstock with 50 ml. of hot distilled water and add several bumping stones.
      2. Bring the mixture to the boiling temperature on a hot plate, remove, and allow to settle.
      3. Pipet off the water layer and allow to cool down to room temperature.
      4. Determine the pH of the water layer using the pH meter.

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Announces New Publication

THE FIRST VOLUME of a new series in applied mathematics published by the National Bureau of Standards is "Tables of Functions and of Zeros of Functions," available from the Government Printing Office, Washington 25, D. C., at $2.25. The 211-page book presents 10 tables of special functions, such as integrals of the Bessel functions J_0 and Y_0, exponential integrals, Strube functions, and values of x^n/n, and eight tables of zeros of functions.

Hugh R. Davidson and Henry Hemmendinger have announced the opening of a laboratory for color measurements and spectrophotometry at Easton, Pa., to be known as DAVIDSON AND HEMMENDINGER.