troduce it between the tubes, which would naturally cut the amount of agitation in half. To do this we used a 5 cylinder piston pump. Four of the cylinders pumped oil into the first chilling tube, while the fifth cylinder, calibrated to supply a little less than 20% milk-salt solution, discharged into the pipe joining the second tube to the first one. This gave a very encouraging improvement in flavor, so we then decided to go still further and by-pass both crystallizing tubes with the milk and salt. If this were done it would be necessary to get the milk and salt mixed in with the supercooled oil in some manner, and to do this a continuous blender was developed by the Vogt people. This blender, holding about six pounds of product, was inserted between the discharge of the second chilling tube and the horizontal setting-up tube, or B-Unit, and then the discharge from the milk-salt pump cylinder brought into the line just ahead of this blender. By setting the blender at a proper speed, the milk and salt were properly incorporated, and still allowed the full flavor and aroma to be obtained from the margarine.

I have described the preparation of the emulsion for this process. Obviously, when the milk is introduced separately, this step is eliminated. The four cylinders on the oil side of the piston pump can be connected to separate oil supplies, and we can now, on a limited range of formulae, pump oil directly from storage to the chilling tubes. This, of course, simplifies the operation and reduces the cost of manufacture correspondingly.

We have also installed, in the discharge line from the milk pump, a direct expansion milk cooler. This increases the capacity of the chilling tube, and reduces the load on the agitator shafts in those tubes.

This system of margarine manufacture is new, and as is the case with most new processes, there remain operating difficulties which need to be worked out. Perhaps the greatest of these is the fact that the crystallizer cannot be easily stopped and started. It is more or less synchronized with the wrapping machine, and when stoppages or jams occur in the wrapper, the slabs continue to come out of the forming nozzle, and must be laid aside. The wrapper is purposely geared a little faster than the crystallizer so that it can catch up on these slabs.

We realize that improvements can be made, but when we compare its advantages with the many disadvantages of other systems, we feel that it represents an undoubted step forward in the manufacture of margarine.

These and all the many other technical advances that have been made and are being made, constantly improving the quality of the product, are resulting in increasing consumption of margarine, and this increase will continue. Competent authorities point out that there are millions of families in the United States who do not have anything like an adequate amount of table fats, and because of its desirable flavor and moderate cost, margarine offers the greatest hope of supplying the deficiency.

This growing demand, together with a constantly increasing trend towards domestic vegetable oils, offers an opportunity and a responsibility to the oil chemist. We must strive for still further advances in processing technique, so that the present oils may be made most suitable for margarine purposes; and particularly we must seek to find ways for bringing into the edible field some of the oils that now cannot be used or which find only a limited use in that field.

REPORT OF COMMITTEE ON INDICATORS

The study of the Committee of Indicators this season has brought forth no positive results. A considerable number of indicators were examined, both with regard to their theoretic desirability and their practical value and behavior in actual tests. In all tests the comparisons were made against Phenolphthalein as the standard. Special attention was given three (3) indicators: Thymol Phthalein, Methyl Blue, and Thymol Blue discussed by Mr. Shuey in his paper last spring.

Conclusions reached through tests are as follows:

THYMOL PHTHALEIN—does not have a sharp end point, gives slightly higher values on high acids and seems generally undesirable.

METHYL BLUE—on very high acids gives in the majority of cases higher values than Phenolphthalein, has a high CO_2 absorption and is thus not dependable. THYMOL BLUE—is perhaps the best of the three, however its color on acid solutions is not strong so that on very dark oils the end point is only a change from the natural color of the oil to the dark blue of the indicator, a change in many cases neither distinct nor adequate. A number of other indicators studied were even less desirable.

By far the most serious objection to all the indicators studied was their lack of uniformity. The committee members obtained one or more samples of each of the dyes and attempted as far as possible, to obtain them from different sources. It was quickly apparent that different lots of the same indicator varied widely, so much so in fact that this factor alone would preclude the adoption of any of them. This point was taken up with the manufacturers who informed us that at the present time it was almost impossible to manufacture these dyes uniformly and that they could hold no hope of our finding one that would be entirely dependable regardless of "lot" or source of supply.

The suggestion was made, however, that it might be possible to submit samples of different "lots" of any indicator found desirable, to a committee of the Society for testing; any "lot" thus found satisfactory to be purchased by the Society and dispensed by the Secretary. Such a procedure would insure uniformity and eliminate almost entirely present objections. It would of course carry with it certain obvious undesirable features.

One indicator suggested by the committee too late for thorough study was an Aniline Blue manufactured by Dr. G. Grubler and imported and distributed in the United States by Akatos, Inc., of New York City. It has been used in several laboratories with good results. The sample tested by the chairman seemed to fill entirely our requirements. The color change from a strong blue in ac to a red is that thought most desirable by the committee for an indicator used with dark oils. The end point is sharp, changing completely on the darkest oil with .05 to .1 cc. of quarter-normal lye. The F.F.A. values of dark oils up to almost thirty per cent (30%) acid were identical with those obtained using Phenolphthalein. Its absorption of CO_2 was not excessive. Whether or not the material is entirely uniform is not known, but the selection of a satisfactory "lot" should be comparatively easy. The adoption of this indicator, however, unless dispensed by the society itself, would necessitate the designation by the society of a specific product of a manufacturer—a practice considered undesirable. In addition to this indicator, several others, as yet untested, have recently been suggested by Dr. Snell as worthy of study.

The majority of the members of this committee feel that the purchase of a tested lot of indicator, to be dispensed by the secretary, would be a satisfactory solution to the problem of an alternate indicator for dark oils. If that should prove to be the will of the society, we recommend the selection of a committee for that purpose.

We are of the further opinion that if the indicator designated must be uniform, regardless of "lot" or source of supply, that the value of continuing this work another year is doubtful. The committee has no further recommendations.

(Signed) J. L. MAYFIELD,
Chairman, Committee on Indicators.

REPORT OF THE SEED ANALYSIS COMMITTEE

The work of the Seed Analysis Committee during the past six months has been confined to studying the methods for determining the percentage of lint on cottonseed. The two methods used in this study are outlined as follows:

METHOD NO. 1:

Fifty gram portions of the seed weighed and placed in porous clay pots, which had been treated with 3 cc. of conc. HCl, and fumed for 1 hour at 130 degrees C. Lint was removed after cooling and reweighing by placing the fumed seed on a 10-mesh screen and rubbing with a No. 11 rubber stopper and finally between layers of a soft cloth. The delinted seed were then reweighed. The lint removed was saved and a moisture determination made and recorded. Original moisture content of the lint was assumed as 8 per cent. Percentage lint was calculated by converting the weight of the dried lint to per cent by multiplying by the factor obtained by dividing (100 — moisture of dried lint) by (100 — moisture of lint).

METHOD NO. 2.

Moisture of the seed was determined. Fifty gram portions were weighed and dried for 3 hours at 130 degrees C. Seed were then placed in porous clay pots, which had been treated with 2.5 cc. of conc. HCl, and fumed for 1 hour at 130 degrees C. All traces of lint were removed by brushing on a 20-mesh screen with an ordinary paint brush or by rubbing between layers of a soft cloth. The bald seed were dried overnight and the weight recorded. The percentage moisture free lint on moisture free seed was calculated. Using this percentage, and assuming the average moisture content of lint as 8 per cent, the pounds of 8 per cent moisture lint on as-is seed can be calculated.

Three samples of cottonseed were used, two being used for Method No. 1 and one being used on Method No. 2. Results of the work were as follows:

1. Method No. 2 is generally considered by members of the committee as being superior and more practical than Method No. 1. Tabulation of results obtained on the samples used for Method No. 2 were more uniform and showed a closer range of variation than results obtained on samples used for Method No. 1.
2. Screens of 10, 20 and 30-mesh were used by the collaborators on their tests, though 10-mesh is specified by one method and 20-mesh by the other. Results obtained were more satisfactory when the 20-mesh screen was used.
3. It has been recommended by some members of the committee that the bald seed be dried by heating for 2 to 3 hours at 130 degrees C. rather than overnight. This would enable the time element involved in handling the sample to be shorter and more practical, and in cases where such drying was used the results checked well with those obtained when the bald seed were dried overnight.
4. The thought has been advanced by some members of the committee that the fuming temperature of 130 degrees C. was too high, and also that 2.5 cc. and 3 cc. of conc. HCl was too much to use in the pots. It has been recommended that the official method of fuming be used and also that the amount of acid be reduced to 1.5 cc. Satisfactory results were obtained when these variations from Method No. 2 were used.
5. Some of the objectionable features in Method No. 1 are eliminated by using Method No. 2; namely, the breaking of the hull of the seed into a fine powder by use of the rubber stopper in removing the lint is minimized; moisture of the dried lint is eliminated; calculations are shorter and involve use of fewer variables; work of determining the lint percentages is simplified and time is saved.
6. Objections have been raised to the assumption of the moisture of the original lint as 8 per cent. No satisfactory method has yet been suggested for making an accurate determination of the moisture content of the lint.
7. It is recommended that further study be made on the methods of determining the lint on cottonseed for another year.

Before closing this report, it might be of interest to the members of the A.O.C.S to know that during the past year, the United States Department of Agriculture has supervised the sampling and grading of approximately 1,500,000 tons of cottonseed in the states of the Mississippi Valley, official samples being drawn and prepared from each shipment by men licensed by the Department and the analyses and grades on the official samples certificated by licensed chemists who are under the supervision of the Department. The grades on 80 certificates of analysis, involving approximately 2,000 tons of seed, have been brought before the Department for review. The percentage of the total tonnage of