ing and allow to stand in ice for a short time, filter off while the mixture remains in ice, wash with stearic alcohol at 0° C., dry and weigh. Determine the melting-point of the product, which should not be much less than 68.5° C.

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THE DETERMINATION OF SOLID FATS IN COMPOUND LARDS.

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IN March, 1896, there appeared in this Journal an article by J. H. Wainwright entitled, "The Determination of the Solid Fat in Artificial Mixtures of Vegetable and Animal Fats and Oils."

Samples of compound lards had been submitted to the United States laboratory for the determination of the relative proportion of their constituents in order that the claim of the exporters for "drawback" of duties paid on one of the constituents might be verified, and the paper consisted in a description of a mechanical process which had been adopted by the United States laboratory for use in such determinations.

Though no great claim for accuracy in results or of scientific principles involved was made yet the conclusion arrived at was that the process would give correct results to within about one and one-half per cent.

Having been connected with one of the companies interested in the collection of this "drawback" of duties paid on the oleostearine used in compound lard, and having personally supervised the making of the lard which was sent to the United States laboratory for analysis, and hearing that the result obtained by the chemist often fell short of the actual amount of oleostearine which I knew to be contained in the samples, I made a great many trials of the process and came to the conclusion that, though under certain conditions it might give concordant and fairly accurate results, it could not be relied upon at all under certain other conditions.

I have selected a series of ten from the many analyes which were made with a view of showing in a rather exaggerated manner perhaps the possible results when the test is carried out under those conditions which prohibit accuracy.

The process was carried out by me essentially as described in this Journal, **18,** 259, except in two particulars.

Firstly, the sample after the preliminary melting and slow cooling to 75° F. was allowed to stand at exactly that temperature for twenty-four hours before subjecting to pressure, instead of "standing over night at ordinary temperature," as described by the author of the process, and secondly, twenty-five grams of the sample instead of fifty were used in the screw press.

These ten samples each contained twenty per cent. oleostearine and eighty per cent oil.

		Grams.
	No. 1.	
Oleostearine.	Titre 50.6° C	20
Cotton-seed oil.	A very heavy bodied oil	80
	No. 2.	
Oleostearine.	Titre 50.6° C	20
Cotton-seed oil.	A moderately heavy bodied oil	80
	No. 3.	
Oleostearine.	Titre 50.6° C	20
Cotton-seed oil.	An ordinary oil	80
	No. 4.	
Oleostearine.	Titre 50.6° C	20
Cotton-seed oil.	An ordinary oil	80
	No. 5.	
Oleostearine.	Titre 50.6° C	20
Cotton-seed oil.	A very light bodied oil	80
	No. 6.	
Oleostearine.	Titre 46.2° C	20
Cotton-seed oil.	The same oil as in No. 1	80
	No. 7.	
Oleostearine.	Titre 46.2° C	20
Cotton-seed oil.	The same oil as in No. 2	80
	No. 8.	
Oleostearine.	Titre 46.2° C	20
Cotton-seed oil.	An ordinary oil	80
	No. 9.	
Oleostearine.	Titre 46.2° C	20
Cotton-seed oil.	An ordinary oil	80
	No. 10.	
Oleostearine.	Titre 46.2° C	20
Cotton-seed oil.	The same oil as in No. 5	80

The following are the percentages of solid fat which were obtained by Wainwright's method on these samples:

Samples.	Per cent.
No. 1	28.14
" 2	26.83
" 3	21.07
" 4	23.77
" 5	18.10
" 6	21.71
" 7	19.43
" 8	16.77
" 9	16.10
" 10	13.13

Cotton-seed oil, as every one is aware who has ever handled it to any great extent, varies in the relative amounts of its chief constituents.

For instance, a natural sample of cotton-seed oil may be of such character that it will remain a limpid liquid for any length of time at a temperature of 32° F.; another oil may deposit stearine at as high a temperature as 80° F., may be a viscous liquid at 65°, and a hard brittle fat at 32° F. Such oils, of course, are unusual and are extremes not often met, but they do occur and may come to the refiner and be used in the manufacture of his compound lard.

Again, oleostearine differs in its constitution, but here the differences are due to the process of its manufacture and not to the processes of nature as in the cotton-seed oil.

The temperature at which the oleo stock is pressed and the amount of pressure applied, which variations may be due to the state of the markets for oleo oil and oleostearine, or due to the carelessness of the workman, effect the composition, and therefore the hardness of oleostearine.

In the examples given above I have chosen purposely an unusually hard stearine and one of unusual softness; an extremely heavy bodied cotton-seed oil, a moderately heavy bodied cotton-seed oil, four ordinary cotton-seed oils, and one of unusual light body.

On running titre tests on the cakes obtained in the screw press it was found that they were within a fraction of a degree in each case of the titre of the oleo which had been used in the samples, thus showing that the pressure in the screw press had been sufficient to insure accurate results if the suppositions upon which the process was based were correct; namely, that from a

mixture of oleostearine and cotton-seed oil, which had been melted and cooled and allowed to stand at a moderate temperature for some hours, all of the oleostearine would crystallize out, and all of the oil remain a liquid.

The cakes were also tested qualitatively for cotton-seed oil and were found to contain it. The oil drained off from the pressing was also tested for beef fat and found to contain it.

It would seem from an examination of the above results that a cotton-seed oil which had a very heavy body, that is, which would easily deposit stearine at ordinary temperatures, when subjected to this process will add some of its stearine to the oleostearine crystallizing from the mixture and render the results too high ; that an ordinary cotton-seed oil gives up very little stearine to the cake but has a tendency to dissolve or keep in solution a portion of the beef fat, a greater portion the softer the beef fat; that a light bodied cotton-seed oil, having comparatively very little stearine in its composition and being capable of dissolving a greater amount than an ordinary oil, has a tendency to do so, and keeps more of the beef fat in solution and the more the softer the beef fat.

A very hard oleostearine has a tendency to make the cakes heavier, owing to the difficulty in pressing out the last portions of the oil.

A very soft oleostearine has a tendency to make the cakes lighter, for a portion of the liquid glycerides contained in it may be pressed out with the oil.

It is evident then, that this process of determining the relative amounts of the constituents of compound lard cannot be relied upon. It may, indeed, under ordinary conditions, give results which may very easily be within one and one-half units of the true percentage, but if the conditions be at all varied, and they are very likely to be varied, the results may be at least seven or eight per cent. too high or low.