

METHODS FOR THE DETECTION OF "PROCESS" OR "RENOVATED" BUTTER.

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"PROCESS" butter commonly called "renovated" butter is a product prepared about as follows: Unsalable dairy or creamery butter, bought at a low price in the spring and summer, is melted and the butter-fat drawn off. The curd originally present in the butter is rejected, thereby removing a large part of the rancidity if any be present. Milk is now added to this butter-fat and stirred in so as to be evenly mixed throughout, when the whole mass is cooled quickly, so as to prevent the separation of the "butter oil." This milk soon sours, the casein therein is coagulated, and thus there is provided an artificial curd which contains a percentage of nitrogen about the same as that of the curd of real dairy butter. The butter-fat of this renovated butter does not materially differ from ordinary butter-fat in any of its chemical properties.

It is evident, therefore, that for the detection of process butter, we must depend on the difference between the curd of genuine butter made from cream, and the artificial curd supplied in "process" butter by the addition of milk. There are proteids in milk which are insoluble in water, and therefore separate out and occur with the cream. The insolubility of these proteids was more fully brought out by S. W. Babcock in his work upon the proteids of cream (1888). These proteids, insoluble in water, pass into the butter and form the main part of the substance commonly known as the curd. It is a cohesive, gelatinous mass and notably non-granular. The curd of "process" butter, however, consists chiefly of coagulated casein. This is a flaky, granular, non-cohesive mass, and does not, therefore, resemble the proteids of cream in physical properties. The following method of analysis has proved satisfactory :

TEST FOR BUTTER-FAT.

The purified fat is examined with the butyro-refractometer. At 25° C., the reading seldom varies from 51° in the case of "process" butter, and hence does not differ from butter-fat in

this respect. This reading is taken to assure the operator that the fat at hand is butter-fat and not a substitute, as oleomargarine. A determination of the volatile fat acids will serve as well.

TESTS OF THE CURD.

After having proved that the fat is butter-fat, an examination of the curd is made. The first test that is made is one which depends on the cohesive properties of the curd of pure butter. If a portion of the butter sample, about 1 gram, is placed in a convenient container—a spoon answers the purpose admirably—and heated over a free flame, the mass will, in case the sample is pure butter, assume a foamy appearance, which is very striking. In case the sample is "process" butter, no foaming is produced, but the mass merely bumps and sputters like hot grease containing water. Oleomargarine behaves like "process" butter, but it has been excluded by previous tests.

APPEARANCE OF THE CURD.

A sample of the butter is melted in a beaker, the fat is decanted, and the curd is well washed with ether to remove the remnant of fat. The curd is poured out on a clean glass plate in a thin layer and allowed to dry. A sample of genuine butter is treated likewise. The physical appearance is then quite distinctive especially when a magnifier of 3 to 6 diameters is used for the examination. The curd from the true butter will have an amorphous, non-granular appearance, while the curd from "process" butter has a very coarse, curdy appearance. The one is the proteid of cream, the other is the proteid of milk; the one is a gelatinous, ropy mass, the other is a granular, easily divided substance. Casein dissolves readily in acid or alkali; the curd of genuine butter dissolves only on prolonged treatment with these reagents.

IDENTIFICATION OF THE SOURCE OF THE CURD.

A convenient sample of the butter, 25 to 100 grams, is placed in a beaker and melted at 45° to 50° C. (It is worthy of note that "process" butter will not yield a clear liquid fat at the end of half an hour or even twenty-four to forty-eight hours, while genuine dairy or creamery butter yields a clear supernatant liquid as soon as melted.) As much as possible of the fat is

decanted, and the remaining portions, composed of curd, water, salt, and the remnant of fat, are thrown upon a moistened filter and the water is allowed to drain through. This water carries the soluble proteids as well as salt. To this filtrate, a few drops of acetic acid are added and then the solution is brought to a boil. In case the filtrate is from the curd of pure butter, only a slight milkiness is produced (absence of albumins); but in case the filtrate is from the curd of "process" butter a flocculent, white precipitate of albumins is formed, a certain indication that the source of the curd is from milk. Other tests for the albumins may, of course, be used. If strong hydrochloric acid be added to the filtrate from the curd of "process" butter, a violet color is produced (Liebermann's test for albumin).

QUANTITATIVE EXAMINATION OF THE CURD.

If the artificial curd of "process" butter has been derived from milk, then the ratio of the percentage of casein to the percentage of albumins should be the same as that ratio is in milk, or about 9 parts of casein to 1 part of albumins. The ratio in the curd of "process" butter sold on the market, as actually found, was 8.6 parts of casein to 1 part of albumins. The method of estimation is as follows: 50 grams of the butter are placed in a beaker and dissolved in ether to a clear solution. In case the sample is genuine butter, the curd is so finely divided that it remains in suspension in the ether and considerable time may be required for a clear solution. As much as possible of the ether solution of fat is decanted and the whole of the remainder transferred to a separatory funnel. The casein and water with the salt are then removed and the washing with ether repeated three or more times to remove all the fat from the curd. The casein is then filtered out, washed with water, and the nitrogen estimated by the Kjeldahl method. The filtrate from the curd is made slightly acid with acetic acid and then brought to a boil. The albumins are filtered out and estimated by the same method.

These tests serve to differentiate between genuine butter and "process" butter, as it is now found on the market.