METHOD OF SEPARATION OF COLORING MATTERS IN BUTTER, IMITATION BUTTER AND SO-CALLED BUTTER COLORS.

By Albert R. Leeds.

In the case of butter and imitation butter, which contain minute quantities of coloring matters, 100 grammes of the sample are dissolved in 300 cubic centimeters of petroleum ether. The specific gravity of this ether, which I have myself used, has been 0.638. It evaporates completely, leaving no residue or trace of color behind. A graduated cylinder or "test-mixer" can be advantageously used in making the solution. The ethereal solution of the fats and coloring matters is separated from the water and salts by means of a separating funnel. It is washed with 100 cc. of water in successive portions, and these wash waters are drawn off by the separating funnel. The ethereal solutions of the fat are allowed to stand in Winter in the cold, or surrounded by ice-cold water for fifteen to twenty hours, when a large quantity of stearin crystallizes out. In some cases the stearin thus separated amounted to twenty per cent. of the total weight.

The clear yellow ethereal solution, after being decanted from the separated stearin, is shaken up in the test mixer with fifty cubic centimeters of a decinormal solution of potash. This is usually sufficient to dissolve out all the coloring matters which are capable of being dissolved by dilute alkali.

After the aqueous solution of the coloring matters has been drawn off from the ethereal solution of the fats, this aqueous solution is very carefully acidified with dilute hydrochloric acid until just acid to test paper. The coloring matter (accompanied by a small amount of fatty acid, which unfortunately is always formed by the saponification of the fats and subsequent setting free by the acid), then separates out. It is filtered through a tared filter and washed with cold water.

In one experiment, in which only fifty grammes of oleomargarine were thus treated, the coloring matter and some fatty acid accompanying it, weighed 0.145 gramme.

It is important to note that in all cases which I have encountered, the ethereal solution of the fats had a pale yellow color.

This slight yellow color was left after the first separation of the ethereal solution of the fats from the aqueous solution of the coloring matters in dilute alkali. It was not removed or lessened by any subsequent treatment with potash solution, however oft repeated. This residual pale yellow color is due to the fats and oils themselves, and it is not due to any added coloring matters. This remark is true of butter, imitation butter and "oleo oil." It is the slight yellow color natural to the fat itself. It may be entirely removed without the use of chemical agents, and without any change whatsoever in the fat itself, except the abstraction of that very minute portion which carries with it the yellow color.

BUTTER COLORS.

Three samples of butter color were similarly treated, using, of course, smaller quantities of the samples. About five grammes were dissolved in 20–25 cc. petroleum ether, and 10 cc. of a 4 per cent. solution of potash were used for separation. The aqueous solution in alkali was then just acidified with dilute hydrochloric acid, and the coloring matter filtered and washed on a tared filter. It was then left behind in a resinous condition.

Wells, Richardson & Co.'s butter color has an oily smell, and so has Fargo's. Hansel's has a smell of treacle. The first yielded a residue of 0.048 grammes coloring matter from 5 cc. of the sample. The reactions given by the color were those of annatto (see appended table). The solvent gave the tests for cotton seed oil.

Hansen's contained 2.66 per cent. of annatto, dissolved in cotton seed oil, with some admixture imparting the odor of treacle. Tests made upon it with the view of detecting some saccharine body, yielded no satisfactory result.

Fargo's contained 3.10 per cent. of annatto, dissolved in cotton seed oil.

[*Concluded from p. 77.*]

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REACTIONS OF COLORING MATTERS.

Coloring Matter.	Concentrated H_2SO_4	Concentrated HNO_3	H_2SO_4 + HNO_3	Concentrated HCl
Annatto.	Indigo Blue, changing to Violet.	Blue, becoming colorless on standing.	Same.	No change, or only slight Dirty-yellow and Brown.
Annatto +decolorized butter.	Blue, becoming Green, and slowly changing to Violet.	Blue, through Green and Bleached.	Decolorized.	No change, or only slight Dirty-yellow.
Turmeric.	Pure Violet.	Violet.	Violet.	Violet, changing to original color on evaporation of HCl.
Turmeric+ decolorized butter.	Violet to Purple.	Violet to Reddish-violet.	Same.	Very fine Violet.
Saffron.	Violet to Cobalt-blue, changing to Reddish-brown.	Light-blue, changing to light Reddish-brown.	Same.	*Yellow, changing* to Dirty-yellow.
Saffron+ decolorized butter.	Dark blue changing quickly to Reddish-brown.	Blue, through Green to Brown.	Blue, quickly changing to Purple.	Yellow, becoming Dirty-yellow.
Carrot.	Umber-brown.	Decolorized.	Do. with NO_2 fumes and odor of burnt sugar.	No change.
Carrot+ decolorized butter.	Reddish brown to Purple, similar to Turmeric.	Yellow and decolorized.	Same.	Slightly Brown.
Marigold.	Dark Olive-green, permanent.	Blue, changing instantly to Dirty-yellow Green.	Green.	Green to Yellowish-green.
Safflower.	Light brown.	Partially decolorized.	Decolorized.	No change.
Aniline Yellow.	Yellow.	Yellow.	Yellow.	Yellow.
Martius Yellow.	Pale-yellow.	Yellow, Reddish precipitate, Magenta at margin.	Yellow.	Yellow precipitate, treated with NH_3 and ignited, deflagrates.
Victoria Yellow.	Partially decolorized.	Same.	Same.	Same, color returns on neutralizing with NH_3.
All were solutions in Alcohol.	Solutions and Reagents were used in equal proportions, two to three drops of each. Ammonia gave with Turmeric Reddish-brown, returning to original color on driving off NH_3.			