Havens. These latter writers also describe a separation of aluminum from glucinum by the same method.[1]

The use of absolute ether may militate somewhat against the practical application of this method to general analytical purposes; since in the case of most of the metals experimented upon, very good separations are already known which do not require the use of a reagent both difficult and unpleasant to manipulate. This method, however, is especially recommended for the separation of iron from zirconium, the separations of the other metals being only tried as a matter of interest through the analogy existing between those metals and zirconium. A point, however, which may prove of practical importance, and which it is most desirable to emphasize here, is that by carefully following out the procedure herein described, zirconium oxychloride and dioxide may be easily and quickly prepared perfectly free from iron. This fact may be of considerable importance and utility in the preparation of zirconium compounds for use in atomic weight determinations, where a high degree of purity is absolutely necessary in order to obtain authentic results.

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[CONTRIBUTION FROM THE LABORATORY OF THE NORTH DAKOTA AGRICULTURAL COLLEGE, NO. 1.]

THE PROTEIDS OF CREAM.

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IN some preliminary work in the chemistry of ripening cream for butter-making, several methods for the separation of proteids were tried, some of which were not suited to this work, and the results may be of interest, if not of value, to other workers in the same line. In the work here presented it was not our purpose to determine each of the individual proteids that cream might contain, but rather to learn something of the changes that take place in the proteids of cream during the process of ripening.

For our purpose the proteids of milk were divided into four groups, casein, albumen, albumoses, and peptones; that is, the

[1] *Am. J. Sci.*, August, *1897*.

methods employed brought down whatever of proteids were present in one of these four groups, and no attempt was made to determine the globulins, etc. The methods employed for the separation of these groups were as follows:

Casein.—About ten grams of cream were diluted with eighty cc. of water and three cc. of a saturated alum solution added, the whole well stirred and then allowed to stand for ten minutes, then filtered and washed with hot water and the nitrogen determined in the residue by means of the Kjeldahl method.

Acetic acid was first employed as the precipitant for casein. This worked well on fresh cream, but on the ripened and sour cream no concordant results could be depended on and the filtration was very difficult.

Albumen.—The filtrate from the casein was then heated to boiling, allowed to stand for a few minutes, then filtered and washed with hot water and the nitrogen determined as in casein. Other methods were tried, such as tannin solution, sodium chloride, and tannic acid, but these methods were not found suited for the separation of albumen in the presence of proteoses, although in other lines of work they gave fairly good results.

Albumoses.—The filtrate from the last was evaporated to a small bulk, say fifty to sixty cc., and the solution then saturated with zinc sulphate. After standing for ten to twelve hours it was filtered, the precipitate well washed, and the nitrogen determined as before.

For separating albumoses, ammonium sulphate was first employed, but with a product like milk or cream, we found it impossible to make quantitative separations by means of this reagent, as it was impossible to get rid of all traces of salt without losing a considerable per cent. of the albumoses themselves. The method proved valuable, however, for separating quantities for dialyses to be purified and used in proximate analyses, or for further separating into the several albumoses.

Peptones.—The filtrate from the above was then evaporated to a small bulk, removing thereby a portion of the zinc salt and absolute alcohol to eighty per cent. of the volume added. After standing twelve hours, filtering and washing with alcohol, the nitrogen was determined.

Further experiments are necessary to determine whether the filtrate may be safely concentrated for the peptones without any loss of proteids. The loss in this case could have been but little, if any, but some work with urines indicated that a loss might result. This point will be further tested. The total nitrogen having been previously determined in the cream, we have a check on our work, and in our studies the sum of the nitrogen in the several precipitates have agreed very closely with the total nitrogen in the cream. Having found methods that would give fairly close results on known products, we next proceeded to determine the changes in the proteids of cream during the process of ripening.

A large number of determinations were made, always with about the same general results, therefore two cases will suffice for this study. No. 1 is for a fresh cream but four hours from time of drawing the milk from the cow's udder. The cream was separated by means of the centrifugal separator.

No. 2 is for a sample of cream well ripened, quite sour and ready for churning. The per cent. of nitrogen is given in each case.

	No. 1. Fresh. Per cent.	No. 2. Ripened. Per cent.
Nitrogen in casein	0.237	0.249
" " albumen	0.035	0.027
" " albumoses	0.031	0.033
" " peptones	0.023	0.032
Total nitrogen	0.326	0.341
Total nitrogen in cream	0.335	0.344
Loss	0.009	0.003

From the above it will be seen that the loss in working by these methods was not great, and further that there is not a very marked change in the proteids of cream during the process of ripening. Further studies may show that the product precipitated as casein in case of the ripened cream differs somewhat from that precipitated from the fresh cream. Such seemed to be the case, but the purified product from fresh and ripened cream has not been fully studied. Further results, together with other studies in milk and cream, will be given later in the form of a station publication.

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