ON THE ANALYSIS OF BUTTER FAT.

BY FRANK P. PERKINS, *Public Analyst for Exeter.*

HITHERTO the determination of the volatile as well as the non-volatile acids, contained in butter, has generally been accomplished in the gravimetric way. Satisfactory, however, as the processes which have been devised in this direction may be, there is little doubt that they are somewhat tedious to perform; and although where the greatest accuracy is required, analysis by weight must always rank the highest, yet a fairly accurate volumetric method, easily and rapidly executed, must be a desideratum. A few steps towards this end have already been made. In the first volume of THE ANALYST there is a paper by Dr. Dupré devoted principally to the volumetric estimation of the *volatile acids* in butter, and in a paper lately published in the same journal by Dr. Koettstorfer, the author proposes to determine the *non-volatile acids* volumetrically. About a year ago, I showed how the amount of volatile acids may be approximately ascertained by taking the acid filtrate derived from the insoluble acids, titrating a portion of it with K Ho to determine total acidity, evaporating another known portion to small bulk, titrating again, and then converting the difference between the two experiments to butyric acid. I have now made a further advance. On referring to Messrs. Angell and Hehner's treatise on "Butter," it will be found that the endeavour to obtain the amount of volatile acids by saponifying the fat and then distilling with sulphuric acid, was futile, the distillation was difficult to manage, and the results unsatisfactory; but I find that, by liberating the fatty acids with oxalic acid this difficulty is overcome, and I believe that the method now proposed will be found simple, workable, and fairly accurate. It is as follows. Weigh out 1 to 2 grammes of purified butter fat, saponify in a beaker in the usual way, drive off the alcohol, cool, set free the acids by adding a cold saturated solution of oxalic acid in very slight excess, pass through a small filter, previously moistened with water, wash the insoluble acids thoroughly, first by decantation with cold, and lastly with hot water on the filter, make up the filtrate to, say, 200 c.c., transfer 100 c.c. to a small retort connected with a condenser and distil slowly until the *whole* has passed over, add a few drops of litmus solution, titrate with deci-normal K Ho, calculate the amount consumed by the volatile

acids in 100 grammes of fat, and translate to butyric acid $\left\{ \begin{array}{l} \text{C}_3\text{H}_7 \\ \text{C O Ho.} \end{array} \right.$ The insoluble acids on the filter are treated with hot alcohol, the fluid holding the acids in solution being received in a flask. The filter is washed with alcohol until it no longer reddens litmus, and the filtrate is made up to 100 c.c. with alcohol. Half of this is taken, coloured with a suitable indicator, and heated gently; deci-normal K Ho is run in and the number of cubic centimetres required for neutralization noted, the second portion is similarly treated. The first experiment serves as a guide to colour, &c.; the number of cubic centimetres used is ascertained, and the amount required by the non-volatile acids in 100 grammes of fat calculated. For the purpose of comparison with fats used as adulterants, it may, perhaps, be convenient to convert this to stearic acid $\left\{ \begin{array}{l} \text{C}_{17}\text{H}_{35} \\ \text{C O Ho.} \end{array} \right.$

Experiment 1.—1.351 grammes of purified fat from good farm butter was taken. The solution containing the volatile acids was made up to 300 c.c. The distillate from 100 c.c. required 3.5 c.c. K Ho. This on 100 grammes of fat gave 4.31 K Ho or 6.7 butyric acid.

Experiment 2.—The alcoholic solution containing the non-volatile acids of the above was made up to 100 c.c. 43.8 c.c. of K Ho were required. This on 100 grammes of fat gave 18.14 K Ho or 92.0 stearic acid.

Experiment 3.—1.19 grammes of fat from another sample of the same class was taken. The solution containing the volatile acids measured 170 c.c. The distillate from 100 c.c. required 5.6 c.c. K Ho. This calculated on 100 grammes of fat gave 4.42 K Ho or 6.8 butyric acid.

Experiment 4.—The alcoholic solution containing the non-volatile acids of the above required 38.5 c.c. K Ho. This on 100 grammes of fat gave 18. K Ho or 91.7 stearic acid.

These results agree closely with those obtained by Dr. Koettstorfer. Thus—

	Per cent. of K Ho.
Experiment 1.—Volatile acids	4.31
Experiment 2.—Non-volatile	18.14
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Experiment 3.—Volatile acids	4.42
Experiment 4.—Non-volatile	18.0
	<hr/> 22.42