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SOME TIME AND LABOR SAVING TECHNIQUES IN VITAMIN A AND OIL ANALYSES

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In the course of an extensive study of the factors affecting the potency of the dogfish liver oils, made in collaboration with the Washington State Fisheries, there were developed a number of time and labor saving techniques such as are discussed by Bjorksten<sup>1/</sup>. These may prove of interest to other laboratories in the oil and vitamin fields.

Use of Malted Milk Mixer--Liver homogenization has been made easy by means of a blender. However, with these machines it is difficult to handle livers weighing less than one ounce,

because the blades of the blender do not engage the liver. In this case, a malted milk mixer becomes valuable. Even small fetal livers can be homogenized by its use. Another advantage is that small liver samples can be disintegrated while in their original containers. If insufficient cutting is obtained with the agitators furnished with the mixer, they can be replaced by cutters of almost any size and shape made from hacksaw blades sharpened on one edge. (Figure 1)

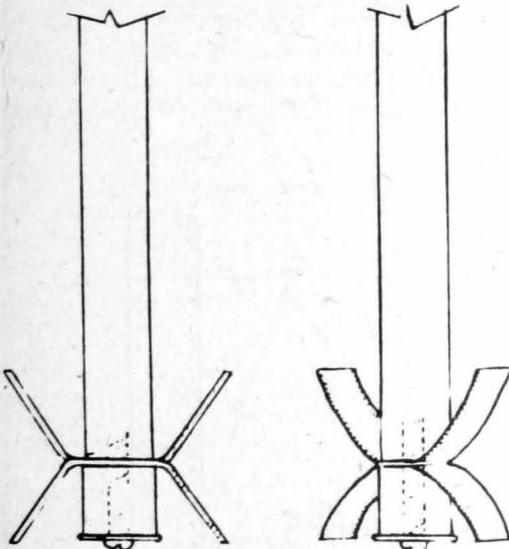


Figure 1--Mixer Blades

Weighing Wires--The advantage of weighing wires in handling the small quantities of oil usually employed in Vitamin A analyses has been known for some time. In this method the coiled end of a tared wire is dipped into the oil being



Figure 2  
Weighing Wire

sampled. As it is being withdrawn, the coil is touched against the side of the container to remove the excess of oil. The weighing operation can be further simplified and made more rapid if all of the weighing wires are adjusted to exactly the same weight, which, preferably, should be an integral number of decigrams. For example, this laboratory uses

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<sup>1/</sup> Bjorksten, J., "Time and Motion Studies for Chemists," Chem. and Eng. News, 21, 1324 (1943)

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several dozen wires which are tared to exactly 0.3000 grams and to which will adhere approximately 0.04 grams of oil. The wire used for this purpose is No. 26 chromel, approximately 11 inches long, formed at one end into approximately 30 coils, 1/8 inch in diameter. The other end has a single large loop by which the wire can be hung from a balance arm (Figure 2). Obviously, it is unnecessary to keep a record of the tare of the particular wire being used, and if a chain or other semi-automatic type balance is employed, the weight of the oil sample can be read directly from the dial or sliding scale. It is a simple procedure to adjust the wire to a given weight by using wire snips for rough adjustment and an emery wheel for fine adjustment. No change in the weight of wires used at this laboratory has been noted over a period of several months.

Paired Automatic Pipettes--The use of an automatic pipette is a substantial aid in pipetting volatile liquids such as ethyl ether. However, the rubber bulb customarily used to draw the liquid into the pipette is troublesome to manipulate. This can be overcome by using the suction afforded by a water aspirator. If two pipettes are used concurrently (Figure 3), one can be filling while the other is discharging; thus, the net time involved in the operation can be decreased by nearly one-half.

4 mm. Glass Thief--Whenever it is necessary to use a quantity of oil larger than can be obtained conveniently on a weighing wire, medicine droppers are frequently employed. These, however, are somewhat difficult to clean and to manipulate. The medicine dropper can be replaced advantageously by pieces of glass tubing of about 4 mm. outside diameter--and of any desired length (Figure 4). Usually, there is sufficient oil in the sample container to fill these to the required depth by means of gravity; otherwise the tubes may be filled in the same manner as any pipette.

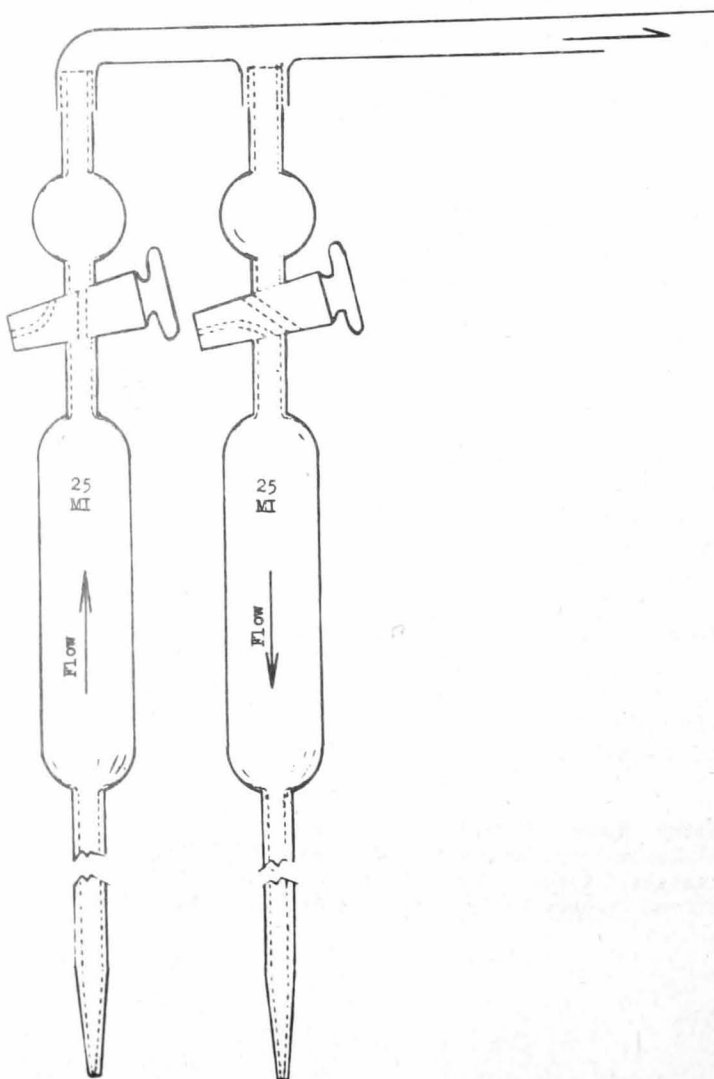


Figure 3  
Paired Automatic Pipettes



Figure 4  
4 mm. Glass Thief



Figure 5  
1 cm. Glass Thief

1 cm. Glass Thief--After liver material has been disintegrated and homogenized in a blender, a sample can be obtained easily if a glass thief 1 cm. in outside diameter and about 12 inches in length is used. If slightly constricted at the lower end, the thief will retain even the most oily material (Figure 5). The weight of the sample can be roughly estimated if calibration lines are etched on the side of the tube.

Tared Containers--In series of analyses in which a large number of tared containers are being used, time can be saved if the containers are numbered and tared in the order of consecutive weight. (Figures 6 and 7). Thus, in weighing these containers, only a minimum number of weights need be changed between any two weighings.

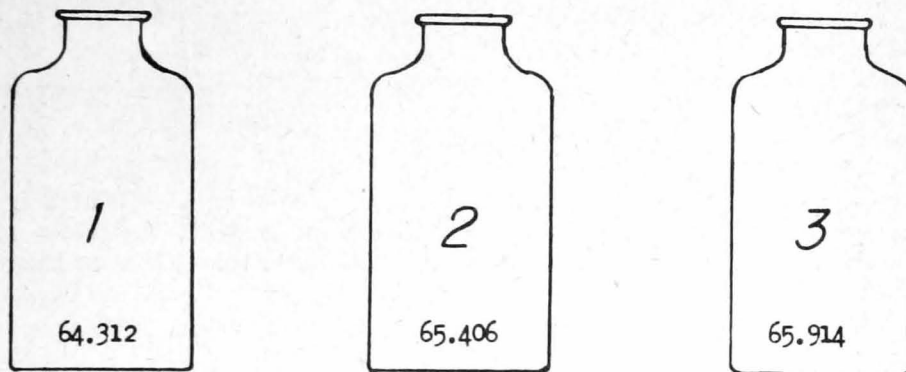


Figure 6--Shaking Bottles

Numbering of Containers--The identification of a sample at any stage of an analysis is simplified and the possibility of error is decreased by the use of sets of exactly 100 or 200, etc., if more than 100 analyses are made at one time) containers of each kind required in the course of the procedure. The containers of each kind should be numbered from 1 to 100 (or 200) consecutively, so that the various containers used to handle a single

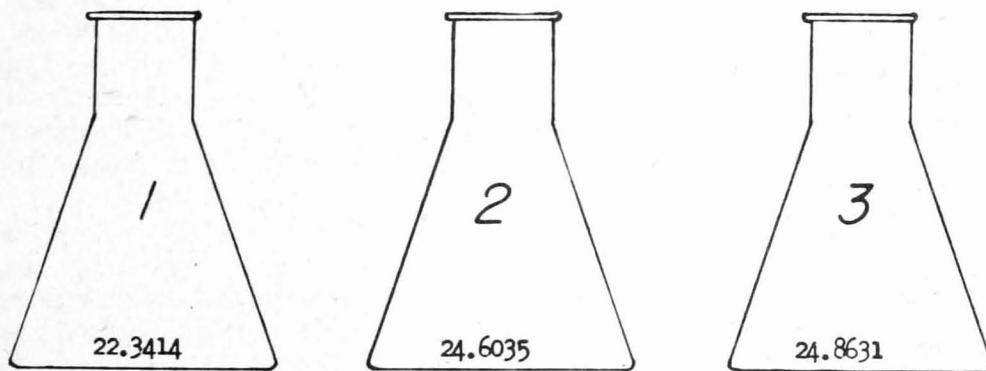


Figure 7--50 ml. Flasks

sample can all have the same number--which should correspond with the sample number itself. For example, a liver sample assigned the laboratory sample number 47, would be handled in jar number 47; after homogenization, it would be extracted in shaker bottle number 47; the oil solution would be evaporated in flask or beaker number 47; and so forth. Similarly, sample 823 would be handled in containers which are all numbered 23. Sample 899 would be placed in containers numbered 99; sample 900 in containers numbered 100; and 901 in 1; 902 in 2; etc.

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