References and Notes

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4. We are indebted to the following organizations for preparing and supplying chemical samples and for technical advice in the development of these materials for our specific use: The Dow Chemical Company; Progressive Color and Chemical Company; Diamond Alkali Company; Niagara Chemical Division, Food Machinery and Chemical Corporation; Monsanto Chemical Company; Michigan Chemical Company; chemistry department, Bucknell University; and chemistry department, University of Michigan.
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Convenient pH Stat Reaction Vessel for Small Volumes

In a series of studies in our laboratory with the *p*H stat of Jacobsen and Léonis (*1*), it became clear that the conventional beaker type of reaction vessel had several disadvantages, the main one being an irreducible minimum solution volume of about 5 to 6 ml, which is an important limiting factor in studies with precious proteins and peptides. The diameter of the beaker and, hence, its volume could not be reduced because of the large number of accessories dipping into it—the glass and calomel electrodes, external stirrer, nitrogen inlet, and others. We have overcome this problem by using a rotating test tube as the reaction vessel with a stationary, concentric glass and calomel electrode assembly (Radiometer No. GK2021). Excellent stirring, with a complete absence of foaming in protein solution, is achieved by the shearing forces between the test tube and the stationary electrode assembly, and volumes may be reduced to 1.0 ml.

As may be seen in Fig. 1, the glass test tube is housed in a Plexiglass rotor fitted with turbine blades. Both rotation of the turbine and temperature control are achieved by a small centrifugal pump which circulates water, from a thermostatically controlled bath, through a jet impinging on the turbine blades. The electrode assembly is raised and lowered by means of a rack and pinion (fitted with a stop to safeguard the electrode bulb). Only a single polyethylene capillary for delivery of acid or base dips into the reaction chamber, thus, we have a relatively unencumbered apparatus. In our work, the use of nitrogen has not been necessary because of the very small surface area of the solution, but in more critical work a polyethylene capillary for the delivery of nitrogen could easily be attached to the electrode assembly.

In summary, the following advantages have been found in the use of this reaction vessel: (i) By using a single size of test tube, volumes of 1 to 5 ml are easily accommodated, and with a larger size of tube, volumes can go to 10 ml. (ii) Stirring is rapid, smooth, and steady in rate for long periods of time, the rate being adjustable by restricting the flow through the jet. (iii) Precise temperature control is achieved. (iv) The glass test tubes are easily changed, giving convenience during a series of titrations and constantly clean glassware without the need for dismantling the apparatus.

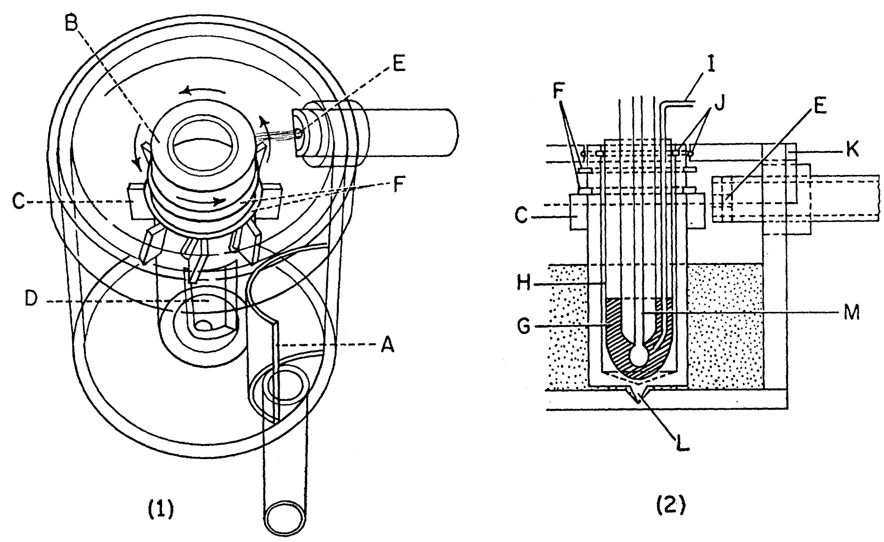

Fig. 1. Apparatus. *A*, Water outlet (designed to act both as a baffle plate and a constant-level device); *B*, rotor (Plexiglass); *C*, turbine blade; *D*, opening in rotor to facilitate rapid temperature equilibration; *E*, jet; *F*, baffle plates to prevent splashing; *G*, reaction mixture; *H*, test tube (glass); *I*, polyethylene capillary for delivery of acid and base from syringe; *J*, Teflon O-rings (the outer ring is a bearing and the inner one is an adaptor for use with various sizes of test tube); *K*, detachable lid; *L*, pivot (the pivot and its bearing should be constructed of stainless steel if extended periods of use are anticipated); *M*, radiometer electrode No. GK2021.

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Correlation of Potassium-40 Concentration and Fat-Free Lean Content of Hams

A rapid, objective, and nondestructive method for determining the amount of lean meat present in live animals, carcasses, and cuts of meat should prove to be of considerable value in improving the pricing efficiency involved in the marketing of livestock and meat. Objective evaluation of the amount of lean present would make it possible to set a price that would better reflect the desirability of the product from the consumer's standpoint. In addition, such a technique should help to speed the development of better grade animals for butchering, since accurate nondestructive measurements of the lean content of live animals would aid in the selection of breeding stock.

The research of Woodward *et al.* (*1*) demonstrated that the potassium content of human beings, as determined by measurement of potassium-40 (K^{40}) gamma activity by means of the Los Alamos "human counter" (*2*), was related to the body water content and, therefore, to the lean body weight of the subjects. In view of these findings, it was considered desirable to evaluate the usefulness of the K^{40} concentration as an index of the amount of lean in meat products. Since Federal pork carcass grades (*3*) are based to a considerable extent upon the degree of fatness and the proportion of lean cuts, it was decided to use hams in the study described in this report.

Fresh hams were obtained from the Animal and Poultry Husbandry Research Division of the U.S. Department of Agriculture's Agricultural Research Center at Beltsville, Maryland. One pair of hams (group A) was selected on the basis of their rather fat appearance, while the other pair (group B) appeared to contain considerably less fat. The visible portion of external fat of the hams of group A ranged from 1.2 to 1.8 in. in thickness, while the corresponding range for group B was 0.9 to 1.0 in. The hams were frozen and transported to the Los Alamos Scientific Laboratory, where the following K^{40} measurements were made