acid were carried out with a vacuum technique. The failure of previous workers to observe any significant amount of reduction of ascorbic acid by glutathione is to be ascribed to their having worked at too low a pH level and without a sufficient excess of glutathione over ascorbic acid.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

A SIMPLE COMBINATION OF CONTINUOUS EXTRACTOR AND EXTRACT-WASHER

IN organic and biochemical laboratories the extraction of liquids with lighter organic solvents and the subsequent washing of the extract with aqueous solutions are very common operations. Yet, continuous extractors for this purpose are used comparatively rarely, although several are on the market. We suspect the reason for this is the expense and complexity of the apparatus available at present. Automatic extract-washers are almost never used.

We have devised a simple automatic extractor-washer combination which can be made from the usual laboratory glassware with the ordinary glass-blowing equipment. All materials are of Pyrex glass and include a 500 cc Kjeldahl flask, a large test-tube (about 400 × 50 mm), a 250 cc Erlenmeyer flask and glass tubing. The assembled apparatus is illustrated in Fig. 1. *A* is the extraction flask—any size Kjeldahl flask may be used to which the side arm is sealed as indicated. This is filled to the neck with the solution which is to be extracted. *B* is the extract-washer, made from a large test-tube by sealing on the side arm. This tube is filled with the solution to be used for washing the organic solvent. *C* is the Erlenmeyer flask and contains the lighter solvent. *D* is a tin can lined with asbestos paper and contains a 75-watt bulb.

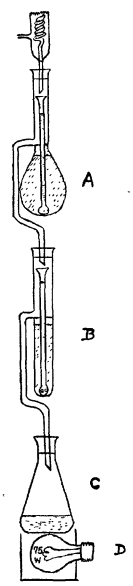

FIG. 1.

The small holes at the lower ends of the inner tubes which provide a fine spray of the solvent may be made readily from a strand of wire taken from a chromel wire gauze (A. H. Thomas Co.: Catalog No. 9993), which is sharpened to a fine point and held in a pliers or sealed into a glass rod. The glass bulb and pointed wire are heated with a fine pin-point blow-torch flame and, with a little practice, fine holes are easily punched. The upper ends of the inner tubes are flanged out with a carbon from an arc lamp.

The solvent head in the inner tube necessary to overcome the hydrostatic pressure of the aqueous solution may be calculated from the specific gravities of the respective liquids and the height of the aqueous solution.

We have used this apparatus for the extraction of oestrin from pregnancy urine with ether. However, any immiscible solvent may be used which is lighter than the liquid to be extracted. We have also used benzene, in which case the 75-watt bulb is replaced with an electric hot plate.

The great advantage of this apparatus is that it prevents completely the formation of emulsions which, a glance at the oestrin literature will show, are so common when urine is shaken with ether in a separatory funnel. The washer, as we use it, is filled with sodium carbonate solution and automatically removes acidic constituents from the ether extract. It is obvious that any type of washing solution and any number of washers may be inserted.

The apparatus is efficient, giving a very thorough extraction of oestrin from a 24-hour human pregnancy urine when allowed to run over night.

The apparatus can be made even more convenient, if it is desirable to use it very often, by replacing the cork connections with ground-glass joints.

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