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A SIMPLE LABORATORY APPARATUS FOR THE CONTINUOUS EVAPORATION OF LARGE VOLUMES OF LIQUID *IN VACUO*.

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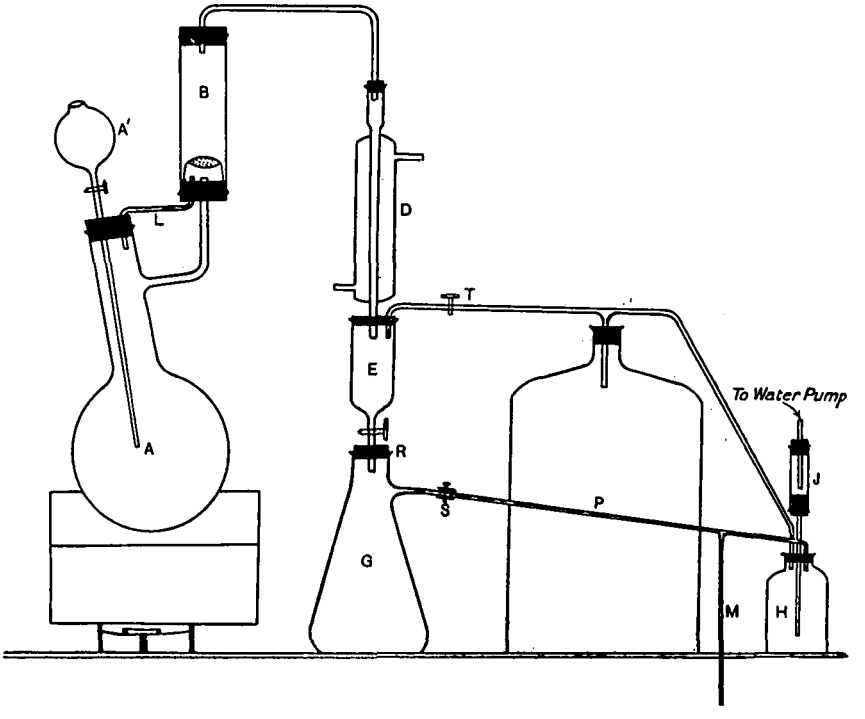
It is frequently necessary, especially in dealing with plant and animal extracts, to concentrate large volumes of liquid *in vacuo*. In such cases, the operation is often a very tedious one, owing to the necessity of closely watching the apparatus so as to control frothing and avoid the passing over of the liquid into the distillate. Having experienced this, more particularly in the distillation of alcoholic plant extracts, which show a great tendency to froth, the simple apparatus shown in the sketch has been devised which completely overcomes all the difficulties encountered in such work. By means of it large volumes of liquid can be evaporated continuously and the distillate recovered, if necessary in fractions; the apparatus requires practically no watching after the distillation has once been started, and the latter can be left to itself whilst other work is proceeded with. It is only necessary from time to time to renew the liquid in the distilling flask A, by means of the dropping funnel A'.

The apparatus consists of an ordinary distilling flask with the side-tube bent up and passing into a wide piece of glass tube B which serves as a froth-trap; the latter is connected by glass tubing with the condenser D, the lower end of which passes through a rubber stopper into the cylindrical dropping funnel E, which in turn is connected, as shown, below with the pump-flask G, and above with the large reservoir P, which serves to take up small variations of pressure and thus ensure a steady vacuum throughout the system.

In this way regular ebullition, without overheating or frothing, is secured.



The vacuum is maintained by means of an ordinary water injector-pump, connected through a Hutchinson regulating valve J (*Chemical News*, 1912, 99) with the bottle H and thence with E and G; a glass cock is interposed at T, whilst S is a screw-clamp which operates on the piece of rubber pressure-tubing connecting G and H. At M a manometer tube is inserted which shows the vacuum throughout the system. The Hutchinson valve takes up large variations in the vacuum due to changes of water pressure, so that by means of this, combined with the regulating reservoir P, changes in the vacuum are reduced to a minimum.

When the liquid in A first begins to boil there is often a great tendency to froth; should this occur, the froth rises into the trap B, breaks against a disc of copper-gauze, and the liquid is returned automatically to the flask through the piece of glass tube L.

The combination E and G allows of the distillate being removed from time to time; whilst the distillation is proceeding, the vacuum

in G is maintained the same as in the rest of the system, so that by opening the glass tap of E the distillate runs down into G. When G is full, and it is required to empty it, the cock on E is closed, and the screw-clamp S screwed down on to the rubber pressure-tube. The latter is then detached from the side tube of G, and the flask G removed from the rubber stopper R, emptied and replaced without interfering with the vacuum throughout the rest of the system. After it has been replaced, S is opened and in a very short time the vacuum is re-established in G, the same as throughout the rest of the apparatus.

It is a very simple matter by introducing T-pieces to run two or more of these distillation apparatus in conjunction with a single vacuum pump and a single regulating vessel P. We have had such an arrangement in continual use now for over a year and it answers all requirements.

All connections must of course be made with rubber stoppers or rubber pressure-tubing.