XXXI. A SIMPLE APPARATUS FOR FILTRATION UNDER DIMINISHED PRESSURE.

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The separation of small quantities of crystalline matter from syrupy solutions, and, conversely, the recovery of residual syrups from semi-crystalline products, are common experimental difficulties. For work of this nature, the filtering tube shown below may be substituted with advantage for the ordinary filtering flask which, particularly when small quantities of material have to be manipulated, is inconvenient and involves undue experimental loss.

As the apparatus has not only served its original purpose well but has also found general application in filtrations under diminished pressure and in analytical work involving the Gooch crucible, a short note on its use may not be out of place, although it presents no very novel features.

The apparatus consists of a cylindrical tube furnished with a delivery stop-cock *C* at the lower end, the upper part being expanded into the bulb *A*. The side-limb carries a three-way stop-cock *D* and permits of connection to the pump. The filter funnel (or Gooch crucible) is attached as shown to the filter tube, which is supported by a clamp about *B*. When in use, *C* is closed and *D* opened to the pump and, on completing the filtration or when the tube is filled, the filtrate can be run off by admitting air to the apparatus by means of *D* and thereafter opening *C*.

Many advantages may be claimed for the arrangement. Syrupy liquids can be drained from the delivery tap without much loss and, as the apparatus can be enclosed in a hot-air bath, the filtration of viscous or saturated solutions is greatly facilitated. It is unnecessary while emptying the tube to remove the funnel or to detach the connection with the pump, which is kept running continuously. The objectionable practice (inevitable when a conical filtering flask is used) of pouring pure liquids out of the neck, into which the cork carrying the funnel is afterwards inserted, is avoided. When used in analytical work in conjunction with a Gooch crucible, the removal of washings for testing purposes is very conveniently done.

Practice with the apparatus reveals other and less obvious advantages, such as the facility with which the economical washing of a filtered residue by alternate slow filtration at ordinary pressure and rapid draining in a vacuum may be carried out, and also the ease with which the last traces of syrupy filtrates may be washed from the tube. This is best done by partially closing *D* to the pump and opening *C*. Air then enters by the delivery tap and bubbles rapidly through the solvent, thereby effecting thorough mixing and solution of the adhering syrup. A double purpose is served by the expansion *A*, as, in addition to adding to the capacity of the tube, it prevents liquids which boil under diminished pressure from rushing over into the side-limb, the bubbles being broken on rising to the bulb.

The diagram is drawn to scale ($\frac{1}{4}$ natural size) and gives the measurements which have been found most suitable for analytical work, or for filtrations of average scale. With the dimensions figured, 150 cc. of filtrate can be collected without emptying the tube, while the maximum and minimum sizes used allow of filtration of 300 cc. and 20 cc. respectively in each operation.