XIV.—*The Routine Preparation of Conductivity Water. Part II.*

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NEARLY five years' experience in the preparation of large quantities of conductivity water has shown the desirability of certain modifications in the still previously described (J., 1927, 2156). After about two years' work, minute cracks developed where the narrowed portion of tube (*d* in Fig. 1 of that paper) joined the main condensing column, and, later, this column became constricted where it is held by a retort clamp just above the lower jacket.

A modified design (Figs. 1 and 2 of present paper) has now been adopted. The tin condensing column C is placed vertically above the tinned-copper steam-trap to which it is connected by a copper tube A, tinned inside and flanged at each end. The top copper flange D is tin-soldered to the lower flanged end of this condensing column, the weight of which is carried on the steam trap B, Fig. 2. The joints of this, shown at S in Fig. 2, are silver-soldered. The trap itself is carried on vertical steel rods arranged as in the earlier still; the only clamp required is one to steady the top of the condensing column.

The condensed water collects in a circular trough T, formed between a short length of tin tube and the inner wall of the condensing column; from this it flows along a short horizontal water-jacketed tin tube H, where it meets a stream of purified air from the tube K; thence it passes through a glass condenser, the outlet of which is formed into a horizontal T-piece, the lower tube of which is connected to the conductivity measuring cell. The arrangement permits a thermometer to be placed vertically in the water in the conductivity cell itself; this is desirable, for the temperature varies between about 17° and 25°, with appreciable effect on the conductivity.

In the main condensing column there is a piece of pure sheet-tin bent so as to break up the main column of steam rising straight up from the trap, and ensure its thorough mixture with the stream of purified air from tube H. This tin was introduced when the still had only been run for a few days, the conductivity of the water being then about $0{\cdot}15 \times 10^{-6}$ mho. Shortly afterwards a steady decrease in conductivity occurred, which may, however, have been the usual improvement due to the gradual washing out of impurities from a newly erected still.

All soldered joints in the condensing column are made with pure tin. Before finally fixing the condensing column in position it

FIG. 1.

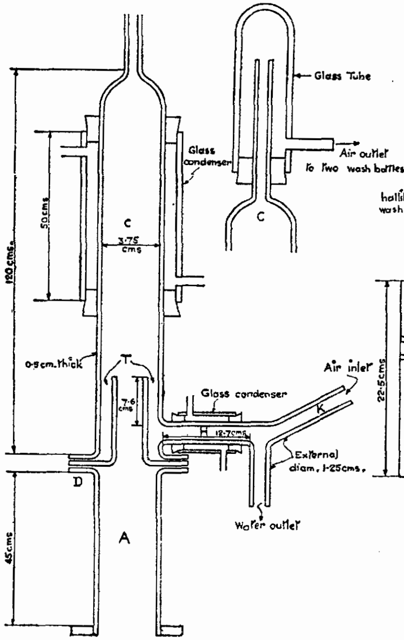
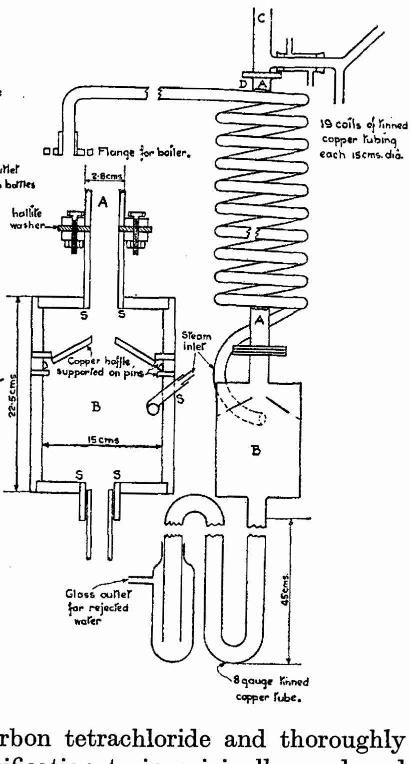


FIG. 2.



should be washed out with carbon tetrachloride and thoroughly steamed. The Weiland air-purification train originally used and illustrated in Fig. 1 of the earlier paper was found to be inconvenient for continuous use owing to sticking taps. The form of train now used consists of four columns, 3 cm. in diameter and 45 cm. high, containing glass beads and joined together by short lengths of rubber tubing so that they can be separated for refilling, thus rendering taps unnecessary. The presence of rubber in the air train does not appear to affect the conductivity of the water.

A typical day's run with the still is recorded below. The temperature is that of the water in the cell, and κ is its conductivity in gemmhos, corrected to 18°.

Time.	Temp.	κ.	Time.	Temp.	κ.	Time.	Temp.	κ.
11.40 a.m.	20·6°	0·090	1.10 p.m.	22·1°	0·057	3.05 p.m.	20·5°	0·058
11.47	20·9	0·067	1.28	21·6	0·055	3.27	20·5	0·060
12.05 p.m.	21·4	0·064	1.43	21·5	0·055	3.50	20.1	0·062
12.22	21·9	0·057	2.03	20·4	0·056	4.10	21·4	0·062
12.40	21·1	0·057	2.22	21·3	0·058	4.30	21·6	0·063
12.57	21·8	0·057	2.43	21.3	0.058			

Total volume of conductivity water collected from 11.40 a.m. to 4.30 p.m. = 4555 c.c.

Total volume of water rejected at trap = 2300 c.c.

The conductivities so far obtained are much the same as those of the older still when both are run simultaneously, but the latter occasionally gives very low values, *e.g.*, 0·047 at 18°. Probably, after a few months' use, the new still will give similar results—the best hitherto is $\kappa = 0{\cdot}053$ at 18°.

The advantages claimed for the modified design are low cost, great strength and compactness, ease of erection and working, and durability. The actual still occupies a bench length of 110 cm. or, including the air-purification train, 2 m. It quickly gives good-quality water which, at its best is rather better than that from such stills as that of Bencovitch and Hotchkiss (*J. Physical Chem.*, 1925, **29**, 705).

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