ELECTRODE WITH STATIONARY MERCURY DROP

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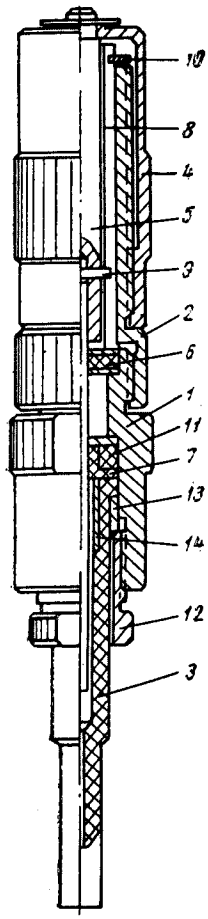

Design of hanging drop electrode. 1) Body; 2) collar; 3) capillary; 4) drum; 5) coupling rod; 6) gasket; 7) washer; 8) split collar; 9) dowel pin; 10) split washer; 11) rubber washer; 12) nut; 13,14) collars.

In order to increase the sensitivity and resolving power of the polarograph, there is a promising future for the method of amalgam concentration in a stationary mercury drop. Barker [1] was the first to pay attention to the great possibilities of the stationary drop, and he proposed the original design for the hanging drop analyzer, called "the Barker valve." Kemula [2] later suggested the idea of obtaining the mercury drop by extruding it from a mercury reservoir. This electrode was called the "Kemula screw." This method of concentration was associated with the need to form a reliable working electrode, which ensured the production of reproducible stationary mercury drops. With such electrodes it was essential to prevent penetration of solution into the capillary, and to ensure a perfect seal which gave precise reproducibility in drop size.

We give below a short description of the constructional features of our electrode (see figure). This electrode used the principle of the "Kemula screw." A specific feature of the design was the use of a component made from hydrophobic material (polyethylene), consisting of three parts: a capillary 0.2 mm in diameter and 40 mm long, a wide vessel to store the main bulk of the mercury, and a compression head. The use of a long capillary prevented penetration of amalgam into the main bulk of the mercury.

To ensure that there was a right and reliable seal, two systems were used with polyethylene washers and a rubber amortization ring, compensating for the shrinkage of the polyethylene. In order to prolong the life of the seal and to improve its soundness, and also to ensure precise dosage of the drops, the connecting rod expelling the mercury had only a forward movements.

With the apparatus described, the size of the mercury drop produced was determined by a special device, the indicator, which measured the vertical movement of the rod. The use of the indicator facilitated the technological production of the screwed component, since it eliminated the need for a micrometer screw thread.

The design ensured the reproducibility of the results within 3%, made it possible to use the electrode in fluoride media, provided reliable operation, and made the apparatus simple to use.

The electrode as described, with stationary mercury drop, was incorporated in a TsLA vector polarograph [3]. The use of the hanging drop with this instrument has made it possible to determine elements at concentrations below 10^{-9} mole/liter, and also to obtain polarograms of elements when the concentration of accompanying elements is more than 30,000 times that of the component to be determined.

LITERATURE CITED

1. G. C. Barker, AER C/R-1563 (1956).
2. W. Kemula and Z. Kublik, Anal. Chim. Acta, 18, 104 (1958).
3. S. B. Tsfasman and R. M. Salikhdzhanova, Zavod. lab., 30, 2 (1964).

All abbreviations of periodicals in the above bibliography are letter-by-letter transliterations of the abbreviations as given in the original Russian journal. *Some or all of this periodical literature may well be available in English translation.* A complete list of the cover-to-cover English translations appears at the back of the first issue of this year.