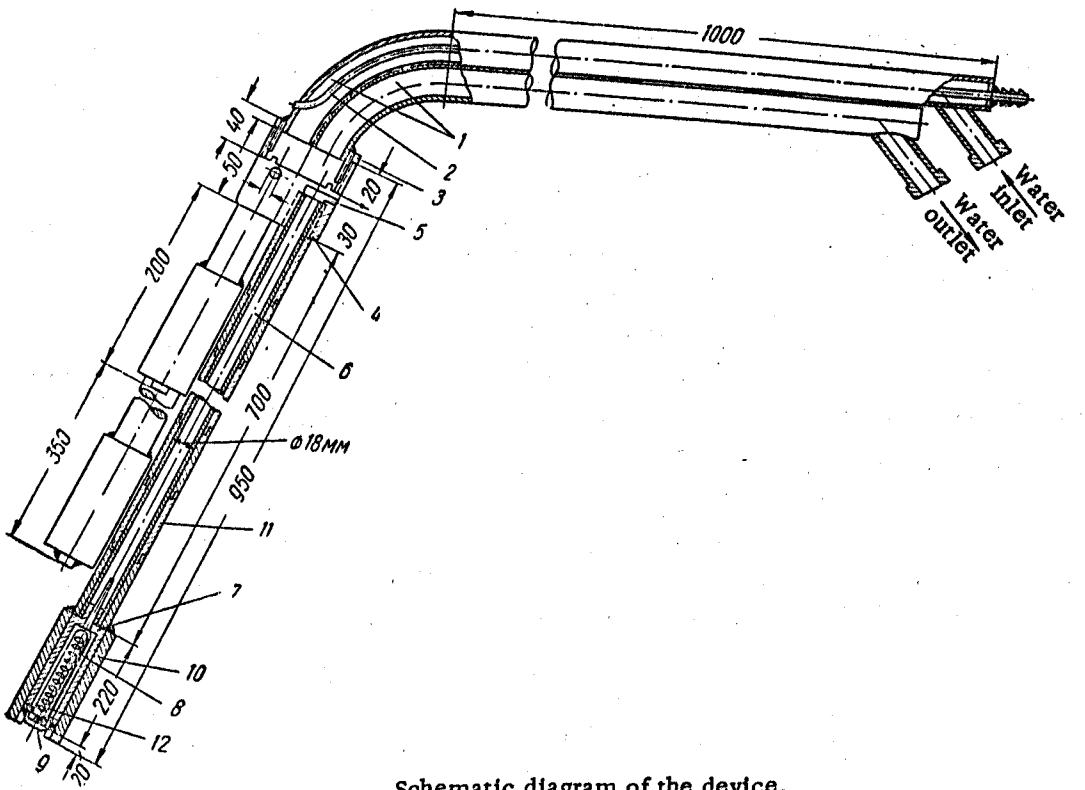

Schematic diagram of the device.

1.5-2 mm opening which prevents the metal from getting inside the device. The bottom end of the sampler has a 2-3 mm diameter inlet hole. A spiral of 0.2-0.5 mm aluminum wire is placed inside the sampler; its purpose is to oxidize the metal in order to obtain a dense specimen with a uniform distribution of components over the length and cross section. The aluminum weighs 0.25-0.35% of the weight of the sample.

The samplers are filled by the hydrostatic pressure. Gas samples are taken from the furnace by the method of ejection with compressed air or by means of a vacuum pump.

The entire process of taking metal samples lasts for 1-1.5 minutes.

The data given in the table indicate the good repetitiveness of results obtained in analyzing samples taken by means of the recommended device.

THE USE OF THE POTENTIOMETER IN POLAROGRAPHIC INVESTIGATIONS

S. G. Mairanovskii and N. N. Silin

(N. D. Zelinskii Institute of Organic Chemistry at the Acad. of Sci. of the USSR)

In the course of polarographic investigations it is often necessary accurately to determine the potential of the trickle electrode.

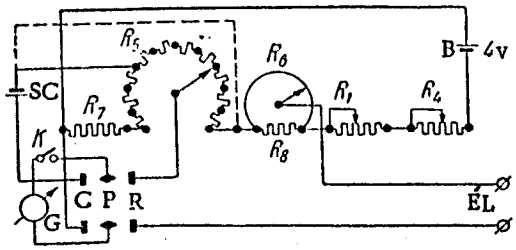

Fig. 1. Circuit of the potentiometer.

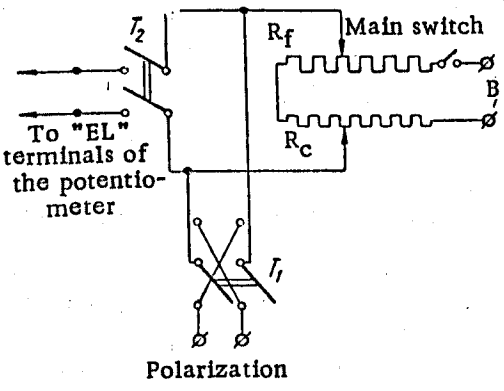

Fig. 2. Voltage divider for the polarization of the trickle electrode.

For determining the heights of waves with half-wave potentials little different in size on a multi-stage polarogram it is sometimes necessary to find the precise relationship between the current and the potential of the electrode. Even more often an accurate measurement of the electrode potential is required in the investigations of electrode processes and in determining the shape of polarographic waves.

The potential of the trickle electrode is determined with respect to the Lugin-type auxiliary electrode by means of potentiometers; we describe below a simple method of extending the measurement range of the widely used P-4 potentiometers.

In Fig. 1, on the wiring circuit of the P-4 potentiometer, the dotted lines indicate the connection which is removed, and the solid lines show the new connection. In addition, the resistor R_7 provided in the circuit for setting the device against the standard cell, must, in the process of extending the measurement range of the potentiometer, be replaced by the new, larger resistor R_7', the size of which is found from the relation $R_7' : R_7 = 2.155$ or $R_7' : R_5 = 0.3943$, where R_5 is the resistance of each of the commutator coils. After these modifications and after connecting the 4-5 v source to the terminals B, the drop of voltage in each of the commutator coils and also between the 0 and 100 divisions of the rheochord is as much as 300 mv. Thus, the modification has widened the measurement range of the device exactly three times. The values of the divisions of the rheochord and of the commutator scale have also increased three times. For easy operation it is useful to mark the rheochord scale and the scale of the commutator with the new values. Experience shows that in a number of cases it is practicable to use a simple two-rheostat voltage divider instead of the polarograph for the polarization of the trickle electrode. The voltage divider can be easily mounted in the same box as the potentiometer. Such a combined device, which we called "the polaropotentiometer," is successfully used in our Institute.* The circuit of the voltage divider is given in Fig. 2. It consists of two rheostats (600-800 Ω and 30-50 Ω) connected in series; for a coarse and fine relation of the potential, the rheostats are fed from a 3-5 v supply. The voltage taken from the voltage divider is passed through the toggle switch T_1 for changing the polarity direction for the "polarization" terminals. The polarization cell (which is connected to the trickle and the nonpolarizing electrodes) and a sensitive microammeter fitted, if necessary, with an Ayrton shunt for varying the sensitivity, are connected in series to these terminals. For measuring the polarizing voltage a 3 v voltmeter can be connected to the "polarization" terminals. For an accurate measurement of the polarizing voltage it can be supplied by means of a toggle switch T_2 to the potentiometer terminals.

If the polarizing divider and the potentiometer are mounted in the same box it is useful to place the rheostats of the voltage divider on the right-hand side wall of the box, and the toggle switches and the terminals of the divider on the front wall, since this will place the control handles of the potentiometer and voltage divider into a favorable position. An ordinary wire rheostat of the kind used in television sets for focusing purposes can be used as the rheostat of the voltage divider. For coarse adjustment (R_c), the rheostat can be used as purchased, while for the fine adjustment (R_f) it must be rewound with a thicker wire in such a manner that its resistance is 30-50 Ω.

*The prototypes of the polaropotentiometers were made by E. M. Vasin and Yu. F. Til.