operations by means of this instrument is raised 2-3-fold. The experimental workshops of the Academy of Sciences, Kazakh. SSR are planning to manufacture these instruments.

APPLICATION OF OSCILLOSCOPE ÉO-7 FOR POLAROGRAPHIC DETERMINATION OF MICROCONCENTRATIONS

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For an analytical determination of microconcentrations Kalvoda and Macku suggested using an oscilloscope [1] on whose screen the curve of the relationship $dV/dt = f(V)$ is displayed; the depth of the indentations on this curve are proportional to the concentrations of substances in the solution (here V is the voltage of polarization and t the time). The authors note that by using a previously electrolytically deposited layer of the element on the mercury cathode it becomes possible to investigate the behavior of the depolarized down to concentrations of

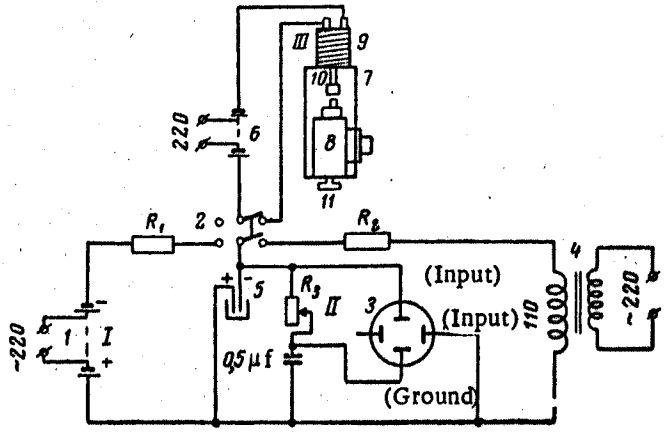
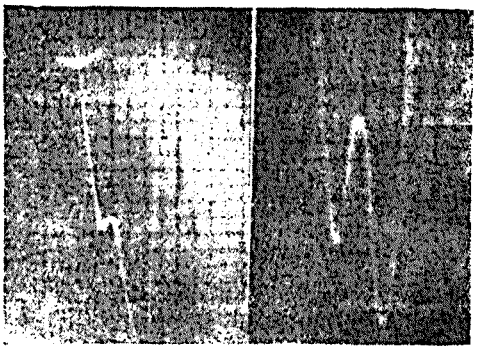


Fig. 1. Schematic of the apparatus. 1) Rectifier-stabilizer, 2) double-throw, double-pole switch, 3) oscilloscope ÉO-7, 4) laboratory transformer LATR-1, 5) electrolyzer, 6) rectifier, R_1 = 4 kilohms, R_2 = 16 kilohms, R_3 = variable resistor, up to 3 kilohms, 7) frame of the synchronizing device, 8) a "Zenith-S" camera, 9) electromagnet, 10) striker, 11) fixing screw.

10^{-7}M and smaller. The published data on the apparatus and circuits used for this purpose [2, 3, 4] are too brief for wide application of the method in analytical work. The present article provides a description of a circuit for microanalysis by means of the Soviet-made oscilloscope ÉO-7.

The attachment consists of three units (Fig. 1): I) the rectifier and stabilizer, II) the differentiating device, III) a synchronizing device which connects the camera for photographing the oscillograms simultaneously with switching-over the electrolyzer to the oscilloscope.

A "Zenith-S" camera was used for photographing on motion picture film with an exposure of 1/50 sec and an aperture of 3.5. In order to decrease the focal distance of the objective an adaptor ring 5 mm high was used. A drop of mercury was used as a cathode and was obtained in the electrolyzer from a saturated solution of mercury nitrate deposited on a platinum wire, which protruded slightly below the end of a glass tube. A platinized



a b

Fig. 2. Part of the oscillogram anode curve; the left-hand-side kink corresponds to lead. The electrolysis lasted 30 min at 45 ma, the solution was 0.015 N sulfuric acid. Lead concentration was: for a = $7 \cdot 10^{-8}$ M; for b = $6 \cdot 10^{-8}$ M.

platinum plate of ~1 cm^2 served as an anode. It is not necessary to seal-off the electrolyzer since the presence of oxygen does not interfere with the tests. If it is required to change the shape of the oscillogram the required values of resistances should be first determined experimentally by means of variable resistors and then appropriate resistors wired into the circuit.

An oscillogram showing a well-pronounced kink due to lead concentration of 10^{-8} M (Fig. 2) was obtained by means of this equipment.

LITERATURE CITED

1. R. Kalvoda and J. Macku, Chem. Listy 48, 378 (1954), Ref. Zhur. Khim. 7598 (1955).
2. R. Kalvoda, Zavodskaya Lab. 24, 1319 (1958).*
3. J. Heyrovsky, Techniques of Polarigraphic Analysis [Russian translation] (IL, 1951) p. 138.
4. J. Heyrovsky, Anal. Chim. Acta 12, 600 (1955).

A HIGHLY SENSITIVE CATAROMETER FOR CHROMATOGRAPHIC GAS ANALYSIS

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Detectors based on the measurement of heat conductivity [1] are the most widespread and convenient for gas chromatography.

We have designed a simple catarometer which is as sensitive as a detector based on the measurement of the heat of combustion or an ionization detector. The unbalance E of an equal-arms catarometer bridge can be calculated [2] from equation

$$E = \frac{IR_{tw}}{4} \cdot \frac{\alpha (t_w - t_c)}{1 + \alpha t_w} \cdot p.$$

Where I is the "common current" of the bridge, R_{tw} is the resistance of the fiber in a hot state, t_w is the temperature of the fiber, t_c is the temperature of the walls of the unit, α is the temperature coefficient of resistance, p is the molar fraction of an impurity.

It follows from this relation that the bridge unbalance can be increased by raising the ohmic resistance R_{tw}. To date the value of R_{tw} in thermal-conductivity detectors was seldom greater than 10 ohms and usually amounted to 5-6 ohms. This limitation was due to the difficulties of fixing long fibers and the undesirability of increasing the size of the measuring chamber. The use of 20 μ tungsten wire in the form of a helix 0.2 mm in diameter (the usual filament of a low-power bulb) provided the possibility of centering the fiber and attaining high resistance with a relatively small volume of the measuring cell. Such a helix possesses great elasticity which it does not lose when heated. An attempt to make a catarometer with platinum helixes was unsuccessful.

*See English translation.