

VECTOR POLAROGRAPH OF THE TsLA (CENTRAL AUTOMATION LABORATORY)

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For effective use of a sinusoidal voltage in polarography, there has been proposed the use of the principle of phase separation of the active and reactive components of the cell current [1]. This principle is employed for the alternating-current polarograph,* the vector polarograph of the TsLA (Central Automation Laboratory) [2].

On the vector polarograph it is possible to carry out a separate determination of the active and reactive components of the reaction current. In the general case, both components of the current contain information about the quality and quantity of the material in solution. Nevertheless, inasmuch as the reactive component of the diffusion current coincides in phase with the capacitive current of a double layer and is recorded as the total capacitive current, this current is generally not used for determining small contents. The possibility of separate determination of the active and reactive current components with a sufficiently large concentration of the depolarizer ($2 \cdot 10^{-5} - 10^{-4}$ of the mass) permits determination of the activated polarization resistance and the resistance of the pseudocapacitive reaction. This gives the possibility of calculating the constants of the rates and currents of the ion exchange of partially reversed reactions and of determining the degree of reversibility [3]. By measuring the capacitive current it is possible to study the effect of adsorption and desorption, and also to investigate the behavior of the capacity of a double layer [4]. It is of interest to use these possibilities of the vector polarograph for studying catalytic reactions in connection with the specific behavior of the capacitive and active components of the current of the catalytic reaction.

The TsLA vector polarograph is equipped with a serial stationary mercury transducer. In combination with this, the instrument is suitably provided with high scanning rates, a mode for conducting preelectrolysis, and also a semi-automatic mode for taking polarograms. This mode includes the following operations: stirrer operation for a fixed time determined beforehand, and starting of the diagram strip-chart and the polarizing voltage. The instrument is provided with a polarizing voltage adjustment, for example, for determining the voltage of the characteristic points of a polarogram.

The TsLA vector polarograph was the first in alternating current polarography to be implemented with a potentiostatic three-electrode system. Its purpose is compensation of the change of potential of the unpolarized electrode and the resistance of the solution.

The presence of a three-electrode mode permits use of auxiliary electrodes of different design. The most convenient is the use of an auxiliary electrode of platinum with an area of $3-5 \text{ mm}^2$. The comparison electrode may be any nonpolarized electrode (calomel, silver chloride, etc.), the magnitude of the resistance of these electrodes not having a substantial value. The three-electrode mode can be recommended for microcells [5] in the case where a certain inconstancy of the potential doesn't play a special role. In these cells the nonpolarizing electrode and the comparison electrode can be platinum leads having an area of $2-5 \text{ mm}^2$. Applications for the instrument should be directed to the address: Moskva, tsentr, yl. Kirova 36, TsLA.

LITERATURE CITED

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2. S. B. Tsfasman, *Zavodskaya laboratoriya*, 26, 7, 889 (1960).
3. J. Randles, *Progress in Polarography*, Intersci. Publ., New York, Vol. 1 (1962), p. 123.
4. H. Schmidt and M. von Stackelberg, *Die neuartigen polarographischen Methoden* (1962).
5. M. T. Kelley et al., *Advances in polarography*, New York-Oxford-London-Paris, Vol. 1 (1960), p. 158.

* Alternating-current polarography in domestic literature is sometimes termed "pul'spolyarografiya." It is suggested that this term is ambiguous, inasmuch as the term "pulse polarography" in foreign literature is used to designate "impul'snayapolyarografiya," as a result of which inverse translation from Russian leads to a distortion of the idea itself.