

NOMOGRAMS FOR THE SELECTION OF PARAMETERS FOR TAKING DOWN AND RECORDING POLARIZATION CURVES

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Many corrosion and electrochemical investigations and also methods of phase analysis are associated with recording potentiodynamic polarization curves [1-4]. In the home-produced type P-5848 and P-5827 potentiostats electronic scanning has been introduced for this purpose with a range of speeds 0.002-4 V/min and it has an output to the type KSP-4 automatic recorder which has a large range of chart paper speeds. The rate of scanning is determined by the position of the potentiostat "Speed Factor" and "Amplitude" knobs. The latter limits the amplitude of the scanning.

We have derived nomograms of the voltage scanning speed (Figs. 1 and 2) and a nomogram for the potential recording scale (Fig. 3) for establishing the required parameters of the instrument when recording potentiodynamic curves and determining these parameters from known positions of the knobs with reproduction of the recording scale and producing a series of curves in convenient scales during comparative investigations.

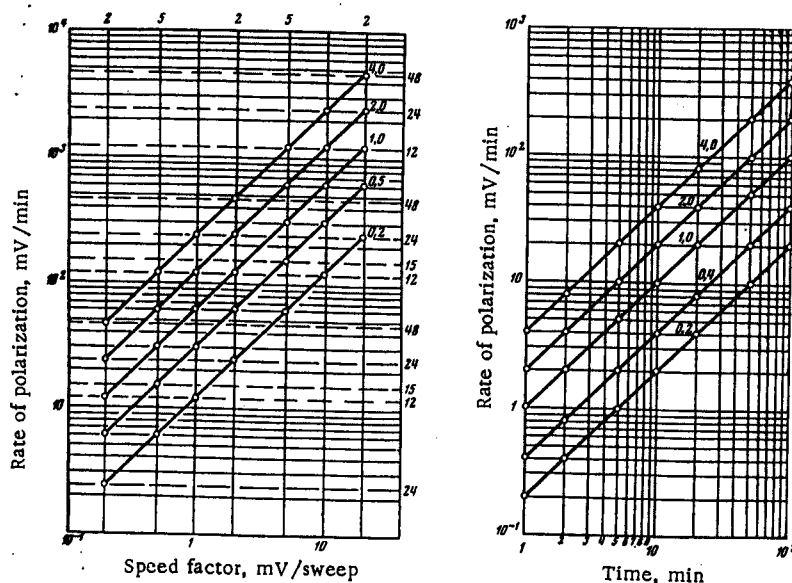


Fig. 1. Nomograms of the logarithmic relation for the rate of polarization as a function of time. The "Amplitude" values are denoted by numbers on the curves (potentiostat P-5848).

Fig. 2. Nomograms of the logarithmic relation for the rate of polarization as a function of time. The "Amplitude" values are denoted by numbers on the curves (potentiostat P-5827).

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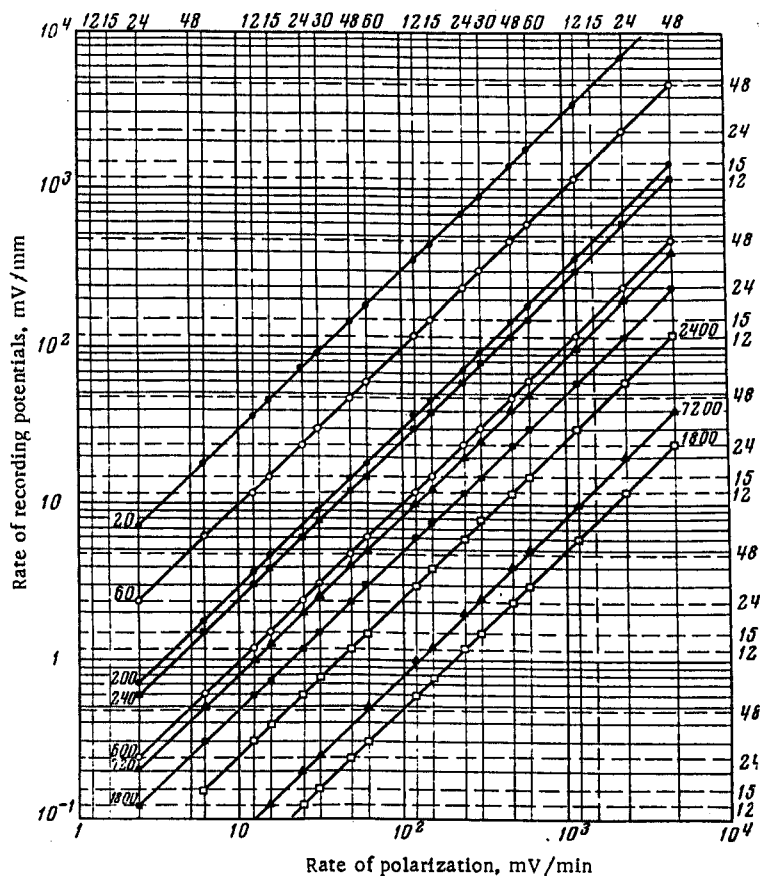


Fig. 3. Nomograms of the logarithmic relation for the potential recording scale as a function of rate of polarization at different chart paper transmission speeds (denoted by numbers on the curves).

Figure 1 is used for the type P-5848 potentiostat to determine the polarization speed with selected positions of the "Speed Factor" and "Amplitude" knobs. In practice, however, it is often the reverse case when a given polarization speed is used to determine the positions of the switches. In this case the graph provides a means of obtaining all the possible alternatives. Accordingly, the polarization speed of 60 mV/min may be obtained with the switch positions: "Speed Factor" 0.5, 1, 2, and 5, for "Amplitude" 2, 1, 0.5, and 0.2, respectively. For the type P-5827 potentiostat these values are determined in accordance with Fig. 2.

The nomogram in Fig. 3 is used to determine the recording scale in relation to the potential axis of the chart. Accordingly, for a polarization speed of 60 mV/min the potential recording scale may be 0.3, 0.5, 1.5, 3.0, 5.0, 6.0, 15.0, 18.0, 60.0 and 180.0 mV/mm depending on the rate of potentiometer chart paper movement. A velocity is selected which provides a means of obtaining a compact representation of the polarization curve. It is often necessary to solve the reverse problem and to find the rate of scanning in terms of a given scale of the curve. Accordingly for a recording scale of 10 mV/mm and a chart speed of 720 mm/h the polarization speed must be 120 mV/min (Fig. 3). Then the nomograms in Figs. 2 or 1 are used to find the values for the "Amplitude" and "Speed Factor."

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