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A SLIDE RULE FOR CHRONOPOTENTIOMETRY

THE fundamental equation for chronopotentiometry is the Sand equation—

$$\frac{i\tau^{1/2}}{A\,C} = \frac{n\,F\pi^{1/2}\,D^{1/2}}{2} = 8{\cdot}55 \times 10^4\,n\,D^{1/2}$$

where i is the current in μA, τ is the transition time in seconds, A is the electrode area in sq. cm, C is the concentration of the electro-active species in millimoles per litre, D is the diffusion coefficient of the electro-active species in sq. cm per second and F is the faraday. For the electrode reaction of a given substance n and D are constants, and the four parameters on the left side of the equation may be chosen at will.

Nicholson and Karchmer[1] showed a graph that could be used as an aid in choosing these parameters over a fairly narrow range of conditions. We have devised a slide rule that can solve the equation for all the six quantities and is useful over almost the entire range of practical experimental conditions.

The slide rule was constructed from a 2-SLIDE slide rule blank No. 22, obtainable from the Dyna Slide Company, 600 South Michigan Avenue, Chicago 5, Illinois, U.S.A. The construction of the rule is apparent from Fig. 1. The C, A and i scales are three cycles of a 3-inch logarithmic

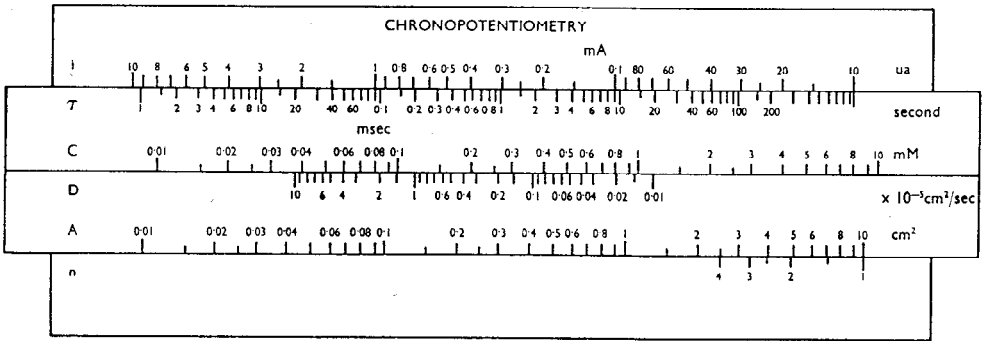

Fig. 1. Slide rule

scale, and the D and τ scales are 1·5-inch logarithmic scales. These scales can be constructed either by ruling gradations with the use of the logarithm chart supplied with the slide rule blanks or by attaching strips cut from logarithmic graph paper of the appropriate size to the slides. The C, A, i, τ and D scales can be located at will, and the position of the n scale (a 3-inch logarithmic scale) is determined by solving a sample problem with the slide rule. For particular analytical problems a rule of somewhat higher precision can be constructed by decreasing the number of cycles of the C scale to 1 or 2 (so that the number of cycles on the τ scale will be reduced to 2 or 4).

In use, after adjusting n and D, the effect of variation of the other parameters is readily observed. For a given electrode and concentration, the slide rule is set in a position for directly reading the current necessary for any given transition time. In most analytical applications a transition time of between 10 and 60 seconds is recommended.[2]

REFERENCES

1. Nicholson, M. M., and Karchmer, J. H., *Anal. Chem.*, 1955, **27**, 1095.
2. Bard, A. J., *Ibid.*, 1961, **33**, 11.

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AUTOMATIC WASHING OF PAPER FOR CHROMATOGRAPHY

IT is general practice to wash paper for chromatography in order to remove impurities that may affect the shape of the zones. For this purpose closed chambers are used that contain trays with solvent into which the paper dips; the descending solvent washes the paper. When paper is being