



XXXV. Note on the graphical treatment of experimental curves

R. A. Lehfeldt

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on the assumption of Boyle's law, in terms of the degree of dissociation of the salt as found from the electrical conductivity ; afterwards, without that assumption, in more general terms. According to this expression the E.M.F. of a cell depends on the total osmotic pressure of the salt, not on that of the metallic ion only.

Experiments are then described, both old ones recalculated, and new ones made for the occasion, in which the E.M.F. of concentration-cells of ZnCl_2 and ZnSO_4 are measured; the results being expressed by curves and tables.

Finally, from the data thus provided the osmotic pressures of those salts in solutions nearly up to the point of saturation are calculated, and the analogy between those pressures and the pressures of highly compressed gases pointed out.

East London Technical College,
June 1900.

XXXV. *Note on the Graphical Treatment of Experimental Curves.* By R. A. LEHFELDT*.

WHEN as the result of experiments a relation between two quantities

$$y=f(x)$$

has been found, it is sometimes desirable to calculate from it some other function of x of a kind that involves differentiating y . The form of the function f being unknown, it is necessary to deal directly with the numerical observations, or with the curve expressing them. This is often done by finding an empirical equation for $y=f(x)$ and differentiating it, but to find a satisfactory empirical equation is not always possible; and if the subsequent treatment involves integration, the choice of forms is closely limited by the possibilities of the integration. There remains of course the method of differentiating the experimental curve graphically, by drawing tangents; but this should be avoided if it is in any way possible to do so, because the errors of the experimental curve are greatly exaggerated in taking its tangents; and no subsequent process of integration can smooth out the errors thus introduced.

In certain cases the difficulty can be avoided, and a process of graphical integration, which can be satisfactorily performed, substituted for the graphical differentiation. Thus

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measure one of the vapour-pressures than the other. Suppose p_1 to be measured, then

$$\log p_2 = - \int \frac{x}{1-x} \frac{d \log p_1}{dx} dx.$$

Hence

$$\log p_2 = \left[\frac{-x}{1-x} \log p_1 \right] + \int \frac{\log p_1}{(1-x)^2} dx,$$

and the numerical solution becomes practicable.

XXXVI. *The Anomalous Dispersion of Carbon.*

*By Prof. R. W. WOOD *.*

IT was suggested to me some time ago by Professor Ames that the rapid decrease of amplitude on a wave-front, resulting from its passage through a prism of some strongly absorbing substance, such as cyanine, might not be without influence on the direction of propagation of the transmitted ray.

In Huygens's construction a constant amplitude is assumed over the wave-front, and it is quite conceivable that varying the amplitude might shift slightly the position of the "effective-point."

There are obviously two ways of attacking the problem: the mathematical and the experimental. I have been unable to treat the case by any of the geometrical methods, and the simplest way seems to be to determine the form and position of the intensity curve, treating the transmitting edge of the prism as a narrow aperture, the amplitude decreasing across its width according to some linear function, and solving by the method employed in the case of the Fraunhofer or telescopic diffraction phenomena. I have not yet attempted the solution in full, but a cursory examination leads me to anticipate that the central maximum will not be symmetrical with respect to the centre of the system. The highest point of the intensity curve will undoubtedly be at its usual place, in the line normal to the centre of the aperture, but the slope may be steeper on one side than on the other. In all determinations of the refractive index of strongly absorbing prisms, when working near the absorption-band, the slit image is broadened by diffraction. By setting the cross-hair of the eyepiece on the centre of this broadened image, we assume that we have determined the centre of the system. If, however, the central maximum of the pattern is unsym-

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