

to the projective differential geometry of curves and surfaces in ordinary space. Bompiani has been especially interested in geometrical definitions of the fundamental forms of Fubini. In the third appendix Terracini gives an exposition of the most interesting results in the projective differential geometry of hyperspace, accompanied by a valuable bibliography, and in the fourth the same author gives a brief account of a special problem concerning surfaces whose asymptotics belong to linear complexes.

These volumes constitute the only existing comprehensive treatise on the modern theories of projective differential geometry. Every one interested in this subject will need to have a copy of this work available, as references will be made to it for some time to come. There still seems to be room, however, for a well organized treatment in English of the same material. And most of all there is need for a text which can be put into the hands of graduate students who are being introduced to the subject, because the monumental work of Fubini and Čech, valuable as it is for the expert, does not seem to be suited to the needs of a beginner in this field.

E. P. LANE

Les Mathématiques du Chimiste. By L. Gay. Paris, J. Hermann, 1926. vii+208 pp.

As indicated by the title, this book is not a mathematics text, but rather a monograph embodying only those principles which the author believes to be of particular utility to the chemist; more especially to the physical chemist. Hence he has omitted all reference to trigonometric functions, polar coordinates, integrals of surfaces and volumes, the mathematics used in crystallography (believing this to belong to the realm of physics), and he has only touched on the subjects of limits, series, imaginaries, etc.

The scope of the book may be judged from the following consecutive chapter headings: powers and roots, logarithms, functions of a single variable, functions of more than one variable, differentials, derivatives of functions of more than one variable, integrals of functions of a single variable, and integrals of differentials which depend upon more than one variable.

It seems to the reviewer that Chapter one might have been omitted; surely every chemist must be familiar with its contents. Much of Chapter two, dealing with logarithms, might also have been deleted, especially the discussion of their use in multiplying, dividing, raising to powers, and extracting roots. However, the reviewer is pleased to find included in the chapter an explanation of the numerical values of logarithms of numbers less than one, and a discussion of the errors which may result from the use of logarithms in making computations. In Chapter three it seems scarcely necessary to explain how to plot using rectangular coordinates, or to point out that the graph of a first order equation is a straight line. Methods of interpolation and extrapolation are given the attention they well deserve. In Chapter four we find a good exposition of the use of the triangle in representing systems of three components. In Chapter five are given the rules

for differentiating the more common algebraic equations. Although the author has defined the use of d and Δ in the usual way, he seems at times to confuse the two conventions, especially in his discussion of the differential of the product of two variables.

Chapters six and seven contain a brief treatment of first and second derivatives, series, the characteristics of maxima and minima, points of inflection, and first and second partial derivatives. In Chapter six it seems unfortunate that the author chose to discuss van der Waal's equation especially as applied to gases in the neighborhood of their critical points which is just the region in which the equation gives the most unsatisfactory results. The last two chapters deal with integration. Here we find that it is quite simple to integrate an irregular area by cutting out the plotted area, weighing the paper, and comparing the weight with that of a paper of the same thickness and quality and of known area. Although this method has been repeatedly recommended, it is the experience of the reviewer that it may lead to considerable error, and that it should be used with considerable skepticism. The characteristics of exact differentials and their physical significance are also discussed.

The book contains some errors, presumably typographical. On page 42, in discussing the velocity of a first order reaction, we read that the temperature, instead of the time, is a logarithmic function of the concentration. On page 59, heat of fusion should read heat of vaporization. On page 68, the corrected chemical equation is $2\text{BaO} + \text{O}_2 \rightleftharpoons 2\text{BaO}_2$. In the footnote on page 78 the name epicycloid is given to the curve usually considered as the cycloid. In the footnote on page 128 lead is, erroneously, said to crystallize; this should read bismuth. On page 199, in the integration between the limits A and B it would seem more logical to use the subscripts A and B for the variables in the final equation. On page 205,

$$\frac{-l}{T_2} \text{ should be } \frac{-l}{T^2}.$$

In the opinion of the reviewer, the value of the book would have been enhanced if the author had included equations for the common curves, more about empirical equations, something on the method of least squares, and if he had laid more emphasis on the errors in results calculated from experimental data.

The book is evidently intended primarily for French consumption. The author in his preface states that there is no other book of its scope in the French language. This, of course, cannot be said for the English language. However, the English student of chemistry will find much of value in this little book. Its contents is common knowledge to the research worker in physical chemistry.

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