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Book Review: *Kinetics of Diffusion Controlled Chemical Processes*

Kinetics of Diffusion Controlled Chemical Processes. A. A. Ovchinnikov, S. F. Timashev, and A. A. Belyy, Nova Science Publishers, Commack, New York, 1989.

The theory of diffusion-controlled reactions is close to the top of the hit parade of hot research topics. There are no presently available monographs of a comprehensive nature to guide the novice into this research area, which suggests a gap that needs filling. Unfortunately, the present monograph, although written by investigators who have made substantial contributions in this area of research, will disappoint both those partly familiar with the subject, as well as those who seek an introductory exposition.

First, there is the matter of the translation from the original Russian edition. It is obvious that the translator has made heavy and slavish use of a Russian–English dictionary without being otherwise familiar with relevant technical terminology. As a single example, the equation adjoint to the Smoluchowski equation is referred to as the conjugated equation rather than the adjoint or backward equation. Aside from such minor and sometimes incomprehensible terminology, the remainder of the translation is often ungrammatical to the point where it is impossible to fathom the thought that the authors want to convey.

In addition to this class of what may be termed as annoyances, the technical material is often superficial. For example, the derivation of the diffusion equation from the Langevin equation is taken, almost verbatim, from the review article by Chandrasekhar, as is the derivation of what the authors term the Kramers–Chandrasekhar (i.e., Klein) equation. A section on the van Kampen Ω^{-1} expansion of the master equation adds little, either by way of embroidery or insight to the original article. There are a number of minor but noticeable errors, exemplified by a solution to the telegrapher's equation that omits delta-function contributions, and an inconsistent limiting process on p. 6. In the course of a number of analyses

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the authors resort to a number of unsubstantiated approximations, leaving the reader to wonder whether there is any region of parameter space for which the approximations are valid. The transition between discrete random walks and diffusion models is somewhat mangled, leaving the reader with the impression that one can only pass to the diffusion limit from the nearest-neighbor random walk. Finally, there is very little contact made between theory and experiment.

In summary, the interested reader will be much better served by a combination of the monographs by Gardiner [C. W. Gardiner, *Handbook of Stochastic Methods*, 2nd ed. (Springer-Verlag, Berlin, 1985)] for mathematical methodology, and that of Rice [S. A. Rice, *Diffusion-Controlled Reactions* (Elsevier Press, Amsterdam, 1985)] for the relation between theory and experiment.

George H. Weiss
National Institutes of Health
Bethesda, Maryland 20892