Recensiones

M. S. Child: Molecular Collision Theory. London and New York: Academic Press 1974. 300 Seiten, £ 8.50.

Das vorliegende Buch beinhaltet eine Einführung in die Theorie molekularer Stöße. In den Kapiteln 2–5 wird die elastische Streuung behandelt. Die inelastische Streuung ist in den Kapiteln 6–9 diskutiert. Kapitel 10 enthält eine sehr detaillierte Schilderung der zur Zeit verfügbaren Methoden zur Beschreibung reaktiver Streuprozesse mit Einschluß des elektronischen Energieflächenwechsels. Besonderer Wert wird dabei auf die praktische Anwendbarkeit der theoretischen Verfahren gelegt, und formale Strukturuntersuchungen zur Theorie werden so kurz wie möglich gehalten. Hervorheben möchte ich in diesem Zusammenhang die im Kapitel 6 sehr klar definierten diabatischen und adiabatischen Kopplungsschemata sowie die in 6.4 erläuterte Orts-Helizitätsdarstellung der inelastischen Streuung an einem anisotropen Potential. Die halbklassische Analysis der elastischen Streuung, insbesondere des "Orbiting" in Kapitel 5, die Diskussion der halbklassischen S-Matrix für inelastische, reaktive und elektronische Anregungsprozesse in den Kapiteln 9 und 10 dürften in der in diesem Buch gebotenen zusammenhängenden Form erstmalig sein.

Zusammenfassend möchte ich bemerken, daß dieses Buch ohne viel theoretisches Beiwerk den in elementarer Quantenmechanik vorgebildeten Chemiker und Physiker auf den neuesten Stand der quantenmechanischen Interpretation molekularer Stoßprozesse hinführt. Für Forscher in diesem Spezialgebiet erweist sich dieses Buch aufgrund vieler Zitate neuer Originalarbeiten als wertvolles Nachschlagewerk.

Heinz Krüger, Kaiserslautern

D. B. Chesnut: Finite Groups and Quantum Theory. New York: John Wiley and Sons 1974. 254 p., US-$ 14.95.

It is quite obvious that Professor Chesnut has enjoyed writing this book, and it has given the reviewer pleasure to read it. Most potential readers and users would probably want to know where to place the book in the quite impressive list of volumes available dealing with group theory and quantum theory. As far as I know, I would place it in between F. A. Cotton's "Chemical Applications of Group Theory" and M. Tinkham's "Group Theory and Quantum Mechanics". Cotton's book covers a broader, more "chemical spectrum" with less formal theory; Tinkham's book is more rigorous and mathematical than the present volume.

Chesnut's book starts out by introducing the concept of sets, goes on to define groups using "new math", discussing mapping and groups and introduces the permutation groups. From then on, it leans more towards old-fashioned functional theory and the chapters on irreducible representations and transformation of functions are more conventional. A welcome feature is the chapter on projection operators. It is somewhat strange that Professor Chesnut has not included proof of Schur's lemmas. After all, they are very central and most of the book is built upon them. They are really too important to be stated without proof – at least that should have been given in the appendices. I also think that the "double groups" should have been included in the book. Much of the mystery which surrounds this topic is really uncalled for, and a short chapter illucidating the topic would have been welcomed by the reviewer.

The last four chapters deal with the fusion of group theory with quantum theory. The treatment is very lucid. Excellent features are the discussions of accidental degeneracy and the symmetric and antisymmetric product. On the other hand, I was less pleased with the treatment of the permutation symmetry of wave functions. The use of group theory in the classification of M.O.'s and valence bond functions closes the book, with three appendices added where class algebra is treated and character tables are given.

Throughout the book the reader will find many problems which deal with the material treated. Answers are provided, but separated by a couple of pages from the problems, in "an attempt to help the reader resist the urge to turn to the answers before working it out himself". Whether this ingenious device will succeed or not is a moot point! However, the problems are good and varied and should provide a great help to the serious student.

C. J. Ballhausen