

less than and greater than the given value. Thus, the median parameters are selected by the user. Once selected, these intersection values are used to calculate predicted concentration values for each observed value.

The performance of the DLP program is shown in the following example. Concentrations expected at time 0.5, 1, 1.5, 2.0, 3, 4, 5, 10, 12, 14, 16, 20, and 24 hr were simulated for the biexponential equation:

$$C_t = 50e^{-0.8t} + 10e^{-0.08t} \quad (\text{Eq. 6})$$

Error with a coefficient of variation of either 5 or 20% was randomly assigned to the simulated concentrations such that four of the 12 observations were affected by the larger error. The results are shown in Fig. 1. The program was used to strip the curve. Concentrations observed between 10 and 24 hr were used for the  $\beta$ -phase, and those between 0.5 and 5 hr were used for the  $\alpha$ -phase. The results of parameter estimation using sequential regression (stripping) and the DLP method are shown in Table I. In this example, DLP produced better estimates of  $A$  and  $\alpha$  (13.8 and 6.2%

error) than did sequential regression analysis (62.8 and 31.2% error). Estimates of  $B$  and  $\beta$  were somewhat better using regression (1.2 and  $-2.5\%$  error) than with the DLP method (13.8 and 6.2% error). The large errors made by regression analysis in estimating  $A$  and  $\alpha$  indicate that DLP estimates for the entire curve were superior.

The determination of the importance of the DLP method of parameter estimation in pharmacokinetics will require further experimentation. It is hoped that the described program will facilitate this process.

(1) L. Endrenyi and H.-Y. Tang, *Comp. Biomed. Res.*, **13**, 430 (1980).

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## BOOKS

### REVIEWS

**Introduction to Pharmaceutical Dosage Forms.** By HOWARD C. ANSEL. Lea & Febiger, Washington Square, Philadelphia, PA 19106. 1981. 408 pp. 18.5 × 26 cm.

The format and presentation of this third edition are the same as in the previous one, but the material has been revised to the current official compendia. The book is intended "to introduce the beginning pharmacy students to medicinal and pharmaceutical substances, the methods of their incorporation into pharmaceutical dosage forms, and the utilization of these forms in patient care."

The discussions on heritage, terminology, code of ethics, regulations, and drug substances should satisfactorily orient beginning students in their first professional course in pharmacy. The appendix defines drug categories and discusses measurements, and tables of official preparations are given. Pharmaceutical products are logically treated from the viewpoint of administration route, and the classes of pharmaceutical preparations also are discussed. Numerous photographs illustrate equipment, processing, and packaging.

However, the presentation of dosage form design in terms of biopharmacy, formulation, and practice is inadequate. Whether the curriculum of a college is arranged to present a preparations-physical pharmacy sequence or a technology series of courses, the scope of this text restricts its use to an orientation course because of its superficial presentation of theory and pharmacy principles and limited discussion of techniques and manufacturing principles.

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**Pharmaceutical Calculations**, 2nd Ed. By JOEL L. ZATZ. John Wiley & Sons, 605 Third Ave., New York, NY 10016. 1981. 388 pp. 13.3 × 25 cm. Price \$17.50.

Pharmaceutical calculations continues to be one of the most frustrating subjects to teach in any pharmacy curriculum. The complete accuracy

required in answering many problems, the mixing of different metrology systems, the frequent use of conversions, and the simultaneous introduction of pharmaceutical terminology confound many students. This ongoing dilemma has resulted in pharmaceutical calculations being taught and evaluated in a variety of ways at different schools of pharmacy. No single textbook can solve the distress frequently associated with calculations, but Joel Zatz's second edition goes a long way to making it all more bearable.

The book is longer than the first edition by 77 pages because it now has an appendix containing instruction and problems on temperature conversion, alcohol proof strength, and sodium chloride equivalents in addition to the inclusion of alligation and a greatly expanded section on milliequivalents.

The cover of the book describes the structure of the text succinctly: "The progression of topics within each chapter and in the overall structure of the book constitutes a programmed format that permits self-paced learning and builds upon previously learned concepts to reinforce understanding. Students participate actively and are able to concentrate on calculations that are most difficult for them. Emphasis is on practical approaches to meeting accuracy requirements in filling prescriptions and manufacturing."

This book is designed to fit into the usual first general pharmacy course, to serve as a text in a calculations course or as a self-instruction text apart from the formal classroom, or to be an aid for review, and it does all of these well.

It is difficult to find much about the text to criticize. About all one can say is that it does not contain a section on commercial arithmetic which some instructors prefer to include in their course, and there are a few prescription problems for oral preparations containing amaranth (Red No. 2) which was banned in time to have been deleted from the new edition.

In conclusion, while working examples from the text, the reviewer finds it refreshing to solve for "j" (for Joel?) rather than to always hunt for the usual unknown "x."

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