

a range from 12.6 to 35.4, is surprising.

The questionnaire also included noncurricular questions addressing staffing and foreign enrollment. The departmental average of faculty was 6.1 professors, 2.6 associate professors, 2.7 assistant professors and 1.5 others. Over one-half the departments reported 1.7 average faculty openings, ranging from 1 to 6. The undergraduate body was composed of 9.2% foreign nationals while the graduate students included 38.7% foreign nationals.

It appears that only minor changes have occurred in the curriculum since the 1981 survey. However, it appears from the comments (and considering recent changes in the AIChE accreditation requirements) that the survey scheduled for 1989 will show greater change. A detailed review of the questionnaire will be made prior to that survey and any suggestions for

change will be gratefully accepted by the author.

REFERENCES

1. Thatcher, C. M., "The Chemical Engineering Curriculum" *Chem. Eng. Ed.*, September, 1962
2. Schmidt, A. X., "What is the Current ChE Curriculum?" *J. of Eng. Ed.*, October, 1958
3. Balch, C. W., "Undergraduate Curricula in Chemical Engineering 1969-70," *Chem. Eng. Ed.*, VI, No. 1, 1972
4. Barker, D. H., "Undergraduate Curricula in Chemical Engineering 1970-71," *Chem. Eng. Ed.*, 6, No. 1, 1972.
5. Barker, D. H., "Undergraduate Curricula 1976," *Chem. Eng. Ed.*, 11, No. 2, 1977
6. Barker, D. H., "1981 AIChE-EPC Survey," *Chem. Eng. Ed.* 16, No. 4, 1982
7. Ekerdt, John, *Chemical Engineering Faculties 1985-86*, Vol. 34, A publication of the Chemical Engineering Education Projects Committee of the American Institute of Chemical Engineers. □

ChE book reviews

THE PICTURE BOOK OF QUANTUM MECHANICS

By Siegmund Brandt and Hans Dieter Dahmen
John Wiley & Sons, Somerset, NJ 08873, \$29.95
(1985)

Reviewed by
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Models from our everyday experiences with balls and strings and sticks and springs are easily pictured in one's mind, and these pictures aid a study of classical mechanics. Wave mechanics has no such ordinary background of familiar pictures, and our learning is then wholly abstract and based upon complex equations. This new book utilizes computer graphics to provide pictures of wave forms, interferences, reflections, time developments, etc., to aid in the visualization that is missing from our everyday experiences. It is a significant step in the teaching of basic quantum mechanics. The book is wholly fundamental physics with no discussions of practical matters. A typical junior-level course in physical chemistry would be a minimum prerequisite to reading the *Picture Book*. The book is written by physicists, and the graphics that appear on about every other page aid basic physical understanding. For basic understanding, this book is excellent. Fortunately, this book does not have the kind of overpowering or intimidating character of

most books on quantum mechanics that are wholly mathematical and abstract.

There is nonetheless little here of direct interest to the chemical engineer who is involved in research in applied chemistry. Chemical engineers would be better served by a study of semi-empirical molecular orbital schemes that have been so well developed over the last two decades. With these techniques, one can calculate heats of formation, structure, vibration frequencies, and the like, from input information that merely states which atoms are joined to which in the molecule. These techniques continue to be successfully used by even organic chemists to pursue practical matters. Even the rational design of drugs—a sort of quantum pharmacology—is viable. The semi-empirical quantum techniques can be well-used without the detailed fundamental understanding that is portrayed in the *Picture Book*, even as a mass spectrometer can be well-used without one having a detailed understanding of the electronic pulsing circuitry that makes it all possible. To be sure, whether in quantum mechanics or in mass spectrometry, a conceptual understanding of underlying detail is important. And, as always, the more detailed one's understanding, the better.

The title sounds tacky, but the book is well done. The writing and graphics are clear, and the text fills only two-thirds of each page, leaving much white space that makes for pleasant reading. □