

algebraic mistakes and partly because the sign of i is used inconsistently. The same inconsistency concerning i appears in the discussion of the time-dependent Schrödinger equation where, incidentally, eigenfunctions are called eigenvalues.

When the emission of light is compared with that of longer electromagnetic waves it is stated: "Because individual atoms are much lighter and less pliable than matter as a whole, they can be the source of oscillating currents of the very high frequency necessary for light and for x rays." Aside from the vagueness of this argument, it gives the reader the mistaken notion that the mass of the atom, rather than the electron, has something to do with the emitted radiation. In a formula showing the transition probability as a sum of the electric and magnetic dipole and the electric quadrupole contributions, all three terms have different dimensions. The equation for the spectral absorption coefficient of a line, which supposedly defines the f value of a transition, does not contain f and the parentheses are missing in the factor $(4\pi)^2$. After being integrated, f appears, but now the atom density is omitted. Finally, there are numerous equations with a differential factor on one side but not the other.

This carelessness pervades the entire volume and it is really a pity because the book is otherwise quite good. It would be worthwhile if the publishers could reissue it with appropriate corrections, but until that is done, I would strongly urge that it not be used as an undergraduate text.

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A senior member of the Lockheed Palo Alto Research Laboratory, the reviewer is the editor of a recent book on radiative properties of very high-temperature air.

Phosphors, elastomers and sealants

MATERIALS OF HIGH VACUUM TECHNOLOGY. VOL. 3: AUXILIARY MATERIALS. By Werner Espe. 530 pp. Pergamon, New York, 1968. \$40.00

by LADISLAUS MARTON

Before World War II an excellent book was published by M. Knoll and Werner Espe on the materials of high-vacuum technology. During the in-

tervening 30 years Espe continued to collect material for a substantially expanded version of the earlier book.

In reviewing volume 3 on auxiliary materials, I am amazed by the author's thoroughness in assembling all the information, but at the same time I wonder if all of it is really needed. The topics covered are phosphors, elastomers, sealants, oils and gases with phosphors taking almost half the book! The viewpoint is that of an electron-tube maker, which makes for rather sparse reading for the cryogenicist or someone concerned with, let us say, radiation damage.

At times I became nostalgic in reading parts of the book: It describes the properties and uses of materials that were in use 40-50 years ago and that are known to the present generation only through the songs of Arthur Roberts. I also doubt that anybody interested in high-vacuum technology would use the section on the preparation and fabrication of luminescent materials. Nevertheless the book should be on the reference shelves of the libraries of institutions using high vacuum as a laboratory tool.

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The reviewer is with the office of International Relations at the National Bureau of Standards.

Heat, light and sound

THE PHYSICS OF VIBRATIONS AND WAVES. By H. J. Pain. 241 pp. Wiley, New York, 1969. \$5.95

by RICHARD WATERHOUSE

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