theory of valency is reviewed, a definition of resonance is provided which is open to serious objections.

It is implied—particularly in the use of the expression "equilibrium mixture"—that distinct molecular species corresponding to the extreme electronic formulae of resonating compounds are capable of independent existence.

The word resonance undoubtedly suggests some kind of rapid oscillation or vibration to many people. Nevertheless, no such change, quick or slow, is actually present, and a resonating compound is not a mixture. It seems unfortunate to add to the confusion by using the word "vibrator" (p. 259) for a part of a molecule which is capable of resonance.

The reader is cautioned aginst confusing resonance with tautomerism (p. 137), yet a typical tautomeric equilibrium is given in Fig. 6.11c (p. 143) as an example of resonance. Similar confusion is reflected in Fig. 8.41. In Fig. 6.11c, too, the equation purporting to show resonance within the molecule of quinone is obviously incorrect; the dipolar structure shown has two positive charges.

The relationship implied by the caption for Fig. 9.29 is at variance with the text. If the unsymmetrical dye shows a deviation in λ max., it would absorb at some shorter wave-length than the mean of the values of λ max. of the related symmetrical dyes, whereas the caption is so worded that the unsymmetrical dye appears to absorb at *longer* wave-length than either of the symmetrical dyes. Actually none of these curves is that of a dye which contains a thiazole ring; they are the spectra of 1,1′-diethyl-2,2′-, 2,4′- and 4,4′-carbocyanine iodides, taken in the order A, B, C. Incidentally, the term "degeneracy" is used in Fig. 9.30 where "deviation" is meant.

Aside from these criticisms, however, this volume contains such a wealth of material that it may confidently be expected to appeal to a wide circle of readers.

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TEMPERATURE

Temperature Measurement. By ROBERT L. WEBER. Frontisp., x + 171 + 6 pp.; 3 pls. Ann Arbor, Mich.: Edwards Brothers, Inc. $2.50. 1941.

THE scope of the book is considerably broader than the title indicates; it might better have been called "Heat Measurements." There are chapters on heat transfer, radiation, calorimetry, thermal analysis and elementary thermodynamics. From the outside reader's point of view this is a defect, for none of these subjects can be treated in such brief chapters in more than a very condensed and—for the elementary student—inadequate way. On the other hand, the author, who is on the teaching staff of the School of Chemistry and Physics of Pennsylvania State College, may have found that his students were not getting, from other physics courses, a point of view or insight that he wished them to have on some of these subjects, and may have inserted them for local and practical reasons. Thirty pages are devoted to laboratory experiments intended for instruction.

The chapters that do hew to the line cover expansion thermometry, resistance thermometry, thermo-electric pyrometry, radiation (including optical) pyrometry, special methods of temperature measurement, measurement of extreme temperatures, the International Scale, temperature recorders and temperature control. The chapter on control, six pages long, can hardly do more than tell the student that there is such a thing as automatic control and hint at its complexity. It is a subject still badly in need of a good write-up.

The job of offset printing from typescript copy is quite satisfactory with the exception of illustrations of the half-tone variety, which are not well adapted to this method of reproduction.

This looks like a book that will be useful to any teacher or student concerned with measurements of energy and temperature.

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SPECIAL ARTICLES

DESTHIOBIOTIN[1]

DURING the work leading to the proof of structure of biotin,[2] a procedure devised for the hydrogenolysis of organic sulfides[3] was applied to biotin methyl ester.[4] The resulting product was named *desthiobiotin* methyl ester, and was formed from biotin methyl ester by the replacement of the sulfur atom in the molecule

[1] The authors wish to thank Dr. R. T. Major and the Research Staff of Merck and Company, Incorporated, for supplies of biotin. The authors also wish to express their appreciation to Dr. J. R. Rachele and R. C. Funk, Jr., for the microanalyses, and to Miss Carol Tompkins and Mrs. Glenn Ellis for technical assistance in the bioassays.

[2] V. du Vigneaud, SCIENCE, 96: 455, 1942.

[3] R. Mozingo, D. E. Wolf, S. A. Harris, and K. Folkers, *Jour. Am. Chem. Soc.*, 65: 1013, 1943.

[4] V. du Vigneaud, D. B. Melville, K. Folkers, D. E. Wolf, R. Mozingo, J. C. Keresztesy and S. A. Harris, *Jour. Biol. Chem.*, 146: 475, 1942.