

fused by the use of the microfarad with its numerical factor of 10^6 . As a matter of fact, the kilogram itself is too large for convenience in most scientific work. Both Dr. Campbell's proposal and that of the writer lose what was considered an advantage of the C.G.S. system, that the density of water is approximately equal to unity; so there is no choice on this point. A great convenience of the writer's proposal is that energy, power, force, mass and other quantities directly derived from them all have units larger than the C.G.S. units by the same factor 10^7 . This would result in great convenience in referring to existing tables of physical data, since the reader would only have to decide whether to introduce this single factor; whereas with Dr. Campbell's proposal factors of 10^{-2} , 10^{-3} , 10^{-5} and 10^{-7} are given in his Table I, and other factors would enter with subordinate quantities, such as pressure and density. It is believed by the writer that these conveniences far outweigh the inconvenience of a large unit of mass.

USE OF THE TRUE OHM

Dr. Campbell's proposal to use the international ohm, coupled with the use of the mechanical watt, requires many of the electrical quantities to be expressed in units which have never heretofore been employed. While it is true that these units differ to a very slight degree from either the international units or the true (practical) units, nevertheless it is felt that the results would be decidedly confusing. The writer's proposal is to use the true practical electrical units throughout, which is consistent with the mechanical watt. These units are all related to the C.G.S. electromagnetic units by factors which are exactly powers of 10; so that conversion from the C.G.S. electromagnetic system would be greatly facilitated. For engineering purposes, of course, the differences between the international electrical units, the practical electrical units and the electrical units proposed by Dr. Campbell are insignificant.

The units proposed by the writer seem to require a minimum of change from existing practice and yet to have the broad advantages of definitive units as expressed by Dr. Campbell. With the exceptions of the units for force and mass and their derivatives, these units are all in wide use at present. The complete system has for several years been employed by the writer in his electrical engineering classes² and for his own computation in fields where electrical and mechanical quantities continually occur together in a variety of ways.

In the writer's opinion, the most important con-

² See L. A. Hazeltine, "Electrical Engineering," The Macmillan Company (1924).

sideration in the introduction of a system of definitive units, assuming the units to be consistent and of reasonable magnitudes, lies in *the convenience of the transition from present practice*. The system proposed permits of a gradual adoption of the few new units, as fast as their advantageous features become appreciated; whereas Dr. Campbell's proposed system requires more radical changes.

L. A. HAZELTINE

STEVENS INSTITUTE
OF TECHNOLOGY

TIME MEASUREMENTS

THE fact that a watch keeps correct time over a period of twenty-four hours is not a sufficient indication of its accuracy in the measurement of short time intervals where the second hand is used. A slight misplacement of the watch dial may cause the pivot of the second hand to be located "off center," thus causing an error of as much as two seconds in measuring an interval of twenty, or twenty-five seconds. Readings on one half of the dial will be too short and those on the other half correspondingly too long.

A similar source of error may be looked for in any dial-reading instrument where particular care has not been taken in fixing the dial position.

RALPH G. DEMAREE

PASADENA, CALIFORNIA

ARTIFICIAL CULTIVATION OF FREE-LIVING NEMATODES

IN SCIENCE, N. S. Vol. 60, No. 1548 (Aug. 29, 1924), pp. 203-204, under the above title, Asa C. Chandler describes a method dependent on the standard culture-methods of bacteriology. So far as developed, this method does not apparently differ from that described by me in the *Trans. Amer. Mic. Soc.*, Vol. 24, pp. 89-102, 1 pl., 1903.

HAVEN METCALF

BUREAU OF PLANT INDUSTRY

SCIENTIFIC BOOKS

The Story of Early Chemistry. By JOHN MAXSON STILLMAN, late professor emeritus of chemistry, Stanford University, xiii + 566 pages, $5\frac{1}{2} \times 8\frac{1}{2}$ inches. D. Appleton and Co., New York, 1924, Price \$4.00.

THE amiable author of this scholarly volume (whose recent death was lamented by a host of friends) has long been known as a contributor to the history of medieval chemistry—more particularly of that transitional Paracelsian epoch which was contemporary with various other great movements of exploration, renaissance and reform. It was only natural, therefore,