[CONTRIBUTION FROM THE CHEMICAL LABORATORY OF HARVARD COLLEGE.]

THE METRIC STANDARD OF VOLUME.

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IT IS well known that the direct measurement of cubic capacity in terms of the unit of length is an extremely difficult process. For this reason the Physikalische-technische Reichsanstalt of Germany, the Bureau of Standards in the United States, and various other institutions and associations have decided to fix as the unit of volume the space occupied by a kilogram of water,[1] under the pressure of one atmosphere, at its temperature of greatest density. This liter is probably larger than the cubic decimeter by a perceptible amount—perhaps as much as the tenth of a cubic centimeter, although the most recent determinations make the error about a third of this quantity.[2]

Evidently, then, the cubic centimeter is not the thousandth part of a liter, but a quantity somewhat smaller than this thousandth part. It is true that the error is beyond the range of the accuracy of most analytical processes, but it is nevertheless an error.

In cases where there is vagueness of definition, or uncertainty of idea, an inexact designation is permissible, indeed unavoidable; but in cases like this, where the uncertainty of the idea has been removed by general consent, it seems to me more scientific to employ an exact designation. In the present case this seems especially desirable, since the exact designation is less cumbrous than the inexact one. The phrase "cubic centimeter" contains two words, six syllables, and fifteen letters, while on the other hand "milliliter" is a single word containing but four syllables and ten letters.

The only serious objections to the general use of this work seem to be, first the general use of the cumbrous inexact term, and secondly the fact that a certain merit undoubtedly exists in a designation which refers volume directly to length. Of

[1] The weight is corrected, of course, for the weight of displaced air.

[2] See for example Mendeléeff: *Proc. Roy. Soc.*, **59**, 143 (1895); also Ostwald-Luther: *Phys. Chem., Messungen*, p. 127 (1903); especially Chappius, *Proces-Verbaux Comité Internat. des Poids et Mes. 1903.*

these two objectons the first does not seem to me weighty. Indeed, I am inclined to think that the metric system would come into more general use if its nomenclature were simpler. The tendency in this direction is shown by the common use in Germany of the *Scheffel* (50 liters), the *Schoppen* (0.5 liter), the *Centner* (50 kilograms), and the *Pfund* (0.5 kilogram). If scientific men do not themselves adopt more convenient names, it is to be feared that in time the populace will make other propositions as unfortunate as Centner.

The second objection seems to me more weighty. Nevertheless, the same argument might be applied to the word *liter*. Why do we not call this volume a cubic decimeter? Simply because the founders of the metric system realized that the term was too cumbrous for convenient use. They were willing to sacrifice the advantage of having the dimension of length appear in the name, for the sake of convenience. When it is remembered, moreover, that in this country the volume is very often designated in writing, speaking and thinking by the unfortunate abbreviation "cc.", it is doubtful if the word milliliter will convey a less definite sense of dimension to many students than their present term.

On the whole, therefore, it seems to me that the arguments in favor of using the word milliliter are greater than those against it; and this note is written in order that the question may be brought for consideration before those who at present most use this unit of volume. Of course, general usage must in the end determine nomenclature, but it may not have occurred to every one that the word milliliter is not only a permissible term, but is also more exact and less cumbrous than the present usage of the phrase "cubic centimeter."

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THE ACTION OF LIQUEFIED AMMONIA ON CHROMIC CHLORIDE.

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JÖRGENSEN describes a number of compounds derived from chromic chloride by the action on chromous chloride of aqueous ammonia, ammonium chloride and subsequent oxidation.