The Bureau of Standards recently advised me that they did not know of any such publication, yet it seems that this would be one of the first requirements for a commercial change, and if it were now provided, might clear the way for the next step. The willingness of certain chemical manufacturers and dealers to furnish goods in metric quantities, does not amount to very much—it is easily done, and has been done automatically since the demand appeared, but a few more practical suggestions with the necessary tools (such as conversion tables as above) would greatly smooth the way in the eyes of the average business man, who is probably accounted the greatest opponent of the change.

HENRY PAUL BUSCH

CONCERNING THE ARTICLE "A NEW GRAPHIC ANALYTIC METHOD

IN an article entitled, "A New Graphic Analytic Method," in SCIENCE of October 7, 1921, Mr. R. von Huhn states a method of deriving the graph of a special case of a function of a function. Stated in more usual mathematical terms:

Given the curves that represent

$$y = kx + m,$$
$$z = hy + n,$$

the curve that represents the resulting equation

$$z = lx + q$$

is drawn.

Essentially the same method, in a far more general form, and in a more usual mathematical formulation has been given by several mathematicians. See the articles by E. H. Moore, "Cross-section paper as a mathematical instrument," in *The School Review,* May, 1906, and by A. Kempner, "Some hints on plotting graphs in analytic geometry," in *The American Mathematical Monthly,* Vol. XXIV, pp. 17-21, and, in particular, the more specific article by W. H. Roever, "Graphical constructions for a function of a function and for a function given by a pair of parametric equations," in *"The American Mathematical Monthly,* Vol. XXIII, pp. 330-333. E. R. Hedrick has suggested the modification of transferring points from one of the two like-named axes to the other by means of a 45° triangle and he has also emphasized the geometric interpretation of the operation as that of finding the projection on the plane xy of the intersection of the two cylindrical surfaces

$$F(x, y) = 0, \qquad \Phi(y, z) = 0$$

This perfectly general problem was well-known to mathematicians and hence the special case treated in the article mentioned above can not be regarded as novel.

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SPECIAL ARTICLES

THE PROPERTIES OF ELEMENTS AND SALTS AS RELATED TO THE DIMENSIONS OF ATOMS AND IONS[1]

(An Application of Geometry to the Study of Inorganic Chemistry)

RECENTLY great interest has been aroused in connection with the determination of the dimensions of atoms and ions by various methods; particularly that of X-ray crystal analysis,—by Bragg, Landè, Hull, Davey, and others. Very recently Fajans and Grimm, and later Biltz and also Henglein have pointed out that there is a very simple linear relation between the volume of certain series of salts and the atomic volumes of their constituents. Six years ago Professor W. D. Harkins and the writer began work upon what are known as complex chemical compounds, such as ammines and hydrates, in an attempt to show *that a large number of the properties of these compounds, as well as those of simple salts, are very simply related to the sizes of the atoms, atomic groups, and ions, from which the salts are built.* This point of view has now been developed in considerable detail by the writer. *The simplicity of the relation is apparent when it is realized that for a number of groups in the periodic system of the most common elements, as many as 35 properties of their simple compounds have been found to be related in a linear way to the atomic and ionic volumes of*

[1] From an address presented at the University of Chicago in December, 1921, and to the Harvard-Technology Chemical Club in January, 1922.