THE CHEMICAL TABLES FOR THE CALCULATION OF QUANTITATIVE ANALYSIS OF H. ROSE

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649350124

The Chemical Tables for the Calculation of Quantitative Analysis of H. Rose by William P. Dexter

Edited by Trieste Publishing Pty Ltd.
Cover @ 2017

www.triestepublishing.com

WILLIAM P. DEXTER

THE CHEMICAL TABLES FOR THE CALCULATION OF QUANTITATIVE ANALYSIS OF H. ROSE

Trieste

TABULÆ ATOMICÆ.

THE

CHEMICAL TABLES

FOR THE

CALCULATION OF QUANTITATIVE ANALYSES

Heinrich

OF H. ROSE.

RECALCULATED FOR THE MORE RECENT DETERMINATIONS OF ATOMIC WEIGHTS, AND WITH OTHER ALTERATIONS AND ADDITIONS.

BY WILLIAM P. DEXTER.

BOSTON:
CHARLES C. LITTLE AND JAMES BROWN.
1850.

CAMBRIDGE:
STEREOTYPED BY METCALF AND COMPANY,
PRINTERS TO THE UNIVERSITY.

PREFACE.

THE Tables contained in the present work are those appended by M. H. Rose, of Berlin, to his celebrated Manual of Analytical Chemistry: they have been found convenient, and have been extensively used by European chemists. Since the publication of his treatise, the atomic weights of a number of the elements have been determined with greater precision, and it has become necessary in consequence to recalculate the Tables for the advance made in this branch of the science. In undertaking this labor, I have endeavoured to choose those atomic weights which rest upon the most trustworthy researches, and which have been most generally received by chemists. In several instances in which more recent determinations might have been taken, it has seemed to me advisable to retain the older numbers.

As the value of a work of this kind depends entirely upon its correctness, I may state that every calculation was performed by myself, *both by direct division and by the use of logarithms.* The columns of multiples were computed separately by myself and another, and our results compared both before and after they were transcribed. Finally, to avoid as far as possible errors of the press, each sheet, besides the usual correction, has been most carefully revised by myself.

Such additions to the Tables have been made as were required by the progress of analytical chemistry. I have likewise added a table of the equivalent numbers of the elements and principal compounds, with their logarithms and chemical symbols. The column of logarithms is my own, and I am not aware that a table has been before prepared for this mode of performing the calculation. In Rose's work, under *chlorine* and *sulphur* are given the composition of all the combinations of these bodies; but as they occupy much space, and are of comparatively little practical use, I have omitted the greater part of these articles.

In the construction of the Tables the Latin terms have been preferred, as being the common language of science, and as better adapted than the English to express the degrees of chemical combination.

W. P. D.

BROOKLINE, Mass., *June* 17, 1850.

INTRODUCTION.

I. *The Atomic Weights used.*

The atomic weights employed in the following Tables are for the most part those adopted by Berzelius in the last edition of his Chemistry. In some few instances there has seemed reason for preferring the results of later experimenters, or for a different calculation of former analyses. In every case in which an equivalent differing from that given by Berzelius has been assumed, a particular explanation of the cause of departing from so high an authority has been subjoined.

In accordance with the views of this chemist, the theory by which the atomic weights of the elements are exact multiples of that of hydrogen, has not been followed; and the equivalents have been given as derived directly from the results of experiment, without allowance by calculation for the weight of the air displaced.

The equivalents of chlorine, hydrogen, and the other bodies of that class, as also of phosphorus, arsenic, antimony, and bismuth, have been taken to represent the weight of the atom; the same has been done with respect to gold, the atom of which is halved by Berzelius, that its weight may correspond with the specific heat of the metal. Aluminium, glycium, and zirconium are the only remaining elements which combine solely by double atoms. The constitution of the compounds of the last two is not, as yet, established with certainty; the isomorphous relations of alumina forbid the supposition that it contains but a single atom of radical.

The atomic weights of *chlorine*, *potassium*, and *silver* are those of Marignac, as revised by Berzelius; they differ from the numbers given in the Annual Report by the omission of a series of analyses of chlorate of silver, by which M. Marignac designed to control the results furnished by the chlorate of potash, and also in not being reduced to a vacuum. The numbers thus revised have been adopted by Rammelsberg.

The equivalent of *hydrogen* was fixed by Berzelius at 12.48; and "this result," he says, "is confirmed by comparison of the specific gravities of oxygen and hydrogen." The later and very accurate experiments of Dumas gave from 12.48 to 12.57, the mean being 12.51. In consequence of its proximity, the multiple 12.50 was adopted. If now the equivalent be calculated from Regnault's determinations of the specific gravity of oxygen and hydrogen, a number 12.53 will be obtained, falling entirely within the limits of the experiments of Dumas, and approaching more nearly the equivalent assumed by him than that of Berzelius. For this reason, it has been thought advisable to take 12.50 for the equivalent of hydrogen.

The equivalent of *carbon* is deduced by Berzelius from the densities of carbonic acid and carbonic oxyde gases. The direct and concordant determinations of Dumas, and of Erdmann and Marchand, seem to merit the preference; by which, in the language of Professor Graham, "the equivalent of carbon has been reduced, with the general concurrence of chemists, to 75."

The atomic weights of several bodies have recently been determined by Pelouze, by the amount of a standard solution of nitrate of silver required for the complete precipitation of their chlorides. The number given for *arsenic* was thus obtained: it is the mean of three concordant analyses, and agrees perfectly with the specific gravity of arsenietted hydrogen obtained by Dumas.

Berzelius determined the equivalent of *phosphorus* from the silver which a given weight of it reduced.* The number so obtained dif-

* In the calculation of this experiment an error seems to have been committed. The atomic weight of phosphorus is given as 392.041; it should be 391.72.

fers considerably from that given by Pelouze (400.3), and agrees much better with Rose's determination of the sp. gr. of phosphuretted hydrogen. On this account, and because there is reason to suspect that in Pelouze's experiments some of the silver may have been reduced by the phosphorus, the number assigned by Berzelius has been retained.

The equivalent of *silicium* obtained by Pelouze differs so much from that given by Berzelius, that it was thought advisable not to adopt it until it should have been more generally received by chemists. The table under the head of Silicium has been calculated for both these numbers; but where this element occurs in other places, the determination of Berzelius has been taken. The atomic weight is now derived by him from the direct oxydation of silicium; it was before deduced from the composition of the silicofluoride of barium, and was dependent, of course, upon those of fluor and barium. In this way the equivalent was found, on the supposition of three atoms of oxygen in silicic acid, equal to 277.312. Experiments by direct oxydation gave 277.778, which is the number here adopted.

For *sodium* the mean result of three concordant and apparently exact experiments of Pelouze has been taken. The number given by Berzelius is founded upon one experiment, in which he ascertained the chloride of silver obtained from a given weight of chloride of sodium.

Stromeyer and Pelouze determined the atomic weight of *strontian* by the analysis of the chloride. The former obtained 545.929; the latter, 548.4256. The mean, 547.177, is the number used.

Marignac has lately given determinations of the atomic weights of barium, cerium, lanthanium, and didymium.

By the method employed by Pelouze he obtained 857.32, as the mean of six experiments, for the equivalent of *barium*. It had been previously determined by Pelouze at 858.01; and by Berzelius, from the composition both of the chloride and the sulphate, at 855.40.

The equivalents of *cerium*, *lanthanium*, and *didymium* were de-