The Atomic Mass of Tungsten.

By Edgar F. Smith and En. D. Desi.

(*Read before the American Philosophical Society, November 2, 1894*).

Most of the experiments made to determine this constant consist in reduction of the trioxide and the subsequent oxidation of the metal. Two experimenters have attempted to weigh the water produced in the reduction of the trioxide. A. Riche (*Annal de Chim. et de Phys.*, (3) *50*, 10, 1857) made five such trials. The atomic mass of tungsten, deduced from his experiments, equals 174 (O=16). Three years later Bernoulli (*Pogg. Ann.*, iii, 599) made two experiments and his recorded value for the constant is 186+. In both instances there is considerable variation in the individual results.

In a previous paper by Pennington and Smith a value (184.9) was obtained that differs quite appreciably from that usually accepted as representing the true atomic mass of the element under discussion. We have undertaken in this present investigation to determine the atomic value from the quantity of water formed in the reduction of the trioxide chiefly for the purpose of ascertaining whether the elimination of the last traces of molybdenum would likely produce the great rise in atomic mass. It will be remembered that great stress was laid upon this point by Pennington and Smith. In the preparation, therefore, of our trioxide we adhered closely to their method of purification and observed all precautions laid down by them. For details, therefore, we would refer the reader to their paper.

The hydrogen used by us in the reductions was prepared from sulphuric acid and the purest zinc obtainable. To purify the gas it was conducted through a series of bottles containing potassium permanganate, an alkaline lead nitrate solution, silver nitrate, caustic potash, sulphuric acid, calcium chloride, and finally through a glass tube nine inches long, filled with bright, polished iron wire. The latter was heated constantly with a Bunsen burner. After this the gas was admitted to the tube where it came in contact with the ignited trioxide, contained in a platinum boat. The water produced in the reduction was collected in a weighed, glass-stoppered U-tube, filled with anhydrous calcium chloride. A similar tube was attached to this to prevent absorption of moisture from the surrounding atmosphere.

All weighings were reduced to the vacuum standard, and in the calculations oxygen was taken as *16* and hydrogen as 1.008 (Clarke).

Results.

WO_3	H_2O	AT. MASS W.
0.983024	0.22834	184.683
0.998424	0.23189	184.709
1.008074	0.23409	184.749
0.911974	0.21184	184.678
0.997974	0.23179	184.704
1.007024	0.23389	184.706
	Mean.....	184.704

Maximum.....	184.749
Minimum.....	184.678
Diff.....	.071

The mean *184.704* falls below that given by Pennington and Smith. The discrepancy may possibly be due to the method, or the personal factor entering into the work may account for it. However, the result we believe clearly proves that the atomic mass of tungsten is certainly greater than what is generally assumed as correct, and in all likelihood the molybdenum contained in the tungsten has caused the low values found by previous experimenters.*

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Notices of Presumably Undescribed Infusoria.

By Dr. Alfred C. Stokes.

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Salpingœca globosa, sp. nov. (Fig. 1).—Lorica pedicellate, carafe-shaped, the body subspherical, tapering at the posterior extremity to the pedicle; neck conspicuous, about one third as long as the body of the lorica, the margin flaring; pedicle often oblique, somewhat flexuous, and about as long as the entire lorica. Solitary. Length, $\frac{1}{2250}$ inch. *Hab.*—Fresh water, near Trenton, N. J.; attached to filamentous algæ.

Salpingœca collaris, sp. nov. (Fig. 2).—Lorica vasiform, less than four times as long as broad, but divisible by its characteristic contour

*A review of all the methods heretofore used in determining the atomic mass of tungsten has been begun by one of my assistants. Care is being taken to completely eliminate certain sources of error which have not been absolutely excluded in earlier work. —E. F. S.