THE VOLUMETRIC COMPOSITION OF WATER.

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(*Abstract.*)

Gay-Lussac and Humboldt made ten experiments on the volumetric composition of water, with a mean error of $\frac{1}{250}$. Scott made at least twenty-five experiments, but without reducing the mean error.

The author was engaged in the same determination before Scott's papers appeared. After much labor he was able to procure hydrogen in which no impurity was present except nitrogen; he constructed an apparatus by which it was possible to detect and measure this residual impurity with a mean error less than $\frac{1}{100000}$; and finally he obtained hydrogen in which no nitrogen could be detected. Oxygen, by use of a similar apparatus, could be examined as rigorously; and finally was obtained with no impurity amounting to $\frac{1}{100000}$.

With gases containing no impurity, or containing only a known amount of a known impurity, twenty experiments have been made on the volumetric composition of water, besides four experiments which were lost, two by oxidation of mercury in the eudiometer, and two by accident to the apparatus during an experiment. Of these twenty results, the maximum was 2.00047; the minimum, 2.00005; and the mean, 2.00023. The mean pressure at which the measurements were made was 71 c.m. If, then, oxygen and hydrogen be measured at about the atmospheric pressure, the ratio in which they combine differs from an integral ratio by about one nine-thousandth part. The mean error of a determination was $\frac{1}{26000}$.