

THE ATOMIC WEIGHT OF CESIUM

Sir:

Some years ago about four kilograms of cesium nitrate was extracted from pollucite and fractionally crystallized in the hope of concentrating an alkali element of higher atomic weight [Baxter, *THIS JOURNAL*, **37**, 286 (1915)]. This hope was not realized. A part of the fourth and fifth less soluble fractions of the last (18th) series of this crystallization which together amounted to 1200 g. have been further purified by three crystallizations as perchlorate, and, after conversion to chloride and fusion, by three crystallizations as chloride, all in platinum. The product was tested spectrographically in an arc formed by pure copper electrodes and was found to be wholly free from rubidium and potassium so far as could be seen. Analysis was then carried out by fusing the chloride in a weighed platinum boat in a quartz bottling apparatus and then comparing the salt with silver nephelometrically. In Analyses 1 and 2 the fusion atmosphere was nitrogen, in Analyses 3 and 4 the fusion atmosphere was hydrogen containing a small proportion of hydrogen chloride, while in Analysis 5 it was hydrogen only. The close agreement of the results seems to indicate that cesium chloride shows no tendency to become basic under these conditions nor to retain hydrogen chloride.

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| Analysis | CsCl in vacuum, g. | Ag in vacuum, g. | Ratio CsCl:Ag | Atomic wt. of cesium |
|----------|--------------------------|------------------------|------------------|-------------------------|
| 1 | 8.96291 | 5.74296 | 1.56068 | 132.91 |
| 2 | 9.60983 | 6.15751 | 1.56067 | 132.91 |
| 3 | 9.70288 | 6.21686 | 1.56074 | 132.92 |
| 4 | 9.53125 | 6.10708 | 1.56069 | 132.91 |
| 5 | 7.52304 | 4.82025 | 1.56072 | 132.91 |
| | | | Average 1.56070 | 132.91 |

The atomic weight found in our experiments is about 0.1 unit higher than that found by Richards and Archibald [*Proc. Am. Acad. Arts Sci.*, **38**, 443 (1903)] and Richards and Françon [*THIS JOURNAL*, **50**, 2162 (1928)], a difference which we can explain only by suggesting that the material used by these experimenters may not have been wholly free from rubidium and potassium, only 0.2% of even the former of which would be necessary to explain the discrepancy.

It is interesting that Aston [*Proc. Roy. Soc.*, (London) **A134**, 571 (1932); *Phil. Mag.*, **42**, 436 (1921)] and Bainbridge [*J. Franklin Inst.*, **212**, 317 (1931)] agree that cesium is a simple element and that Aston calculates from measurements of its packing fraction (-5×10^{-4}) an atomic weight of 132.917, using the conversion factor, 1.000125. With the factor 1.00022, cesium becomes 132.904. Our result therefore appears to remove the

chief discrepancy between atomic weights determined by physicochemical methods and those obtained from mass-spectrographic data.

We expect to continue work on this problem.

COOLIDGE MEMORIAL LABORATORY
HARVARD UNIVERSITY
CAMBRIDGE, MASSACHUSETTS

G. P. BAXTER
J. S. THOMAS

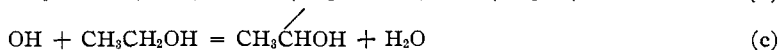
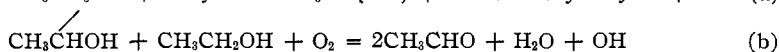
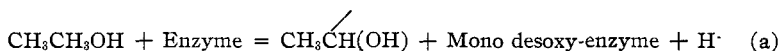
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THE HABER-WILLSTÄTTER CHAIN MECHANISM OF ORGANIC AND ENZYMOLOGICAL PROCESSES

Sir:

Haber and Willstätter [*Ber.*, **64**, 2844 (1931)] have proposed chain mechanisms for a number of organic and enzymotic processes of which we may cite the oxidation of alcohol as typical. Their reaction scheme is



A similar chain can be set up for aldehyde oxidation. We have attempted to verify such a mechanism, starting the chain of processes at stage (c) by decomposing hydrogen peroxide photochemically in mixtures of alcohol and oxygen suitably agitated. We find that the photo-decomposition of peroxide markedly sensitizes the interaction of alcohol and oxygen. The oxidation process is a chain reaction, sensitive to inhibitors but the chain length is short. It is much shorter than the assumed chain length ($\sim 10^5$) in the communication of Haber and Willstätter. Dilute aqueous aldehyde solutions behave similarly and the chain length is somewhat longer. The detailed results will be communicated immediately.

DEPARTMENT OF CHEMISTRY
PRINCETON UNIVERSITY
PRINCETON, N. J.

HUGH S. TAYLOR
AUSTIN J. GOULD

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ORIENTATION IN THE FURAN NUCLEUS

Sir:

The introduction of an aldehydic group into 3-methylfuran, by means of hydrogen cyanide and hydrogen chloride, results in the formation of 3-methyl-2-furfural [Reichstein, Zschokke and Goerg, *Helv. Chim. Acta*, **14**, 1277 (1931)]. The nitro- β -methylfuran obtained from 3-methylfuran by the action of fuming nitric acid in acetic anhydride has been shown to be 3-methyl-2-nitrofuran [Rinkes, *Rec. trav. chim.*, **49**, 1125 (1930)] by comparison with an authentic specimen kindly provided by Dr. I. J. Rinkes.